Gastrointestinal Radiology

ED023

CME Learning Checkpoint Exhibit ED023 (Neoplastic Diseases of Duodenum)

All Day Room: Case of Day, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

Participants

Yong-Soo Kim, MD, PhD, Guri City, Korea, Republic Of (*Presenter*) Nothing to Disclose
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ED029

CME Learning Checkpoint Exhibit ED029 (Dect Applications in the Liver: All You Need to Know)

All Day Room: Case of Day, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

Participants

Avinash R. Kambadakone, MD, Boston, MA (*Presenter*) Nothing to Disclose
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Dushyant V. Sahani, MD, Boston, MA (*Abstract Co-Author*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc
Andrea Prochowski Iamurri, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

GI001-EB-X

Acute Mesenteric Ischaemia: Imaging Presentation of Common and Rare Findings and Differential Diagnoses

All Day Room: GI Community, Learning Center

Participants
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Norbert Hosten, MD, Greifswald, Germany (*Abstract Co-Author*) Institutional research agreement, Siemens AG; Institutional research agreement, Bayer AG; Stockholder, Siemens AG

TEACHING POINTS

1. Review etiology, diagnosis and therapeutic options of acute mesenteric ischaemia.2. Outline its common direct and indirect imaging presentation.3. Illustrate case-based rare findings and differential diagnoses.

TABLE OF CONTENTS/OUTLINE

Background on Acute Mesenteric Ischaemia- Etiology- Imaging Techniques- Therapeutic OptionsCommon Imaging Presentation of Acute Mesenteric Ischaemia- Direct Signs of Acute Mesenteric Ischaemia- Indirect Signs of Acute Mesenteric IschaemiaRare Findings – Differential Diagnoses Radiologists Should ConsiderConclusion

GI002-EB-X

Inside Out: Ductal Morphology in Characterization of Pancreatic Pathology

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
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TEACHING POINTS

Different pancreatic duct appearances are predictive of pancreas disease processes. Multiple ancillary findings associated with ductal anomalies help with pancreatic disease diagnosis.

TABLE OF CONTENTS/OUTLINE

Embryology, normal anatomy, and variants of the pancreatic ductal system. Pattern recognition Inflammatory Acute pancreatitis: invisible/compressed duct secondary to an inflamed pancreas Chronic pancreatitis: areas of duct stricture and dilatation in an atrophied pancreas +/- parenchymal and intraductal calcifications Autoimmune pancreatitis: multifocal duct narrowing and loss of pancreatic lobulations +/- pseudocapsule Neoplastic Primary ductal – 1) Main-duct Intraductal Papillary Mucinous Neoplasm (IPMN): dilated main duct without strictures +/- side branch dilatation and intraductal papillary projections; 2) Branch-type IPMN; 3) Mixed-type IPMN Adenocarcinoma: duct dilatation upstream to the infiltrative lesion and normal duct downstream +/- common bile duct dilatation for pancreatic head lesions Neuroendocrine and other rare variants: mild dilation from extrinsic mass effect without direct invasion. Atypical presentation with intraductal masses Metastases – e.g. renal cell, lung, breast: mild irregularity of the duct without dilation Post-surgical – e.g. Post Whipple and Fray

GI003-EB-X

Identification of Atypical Presentation of Pancreatic Neuroendocrine Tumor (NET)

All Day Room: GI Community, Learning Center

Participants
Wu S. Liu, DO, Tucson, AZ (*Presenter*) Nothing to Disclose
Bobby T. Kalb, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Hina Arif Tiwari, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Ferenc Czeyda-Pommersheim, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
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Diego R. Martin, MD, PhD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
James R. Costello, MD, PhD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

NETs with atypical imaging features challenge the most experienced radiologists. By sharing atypical presentations of NETs, we hope to increase imaging accuracy and early diagnosis. The spectrum of NET presentations include: typical solid NET, atypical solid NET, cystic NET. Dynamic contrast-enhanced magnetic resonance imaging and diffusion weighted imaging provide powerful imaging tools. Most NETs are hyper-vascular with typical MRI features: hypointense to background pancreas on pre-contrast imaging, robust enhancement on arterial phase, marked restricted diffusion on DWI. Atypical presentations of NETs can include both solid and cystic variants. Solid tumors can demonstrate hypointensity on pre-contrast imaging which becomes isointense to background pancreas on arterial phase. Since expectations predict the mass to be hyperintense to background pancreas, this enhancement pattern can confound even the most skilled radiologists. Equally challenging are cystic neuroendocrine tumors which can closely resemble such mimics as pseudocysts, solid pseudopapillary tumors, ductal adenocarcinomas with cystic features, pancreatic IPMNs, and mucinous cystadenomas.

TABLE OF CONTENTS/OUTLINE

- MRI techniques- Solid typical NET MRI features- Atypical NET MRI features- Cystic NET MRI features- MRI features of NET mimickers

GI004-EB-X

Clinical Challenges and Images of Incidental Splenic Masses: How Much Do You Know Regarding Splenic Tumors and Mimickers?

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Awards
Identified for RadioGraphics

Participants
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Yong-Yeon Jeong, MD, Chonnam, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To overview imaging findings of various splenic tumors and mimickers2. To illustrate radiologic-pathologic correlation in various splenic tumors and mimickers3. To discuss differential points to help discriminate among various splenic tumors and mimickers

TABLE OF CONTENTS/OUTLINE

1. Classification of splenic neoplastic and non-neoplastic lesions2. Clinical challenges and images 1) Case 1: Metastasis 2) Case 2: Pseudocyst 3) Case 3: Hamartoma 4) Case 4: Hemangioma 5) Case 5: Microabscess 6) Case 6: Angiosarcoma 7) Case 7: Epithelial cyst 8) Case 8: Lymphangioma 9) Case 9: Splenic abscess 10) Case 10: Hemangiomatosis 11) Case 11: Splenic infarction 12) Case 12: Malignant lymphoma 13) Case 13: Invasive aspergillosis 14) Case 14: Intraparenchymal hematoma 15) Case 15: Malignant fibrous histiocytoma 16) Case 16: Sclerosing angiomatoid nodular transformation3. Review of cases 1~16 with radiologic-pathologic correlation4. Summary of useful radiologic findings to help discriminate among various splenic tumors and mimickers5. Suggested algorithms for narrowing differential diagnosis of various splenic tumors and mimickers

GI005-EB-X

How To Differentiate Cystic Pancreatic Lesions: A Pictorial Review with Pathologic Correlation

All Day Room: GI Community, Learning Center

Participants
Suraj J. Kabadi, MD, Charlottesville, VA (*Presenter*) Nothing to Disclose
Arun Krishnaraj, MD, MPH, Charlottesville, VA (*Abstract Co-Author*) Nothing to Disclose
Eduard E. DeLange, MD, Charlottesville, VA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Illustrate the imaging features of various cystic pancreatic lesions, specifically pseudocyst, serous cystadenoma, mucinous cystic neoplasm, solid and pseudopapillary neoplasm, and side-branch and main duct intraductal papillary mucinous neoplasm Highlight the demographics, pathologic appearance, and cyst aspiration profiles characteristic of each lesion Review the malignant potential and management of each lesion

TABLE OF CONTENTS/OUTLINE

1. A review of the imaging features on CT and MRI of the following cystic pancreatic lesions with a focus on how demographics and other contributory patient data can help favor a diagnosis Pseudocyst Serous cystadenoma Mucinous cystic neoplasm Solid and pseudopapillary neoplasm Side-branch intraductal papillary mucinous neoplasm Main duct intraductal papillary mucinous neoplasm Other miscellaneous cystic lesions2. A brief review of the gross pathologic features and microscopic features of each lesion3. Correlation of cyst aspiration profiles associated with each lesion, with an emphasis on CEA, CA 19-9, mucin, and amylase/lipase4. A review of the natural history of each lesion, malignant potential, and management algorithms

GI006-EB-X

Imaging Presentations of Pancreatic Neuroendocrine Neoplasms

All Day Room: GI Community, Learning Center

Participants
Mirko D'onofrio, MD, Verona, Italy (*Presenter*) Nothing to Disclose
Valentina Ciaravino, MD, Verona, Italy (*Abstract Co-Author*) Nothing to Disclose
Nicolo Cardobi, Verona, Italy (*Abstract Co-Author*) Nothing to Disclose
Paolo Tinazzi Martini, MD, Peschiera del Garda, Italy (*Abstract Co-Author*) Nothing to Disclose
Riccardo De Robertis, MD, Verona, Italy (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To show different typical and atypical, common and uncommon, rare and very rare imaging presentations of pancreatic neuroendocrine neoplasms. The images cases will be presented with multimodalities approaches and pathologic correlations to justify and explain the presented features.

TABLE OF CONTENTS/OUTLINE

Pancreatic neuroendocrine neoplasms usually present as hypervascular masses. More rarely can be hypovascular making the differential diagnosis in respect to ductal adenocarcinoma very difficult or impossible. Many other presentations of pancreatic neuroendocrine neoplasms are possible because the lesions can be cystic, necrotic or calcified. Moreover these tumors can be single or multiple involving different site of the pancreatic gland. Regarding the growth patterns the pancreatic neuroendocrine neoplasms can involve vessels by infiltration or colonization of the vascular lumen that is quite typical of this pancreatic tumor hystoptype. Finally the pancreatic neuroendocrine tumors can spread to other sites with few organ or multi-organ metastatic diffusion.All these aspects will be shown and explained to improve radiologist knowledge to diagnose and stage pancreatic neuroendocrine neoplasms.The radiologist should be aware of all these possible presentations to better diagnosis, report and manage each every single case.

GI007-EB-X

Evaluation of Subepithelial Lesions of Stomach with Three-dimensional Multi-detector CT Gastrography: Emphasis on Differential Diagnosis

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

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Yong-Yeon Jeong, MD, Chonnam, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To list common and uncommon gastric subepithelial lesions (SELs)2. To correlate imaging features of various gastric SELs in CT gastrography with endoscopy and EUS3. To discuss differential diagnosis of various gastric SELs

TABLE OF CONTENTS/OUTLINE

A. IntroductionB. Frequency and location of various SELs in stomachC. Diagnostic approach to gastric SELs 1. Comparison among conventional endoscopy, EUS and CT gastrography 2. Role of CT gastrography for evaluation of gastric SELs 3. Comprehensive guidelines for imaging diagnosis of SELsD. Imaging findings of various SELs in CT gastrography with endoscopic and EUS correlation 1. True neoplasiaa. GIST, b. leiomyoma, c. schwannoma, d. glomus tumor, e. lipoma, f. hemangioma, g. inflammatory fibroid polyp, h. carcinoid tumor 2. Non-neoplastic lesionsa. ectopic pancreas, b. gastritis cystica profunda, C. varices3. Diagnostic pitfallsE. Summary of useful imaging findings in differential diagnosis of various SELs in stomachF. Suggested diagnostic algorithms for various gastric SELs

GI008-EB-X

Accurate Magnetic Resonance Imaging Diagnosis of Splenic Pathology

All Day Room: GI Community, Learning Center

Participants
Viral Patel, DO, Tucson, AZ (*Presenter*) Nothing to Disclose
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James R. Costello, MD, PhD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Advanced magnetic resonance imaging (MRI) provides a powerful imaging tool for the accurate diagnosis of splenic pathology. Splenic findings present frequently as an incidental observation, and advanced MRI techniques provide valuable insight to generate an accurate imaging description. Advanced MRI techniques rely upon traditional T2w and T1w imaging in addition to such functional imaging techniques as diffusion weighted imaging and spectroscopic evaluation of fat and iron content. MRI frequently provides an additional component of soft tissue contrast which eludes traditional CT imaging. More importantly, MRI helps not only to distinguish between benign and malignant etiologies but also to provide an accurate and specific description of often confused diagnostic considerations.

TABLE OF CONTENTS/OUTLINE

Advanced MRI techniques
Congenital variants of the spleen on commonly acquired MR sequences
Overview of disease processes affecting the spleen: Heterotaxy Syndrome with Left Isomerism Abscess & Microabscesses Sarcoidosis Hematologic (Sickle Cell Disease, Extramedullary Hematopoiesis, Gaucher Disease, Hemosiderosis) Chronic liver Disease with Stigmata of Portal Hypertension Laceration Infarct Splenic Cyst Hydatid Cyst Hemangioma Hamartoma Lymphangioma Lymphoma Angiosarcoma Metastatic disease including periserosal implants

GI009-EB-X

Cystic Lesions of Upper Gastrointestinal Tract

All Day Room: GI Community, Learning Center

Participants
Youngseo Cho, MD, Kuri, Korea, Republic Of (*Presenter*) Nothing to Disclose
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Sanghyeok Lim, MD, Gyeonggi-do, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To review CT findings of various cystic lesion involving stomach and duodenum
2. To correlated with CT, endoscopic, endoscopic ultrasonography and pathologic findings of various cystic diseases of stomach and duodenum

TABLE OF CONTENTS/OUTLINE

Cystic lesion in the stomach and duodenum are rare disease entity. Most of cystic lesions are benign lesions and their imaging features look very similar. Patients have various chief complains such as nonspecific abdominal pain, bowel obstruction, bleeding, and associated malignancy. We will show the CT and endoscopic ultrasonographic findings of cystic lesion in the upper GI and correlate these features with pathologic findings. We demonstrate diverse cystic lesions in stomach and duodenum classified as follows;1. Congenital lesions (bronchogenic cyst, duplication cyst and ectopic pancreas)
2. Inflammatory lesions (gastritis cystica profunda, Tuberculosis, pancreatic pseudocyst and anisakiasis)
3. Neoplasms (lymphangioma, cystic degeneration of GIST and mucinous adenocarcinoma)
4. Miscellaneous lesions (Brunner's gland cyst, trauma related submucosal hematoma and gossypiboma)

GI011-EB-X

Yellow Alert Simply Noting at the Bedside: Early Detection of Complication Following Liver or Pancreas Transplantation Using Contrast-enhanced US

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Ran Kim, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
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Won Jae Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Samsung Electronics Co, Ltd

TEACHING POINTS

Contrast-enhanced US (CEUS) is very useful to detect early vascular complications after transplantation at the bedside and enable to take action immediately. The purposes of this exhibit are :1. To review early complications of liver and pancreas transplantations.2. To understand the complexity of vascular anatomy after pancreas transplantation.3. To demonstrate various early complications after liver or pancreas transplantation using CEUS.

TABLE OF CONTENTS/OUTLINE

A. Liver transplantation - Strength of CEUS - Indication/protocol of CEUS after LT - Early complications of liver transplantation * Hepatic artery thrombosis * Hepatic artery stenosis * Liver ischemia and infarction * Portal vein thrombosis or stenosis * Inferior vena cava and hepatic vein thrombosis or stenosis * Hyperemia or congestion due to hepatic vein occlusion * Hematoma with active bleedingB. Pancreas transplantation - Complexity of vascular anatomy following the pancreas transplantation - Early complications of pancreas transplantation * Vascular graft thrombosis or stenosis * Stricture of duodeno-cystostomy * Graft rejection

GI012-EB-X

Variable Injection Parameters in Contrast-Enhanced CT: Theory and Clinical Application of the Variable-Injection Method

All Day Room: GI Community, Learning Center

Participants

Kazuaki Terasawa, PhD, Saitama-Shi, Japan (*Presenter*) Nothing to Disclose
Tomoyuki Ogata, RT, Saitama, Japan (*Abstract Co-Author*) Nothing to Disclose
Tomohiro Tsukimata, RT, Nagano-Shi, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

A contrast method can change around weight and time only with two parameters, the amount of iodine (mgI/kg/s), and injection duration time (s). From this, in order to change the contrast enhancement effect, the clinical application by the theory of a variable-injection method and it which used the variation factor (an injection end rate / injection start rate) as the 3rd parameter was considered.

TABLE OF CONTENTS/OUTLINE

The components of the contrast material flow phantom (TEC phantom).1) Plastic water tank; Contrast material is injected into (1)2) Flow pump3) Flow meter4) Water-filled acrylic cylinder5) Closed metallic tank6) Connecting tubeContrast material was circulated with the pulsatile flow pump at a rate of 60 pulses per minute.

GI013-EB-X

Staging and Response Assessment in Pancreatic Cancer: Images Advances and Updates

All Day Room: GI Community, Learning Center

Participants

Vinit Baliyan, MBBS, MD, Boston, MA (*Presenter*) Nothing to Disclose
Hamed Kordbacheh, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Dushyant V. Sahani, MD, Boston, MA (*Abstract Co-Author*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc
Avinash R. Kambadakone, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this educational exhibit is: To review the current role of imaging in staging of pancreatic cancer Imaging Role of advanced Imaging techniques in pancreatic cancer To discuss recent advances and updates in imaging of pancreatic cancer To highlight key imaging features of pancreatic cancer staging using an interactive quiz based format

TABLE OF CONTENTS/OUTLINE

Updates of technical advances (Dual energy CT, Diffusion weighted MRI) Discuss current criteria and updates in assessment of pancreatic cancer resectability Prognostic markers and predictors of treatment response on Imaging Interactive case-based imaging quiz to highlight role of imaging in pancreatic cancer Answers and explanations

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Dushyant V. Sahani, MD - 2012 Honored Educator
Dushyant V. Sahani, MD - 2015 Honored Educator
Dushyant V. Sahani, MD - 2016 Honored Educator

GI014-EB-X

The Dilemma and Pitfalls in the CT Staging of Gastric Cancer: Do We Have 'Stage Fright'?

All Day Room: GI Community, Learning Center

Participants
Lei Tang, MD, Beijing, China (*Presenter*) Nothing to Disclose
Zi-Yu Li, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Jia-Fu Ji, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To illustrate the dilemma and pitfalls during the CT staging of gastric cancer.2. To introduce the possible ways to improve the staging accuracy.

TABLE OF CONTENTS/OUTLINE

1. The dilemma and possible pitfalls for CT staging of gastric cancer: (1) If the submucosal layer is not displayed, it can only take the indirect “50% thickness ratio” to distinguish T1 and T2, which rely on the enhancement of mucosa and easily cause bias (Fig 1). (2) T3 tumors may be overstaged as T4a, in the case of the inflammatory and fibrosis strands and spiculations near the serosa which are similar as tumor infiltration (Fig 2). (3) The CT criteria for T4b are still in controversial, and the resectable signs are not uniform. Some significantly infiltrated unresectable tumors lack typical CT signs (Fig 3). (4) Size is still the widely-used criterion for the diagnosis of lymph node metastasis. (5) It lacks the typical signs for the diagnosis of early peritoneal metastasis, with a diagnostic sensitivity of only 50%.2. The ways to improve the CT staging accuracy: (1) Standardized examination and reporting processes. (2) Exploration of new signs: “hyperattenuating serosa sign” to discriminate T4a from T3 (Fig 4); “smudge sign” to detect early peritoneal metastasis (Fig 5). (3) Development of new modalities such as monochromatic CT images.

GI015-EB-X

X-Ray Defecography 'The Forgotten Buddy'

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Daniel A. Rodriguez Quintero Sr, MD, Mexico City D.F., Mexico (*Presenter*) Nothing to Disclose
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Jaime A. Saavedra-Abril, MD, Mexico, Mexico (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

After the exhibit the reader would be able to:- Describe the radiologic technique of x-ray defecography.
- Recognize the indications to perform this procedure.
- Depict the anatomical structures through this method.
- Identify the different pathologies through this method.
-Evaluate the advantages of x-ray defecography over MRI.The X-ray defecography remains as an important diagnostic tool in the evaluation of patients with functional and morphological abnormalities of the anorectal region.
It is an effective method with low radiation dose, cost and widespread accessibility. In addition, it evaluates the evacuation in a natural position.
X- ray defecography screens for other potential causes of symptoms and helps determine wether to perform another imaging modality

TABLE OF CONTENTS/OUTLINE

IntroductionIndications
Technique
Normal Anatomy
Pictorial review of the anorectal abnormalities through the X-ray defecographyConclusions

GI016-EB-X

Calcification Contained Peritoneal Diseases

All Day Room: GI Community, Learning Center

Participants
Yong-Soo Kim, MD, PhD, Guri City, Korea, Republic Of (*Presenter*) Nothing to Disclose
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Sanghyeok Lim, MD, Gyeonggi-do, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To illustrate calcification containing peritoneal diseases
2. To differentiated the imaging characteristics of peritoneal diseases by using the morphology and distribution of calcifications

TABLE OF CONTENTS/OUTLINE

We retrospectively reviewed CT findings in pathologically confirmed calcification contained peritoneal diseases. We classified peritoneal disease as follows:1. Central calcification; carcinoid tumor, sclerosing mesenteritis, spillage of gallstones, Gossypiboma
2. Peripheral rim calcification; Sclerosing peritonitis, peritoneal carcinomatosis with calcification, ruptured ovarian teratoma, ruptured hydatid cysts
3. Clustered calcification; Tbc lymphadenitis, parasite infestation

GI017-EB-X

Ultrasonography Guided Percutaneous Injection of Anal Bulking Agents in the Treatment of Fecal Incontinence

All Day Room: GI Community, Learning Center

Participants
Alejandro Moreira Grecco, Ciudad De Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
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Patricia E. Farias, MD, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Maria M. Ramirez Sanchez, MD, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
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Jorge A. Olmos, Ciudad De Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review treatements available of anal incontinence To understand the advantage of transperineal ultrasound to disclose anal sphincter anatomy To show a new way to guide bulkin agent injection in anal incontinence treatment and its advantages

TABLE OF CONTENTS/OUTLINE

Definition of anal incontinence Causes and predisposing factors of anal incontinence Anal sphincter ultrasonographic anatomy Advantages of transperineal ultrasound versus 360 endoanal sonography guidance in the procedure. Tratement options focusing in bulkin agent injection (technique description)

GI018-EB-X

Tumors or Non-tumorous Focal Masses of the Spleen: Imaging Findings and Differential Diagnosis

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

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Kwon-Ha Yoon, MD, PhD, Iksan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Haeji Rue, Iksan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is1. To review the imaging findings of benign or malignant splenic tumors and non-tumorous focal masses.
2. To know helpful imaging features of ultrasound, contrast-enhanced US, CT and MRI for differential diagnosis of splenic masses.
3. To discuss radiologic and pathologic correlation of surgically resected solid or cystic splenic masses.

TABLE OF CONTENTS/OUTLINE

Developmental anomaly that mimic splenic or perisplenic tumorsClassification of cystic and solid masses of the spleenImaging features for differential diagnosis of various splenic tumors and tumor like focal splenic lesions - Tumor like non-tumorous lesions (Pseudocyst, infected cyst, abscess, hematoma, pseudoaneurysm, infarction, granuloma, sarcoidosis, gamna-gandy bodies, inflammatory pseudotumors, Splenic angiomatoid nodular transformation)
- Benign splenic tumors (Cyst, lymphangioma, hemangioma, harmatoma)
- Malignant splenic tumors (lymphoma, leukemia, metastasis, angiosarcoma)Radiologic-pathologic correlation of surgically resected solid or cystic splenic masses

GI019-EB-X

Accurate Diagnosis of Acute and Chronic Cholecystitis using Magnetic Resonance Imaging

All Day Room: GI Community, Learning Center

Participants
Haramrit Hansra, MD, Tucson, AZ (*Presenter*) Nothing to Disclose
Bobby T. Kalb, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Iva Petkovska, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
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James R. Costello, MD, PhD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Right upper quadrant pain is a common presentation in the emergency department. Clinicians are often faced with a lengthy differential of potential contributing etiologies with acute and/or chronic cholecystitis frequently emerging as an important diagnostic consideration. Advanced MRI techniques easily identify features of acute inflammation which can be distinguished from characteristic findings of chronic inflammation. T2 fat saturation techniques readily identify acute inflammation which is differentiated from the progressive delayed enhancement of chronic inflammation on dynamic T1w imaging. MRI can accurately evaluate confounding cases of acute on chronic inflammation of the gallbladder in addition to gangrenous cholecystitis, emphysematous cholecystitis, and gallbladder perforation. This represents a significant improvement over traditional ultrasound and computed tomography techniques. Ultimately, MRI evaluation can help to facilitate clinical management.

TABLE OF CONTENTS/OUTLINE

Discuss advanced MRI techniques Review pathology of acute and chronic cholecystititis Detail MRI features of acute cholecystitis, chronic cholecystitis, and acute on chronic cholecystitis Illustrate MRI features of gangrenous cholecystis, emphysematous cholecystitis, and gallbladder perforation Summary

GI020-EB-X

Tomographic Assessment of Pancreatic Fibrosis to Predict Pancreatic Fistula after Pancreaticoduodenectomy

All Day Room: GI Community, Learning Center

Participants

Cecilia Carrera, Caba, Argentina (*Presenter*) Nothing to Disclose
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TEACHING POINTS

Pancreatic fistulas are caused by disruption of the main pancreatic duct, smaller ducts or lesions of the parenchyma. The most common cause of pancreatic fistula is pancreatic surgery. In this exhibit we aim to: 1) Review the factors associated with postoperative pancreatic fistulas. 2) Establish the utility of preoperative computer tomography (CT) as a predictor of pancreatic fibrosis (PF) and the risk of pancreatic fistula. 3) Discuss parameters that can be used as indicators of PF.

TABLE OF CONTENTS/OUTLINE

1) Introduction:- a. Pathophysiology of pancreatic fistulas and fibrosis. b. Predictors of pancreatic fistulas c. Todays use of preoperative CT scans. 2) Materials and methods:- a. Preoperative CT parameters used to predict pancreatic fibrosis 3) Review of cases 4) Conclusion

GI021-EB-X

Intestinal Intussusception: What's the Leading Cause?

All Day Room: GI Community, Learning Center

Participants
Jinyoung Chang, MD, Anyang, Korea, Republic Of (*Presenter*) Nothing to Disclose
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Hong-Il Ha, MD, Anyang-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kwanseop Lee, Anyang, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To present pathognomonic radiologic findings of intestinal intussusception such as a target-like or sausage-shaped mass.
2. To identify various disorders at the leading point of intussusception according to patient's age, location of intussusception, and leading causes.
3. To decide whether there is the leading cause of intussusception and to illustrate characteristic imaging findings of leading causes.

TABLE OF CONTENTS/OUTLINE

1. Pathophysiology2. Pathognomonic radiologic findings of intussusception3. Classification of intussusception - Age: Child, Adult - Location: Gastroduodenal, Enteroenteric, Ileocolic, Colocolic, Colorectal - Leading cause: Transient peristalsis Benign (Lipoma, Leiomyoma, Inflammatory fibroid polyp , GIST, Hamartoma, Meckel diverticulum, Duplication , Anastomosis site) Malignant (Adenocarcinoma, Lymphoma, Malignant GIST, Metastasis,…) Idiopathic4. Summary

GI022-EB-X

Four Solid Primary Pancreatic Neoplasms and Their Mimickers

All Day Room: GI Community, Learning Center

Participants
Arielle A. Bauer, MD, Aurora, CO (*Presenter*) Spouse, Employee, Medtronic plc; Spouse, Stockholder, Medtronic plc
Jeffrey Meier, MD, Aurora, CO (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Solid neoplasms of the pancreas are increasingly encountered in radiology practice due to growing volume and improved diagnostic capabilities of CT imaging. Although correctly identifying these neoplasms aids in clinical management, many pancreatic lesions have similar imaging characteristics, making their differentiation difficult. The differential diagnosis for a solid pancreatic lesion encountered on CT can be narrowed by considering 1) typical CT imaging features of four relatively common solid primary pancreatic neoplasms (pancreatic adenocarcinoma, pancreatic neuroendocrine tumors (PNET), lymphoma, and solid pseudopapillary tumor (SPT)) and 2) pancreatic lesions that mimic the appearances of these four primary neoplasms.

TABLE OF CONTENTS/OUTLINE

BackgroundSolid primary pancreatic neoplasms and their mimickersPNET * Intrapancreatic splenule * Serous cystadenoma * Hemangioma * MetastasisLymphoma * Adenocarcinoma * Pancreatitis * MetastasisSPT * PNET * Acinar cell carcinoma * Serous cystadenoma * MetastasisPancreatic adenocarcinoma * Lymphoma * Pancreatitis * Acinar cell carcinoma * MetastasisDecision Tree: Three key imaging features to focus the differential of pancreatic masses: Contrast enhancement, diffuse involvement, and presence of cystic or calcified components.References

GI023-EB-X

Are You Sure of FNH? What about ß-catenin Activated Hepatocellular Adenoma?

All Day Room: GI Community, Learning Center

Participants
Samuel Chang, MD, Aurora, CO (*Presenter*) Nothing to Disclose
Jeffrey Meier, MD, Aurora, CO (*Abstract Co-Author*) Nothing to Disclose
Kavita Garg, MD, Denver, CO (*Abstract Co-Author*) Nothing to Disclose
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Gerald D. Dodd III, MD, Aurora, CO (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Up to 80% of β-catenin activated hepatocellular adenomas (β-HCAs) uptake Gd-EOB-DTPA and mimic focal nodular hyperplasia (FNH). Inflammatory HCAs (I-HCA) also often mimic FNH on Gd-EOB-DTPA liver MR due to background hepatic steatosis up to 30%. β-HCAs has a higher malignant transformation rate up to 46%. Radiologically I-HCA may also have β-catenin activation in up to 20%. The radiologists should understand and discern similar findings of HCAs to FNH, not to misdiagnose HCA as FNH, by recommending biopsy or surgery.

TABLE OF CONTENTS/OUTLINE

Classification and Clinical Characteristics of 4 Subtypes of HCAs Molecular Basis and Immunohistochemical Staining of 4 Subtypes of HCAs Key MR Imaging Characteristics of 4 Subtypes of HCAs Differential Imaging Points of β-HCAs and I-HCA versus FNH Recommended Brief Management Scheme

GI025-EC-X

The Fat and the Curious

All Day Room: GI Community, Learning Center

Participants
Samir A. Khwaja, Meng, MBBS, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose
Siobhan A. Whitley, MBBS, Toronto, AB (*Abstract Co-Author*) Nothing to Disclose
Sara S. Upponi, MBBS, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
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Edmund M. Godfrey, MBBCh, FRCR, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Diagnosing hepatic steatosis is usually straightforward however atypical patterns of fat deposition can cause diagnostic uncertainty.Fat containing liver lesions vary greatly in their imaging features and biological behaviour.MR imaging is the most specific technique for demonstrating microscopic and macroscopic fat.

TABLE OF CONTENTS/OUTLINE

Hepatic steatosis is one of the commonest findings in cross-sectional imaging. Fat may be identified diffusely or regionally within the liver or more unusually within focal liver lesions.In our case based multi-modality review you will:
1) Tackle real clinical cases where lesion characterisation presented a diagnostic dilemma
2) Recognise typical and atypical patterns of fat deposition such as multifocal, subcapsular, perilesional and perivascular deposition
3) Identify imaging features of liver lesions which can contain fat such as hepatocellular adenoma, focal nodular hyperplasia, angiomyolipoma, hepatocellular carcinoma, pseudolipoma of Glisson’s capsule and fat-containing liver metastases
4) Learn strategies to reach a confident diagnosis where the presence of fat makes lesion characterisation difficult.This review will enable radiologists to distinguish patterns of focal fat deposition from each other and from fat-containing benign and malignant liver lesions which may require further management.

GI026-EC-X

CT Evaluation of the Suspected Pancreatic Mass: The Use of an iPad as an Interface to a Knowledge Based System for the Differential Diagnosis of Pancreas Tumors

All Day Room: GI Community, Learning Center

Participants

Elliot K. Fishman, MD, Baltimore, MD (*Presenter*) Institutional Grant support, Siemens AG; Institutional Grant support, General Electric Company;
Rachel B. Thomas, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Sara Raminpour, BS, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Hannah Ahn, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Pamela T. Johnson, MD, Baltimore, MD (*Abstract Co-Author*) Consultant, National Decision Support Company

TEACHING POINTS

After using the exhibit (iPad App) the user will have a more complete understanding of the analysis of pancreatic tumors by;1. using a checklist to better define the etiology of a pancreatic mass in a systematic fashion with a detailed and proven pathway2. reviewing the teaching file of over 2000 pathologically proven cases across a range of pathologies3. reviewing a series of pearls on the various pancreatic lesions4. listening to lectures about pancreatic tumors including lectures on solid and cystic pancreatic lesions5. reviewing a series of illustrations about pancreatic anatomy and surgeries used for management of pancreatic tumors

TABLE OF CONTENTS/OUTLINE

The program contains eight main sections that are accessed through the app.Each section can be accessed with a search tool. The program is easy to use and available for free on the Apple App store.1. checklist2. teaching file3. pearls 4. journal club with key articles summarized5. lectures on pancreatic tumors6. pancreatic imaging quiz7. pancreatic illustations8. search tool

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Elliot K. Fishman, MD - 2012 Honored Educator
Elliot K. Fishman, MD - 2014 Honored Educator
Elliot K. Fishman, MD - 2016 Honored Educator
Pamela T. Johnson, MD - 2016 Honored Educator

GI100-ED-X

What Radiologist should Note about Molecular Targeting Therapy; Special Focused on Sorafenib Administration for Advanced HCC

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
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Kazuto Kozaka, MD, Kanazawa, Japan (*Abstract Co-Author*) Nothing to Disclose
Tetsuya Minami, MD, Kanazawa, Japan (*Abstract Co-Author*) Nothing to Disclose
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Azusa Kitao, MD, Kanazawa, Japan (*Abstract Co-Author*) Nothing to Disclose
Osamu Matsui, MD, Kanazawa, Japan (*Abstract Co-Author*) Nothing to Disclose
Toshifumi Gabata, MD, PhD, Kanazawa, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

After administration of Sorafenib to advanced HCC cases, the tumor shows various radiological changes such as necrosis, blood flow decrease, pseudo-aneurysm formation, and tumor shrinkage. Sometimes it is difficult to assess the therapeutic effect of Sorafenib with ordinary criteria for tumor therapeutic effect evaluation such as RECIST. Radiologists should be familiar with novel therapeutic effect assessment methods such as CT perfusion, Choi's criteria, and Iodine map for molecular targeting therapy of HCC.The purpose of this exhibit is to:1. Illustrate the current concept of molecular targeting therapy for HCC.2. Describe the morphological and functional alteration of HCC after Sorafenib administration.3. Review the various methods to evaluate the therapeutic effect after administration of Sorafenib to advanced HCC.

TABLE OF CONTENTS/OUTLINE

Current indication of molecular targeting therapy for advanced HCC. Merit of Sorafenib administration to advanced HCC cases. Imaging evaluation of the side effects on Sorafenib administration to HCC Imaging evaluation of morphological and functional alteration on HCC after Sorafenib administration. How to evaluate the therapeutic effect of Sorafenib administration to HCC

GI101-ED-X

Oops I Drained it Again

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
Ryan D. Clayton, MD, Richmond, VA (*Abstract Co-Author*) Nothing to Disclose
Lauren Moomjian, MD, Richmond, VA (*Presenter*) Nothing to Disclose
Laura R. Carucci, MD, Midlothian, VA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

A variety of entities may mimic drainable abscesses This can lead to misdiagnosis of these entities, unnecessary percutaneous pigtail drainage catheter placement and other complications Misdiagnosis can lead to delay in appropriate treatment of the patientPurpose/Aim: To expose radiologists to a variety of entities for which percutaneous drainage may be requested, but is not indicated, to facilitate greater diagnostic accuracy and treatment in their practice

TABLE OF CONTENTS/OUTLINE

Indications for percutaneous drainage Methods of percutaneous drainage Entities which may mimic drainable abscesses Neoplasm- GIST, Necrotic rectal Ca, Gallbladder Ca, Lymphoma involving the pancreas/splenic hilum, Recurrent malignancy- in a surgical bed or along a staple line Ischemia/Infarction- Liquefactive infarction of the spleen, Infarcted intrapancreatic splenule Congenital- Meckel's Diverticulum, Obstructed upper pole moiety, True Giant Colonic Diverticulum Postoperative- Distended or partitioned excluded stomach post RYGB, Small bowel anastomosis, Indiana Pouch urinary diversion Non pyogenic infection- XGP involving the colon, TB, MAI, Echinococcal Cyst Inflammatory/Other- Gossypiboma, Ruptured Dermoid Cyst, Necrotic Lymph nodes How to avoid draining abscess mimics

GI103-ED-X

A Primer on Giant Incisional Hernia Repair: What the Radiologist should Know

All Day Room: GI Community, Learning Center

Participants
Kushal Parikh, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Mahmoud M. Al-Hawary, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Richard Burney, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Katherine E. Maturen, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

After reviewing this exhibit, learners will: Be aware of the prevalence and associated morbidity of large/giant incisional abdominal wall hernias Become familiar with the uses of pre-operative imaging and the pertinent findings Be familiar with operative techniques and post-operative complications, in particular, the component separation technique (CST)

TABLE OF CONTENTS/OUTLINE

Background of giant incisional hernia Definition and current data from the surgical literature Review of myofascial anatomy along with relevant physiologic and anatomic considerations Unique features of giant incisional hernias Operative techniques review Primary suture repair Mesh repair Extraperitoneal Sublay/inlay With or without component separation technique (CST) Choosing the right repair Role of Imaging Indications Role of different modalities Our institutional imaging protocol Proposed CT reporting criteria Emerging imaging methods Complications of incisional hernia repairs with pictorial examples

Honored Educators

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Katherine E. Maturen, MD - 2014 Honored Educator

GI104-ED-X

Focal Liver Lesions and Pseudolesions after Liver Transplantation: Spectrum of Imaging Findings and Differential Diagnosis

All Day Room: GI Community, Learning Center

Participants
Ronald H. Wachsberg, MD, Newark, NJ (*Presenter*) Nothing to Disclose
Baburao Koneru, MD, Newark, NJ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Viewers of this exhibit will learn that:1. The differential diagnosis of focal liver lesions in a liver transplant recipient is more extensive than the usual considerations of infarct, abscess, biloma and tumor2. Pre-existing lesions in the liver graft, sequelae of the trauma that caused the death of the donor, specific findings unique to this population, and various pseudolesions can mimic pathology in the liver graft.3. While the imaging findings alone may be nonspecific in many cases, attention to the clinical history, prior imaging studies, and specific imaging findings can often lead to a specific diagnosis

TABLE OF CONTENTS/OUTLINE

Conventional differential diagnosis: infarct, abscess, biloma, malignancyLess commonly considered liver lesions: pre-existing lesion in the donor liver, hematoma, AV fistula Pseudolesions: loculated intrafissural collection, donor IVC thrombus mimicking tumor, bile duct filled with hyperechoic sludge mimicking tumor

GI105-ED-X

Complications in Biliary Atresia Patients after Treatment; What Radiologists Need to Know

All Day Room: GI Community, Learning Center

Participants

Harsha V. Nalluri, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
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Nabeel Porbandarwala, MD, Kansas City, MO (*Abstract Co-Author*) Nothing to Disclose
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Andrew T. Trout, MD, Cincinnati, OH (*Abstract Co-Author*) Advisory Board, Koninklijke Philips NV; Travel support, Koninklijke Philips NV ; Author, Reed Elsevier; Research Grant, Siemens AG
Jonathan R. Dillman, MD, Cincinnati, IA (*Abstract Co-Author*) Research Grant, Siemens AG; Research Grant, Guerbet SA; Travel support, Koninklijke Philips NV; Research Grant, Toshiba
Chandana G. Lall, MD, Orange, CA (*Abstract Co-Author*) Nothing to Disclose
Sadhna Verma, MD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Understand the pathology of biliary atresia (BA), how it is treated, and when a liver transplant should be considered. Illustrate a spectrum of complications in BA patients of varying severity prior to and after liver transplant on CT and MR. Discuss factors affecting prognosis in BA patients after treatment and the clinical implications of complications found on imaging.

TABLE OF CONTENTS/OUTLINE

Background information and pathophysiology of biliary atresia (BA)Kasai hepatoportoenterostomy; initial treatment for BAComplications in BA patients post Kasai and pre liver transplant - Biliary tree - Hepatic parenchyma - VasculatureFactors affecting outcomes in BA post KasaiLiver transplant; definitive treatment for BACriteria for liver transplant in BAComplications post liver transplant specific to BA patientsConclusion

Honored Educators

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Jonathan R. Dillman, MD - 2016 Honored Educator
Chandana G. Lall, MD - 2013 Honored Educator
Sadhna Verma, MD - 2013 Honored Educator

GI106-ED-X

Advanced Imaging Techniques: How Much can They Help You in Colorectal Cancer?

All Day Room: GI Community, Learning Center

Awards
Identified for RadioGraphics

Participants
Roberto Garcia Figueiras, MD, PhD, Santiago de Compostela, Spain (*Presenter*) Nothing to Disclose
Sandra Baleato Gonzalez, MD, PhD, Santiago, Spain (*Abstract Co-Author*) Nothing to Disclose
Anwar R. Padhani, MD, FRCR, Northwood, United Kingdom (*Abstract Co-Author*) Advisory Board, Siemens AG; Speakers Bureau, Siemens AG; Researcher, Siemens AG; Speakers Bureau, Johnson & Johnson
Vicky J. Goh, MBBCh, London, United Kingdom (*Abstract Co-Author*) Research Grant, Siemens AG Speaker, Siemens AG
Antonio Luna, MD, Jaen, Spain (*Abstract Co-Author*) Nothing to Disclose
Ana Marhuenda, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Joan C. Vilanova, MD, PhD, Girona, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Imaging techniques play a key role in the management of patients with colorectal cancer.2. Advanced anatomical, functional and molecular imaging (FMI) techniques may improve the assessment of diagnosis, prognosis, planning therapy and assessment of response to treatment of these patients.3. FMI techniques may allow the assessment of tumor specific characteristics and tumor heterogeneity

TABLE OF CONTENTS/OUTLINE

1. Introduction2. Anatomical imaging techniques in colorectal cancer (CRC):2.1. 3D-Imaging: CT colonography, tumor volumetry, liver segmentation for surgical planning2.2. Emerging imaging techniques: Dual-energy CT, texture analysis, magnetization transfer MRI.3. FMI for the evaluation of tumor hallmarks:3.1. Angiogenesis in CRC: MR-based imaging techniques (DCE-MRI, IVIM), Perfusion CT, DCE-US.3.2. Tumor proliferation and cellularity in CRC:*Functional imaging of cellularity (Diffusion-weighted imaging (DWI), whole-Body DW-MRI, Kurtosis)*Molecular imaging of tumor proliferation with PET3.3. Tumor metabolism in CRC: 18F-FDG-PET and MR spectroscopy3.4. Imaging oxygenation and hypoxia: BOLD-MRI3.5. Functional imaging of lymph nodes (DWI, USPIO)3.6. Functional imaging in liver metastases (hepatocyte-specific MRI contrast media)3.6. Others4. The value of multiparametric imaging in CRC5. Conclusions

Honored Educators

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Anwar R. Padhani, MD, FRCR - 2012 Honored Educator

GI107-ED-X

Bariatric Surgery: The Normal and Abnormal Post-operative Appearance on CT

All Day Room: GI Community, Learning Center

Participants
Jonathan Weinstein, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Roshan Y. Modi, MD, Hartford, CT (*Abstract Co-Author*) Nothing to Disclose
Flavius F. Guglielmo, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

After conservative obesity treatment measures have failed, bariatric surgery has become the next line of treatment. This primer reviews the most common bariatric surgeries performed and the normal and abnormal post-operative imaging appearances on CT scan.

TABLE OF CONTENTS/OUTLINE

The 3 most common types of bariatric surgery include:-Roux-en-Y Gastric Bypass: gastrojejunal (GJ) anastomosis· Surgical technique· New anatomyComplications:Immediate post-op: Anastomotic leak, Roux limb ischemiaAfter immediate post-op: GJ anastomosis narrowing, marginal ulcers, Roux limb ischemia, small bowel obstruction, internal hernia, gastrogastric fistula-Adjustable Gastric Banding· Surgical technique, banding systems· Satisfactory band positioning: evaluate the phi angleComplications:Immediate post-op: Gastric perforation, band malposition, tubing disconnectionAfter immediate post-op: Posterior slippage "O sign" and phi angle, port malfunction, gastric erosions, concentric dilatation of pouch due to adhesions/excessively tightened stoma-Sleeve Gastrectomy: suture/staple line along greater curvature· Surgical technique· New anatomyComplications:Immediate post-op: Gastrectomy site leakAfter immediate post-op: Antral scarring resulting in gastric outlet type symptoms, reflux

GI109-ED-X

Possible Efficacy of Lubiprostone on CT Colonography: Improvement in the Examination Accuracy for Defecation and Colon Expansion

All Day Room: GI Community, Learning Center

Participants

Hideki Horigome, RT, Choshi, Japan (*Presenter*) Nothing to Disclose
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Kazuo Narushima, MD, PhD, Chiba, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuo Narushima, MD, PhD, Chiba, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Although sufficient colon expansion is essential for maintaining CT colonography（CTC）accuracy, sometimes insufficient expansion is also observed on the image despite adequate care.The purpose of this exhibit is :Since lubiprostone does not result in colon irritation and enables defecation, it can be used for CTC of the participant who underwent examination without fear of colon expansion; it also improves examination accuracy.

TABLE OF CONTENTS/OUTLINE

Understanding about the mechanism of action of lubiprostone Understanding of the factor inhibiting colon expansion Utility of lubiprostone to confirm with a CTC image

GI110-ED-X

LI-RADS v2014 - Illustration of Imaging Features Favoring Malignancy Other than HCC (LR-M)

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Ines Nikolovski, MBBS, New York, NY (*Presenter*) Nothing to Disclose
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Tara A. Morgan, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Robert M. Marks, MD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Richard Kinh Gian Do, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Identify ancillary imaging features that favor the LR-M Category over LR-4 or LR-5 categories in LI-RADS v2014. Recognize imaging features of intrahepatic cholangiocarcinomas, the second most common primary liver malignancy. List overlap in risk factors for hepatocellular carcinomas and intrahepatic cholangiocarcinomas.

TABLE OF CONTENTS/OUTLINE

Definition of LR-M category in LI-RADS v2014 Illustration of ancillary imaging features Clinical risk factors and tumor markers for HCC and intrahepatic cholangiocarcinoma Imaging features of the following non-HCC malignancies, and distinguishing characteristics from HCC; Intrahepatic cholangiocarcinoma Hepatocholangiocarcinoma Metastatic disease Sample cases

GI111-ED-X

Splenomegaly: Useful Clues to Expanding the Differential Diagnosis

All Day Room: GI Community, Learning Center

Participants
Hyungjoon Cho, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Na Yeon Han, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Deuk Jae Sung, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Min-Ju Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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Sung Bum Cho, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The size of the spleen can increase owing to the disease of spleen itself, however in most cases, splenomegaly occurs in connection with pathologic conditions of other organ systems including blood, liver and heart. Therefore, splenomegaly can be used as a first indicator of other diseases, and it should not be ignored. CT not only enables to measure splenic size accurately, but also may provide important clues for diagnosis of various diseases which are associated with splenomegaly.1. To understand the anatomy and function of the spleen.2. To compare suggested methods to measure the splenic size.3. To understand the pathophysiology of splenomegaly and accordingly classify the splenomegaly.4. To demonstrate image findings of each diseases and to suggest useful points for diagnosis.

TABLE OF CONTENTS/OUTLINE

Anatomy, structure and function of the spleen Measurement of the spleen and determination of splenomegaly Classifications of splenomegaly by mechanism and their image features Congestive disease Hematologic disease Infectious disease Storage diseases Immunologic-inflammatory disease Primary neoplasms and cysts Secondary neoplasms Miscellaneous Disorders

GI112-ED-X

Hepatic Regenerative Nodules in Budd-Chiari Syndrome: Enhancement Pattern on Gd-BOPTA Magnetic Resonance Imaging, with Emphasis of Hepatobiliary Phase

All Day Room: GI Community, Learning Center

Participants
Giuseppe Mamone, MD, Palermo, Italy (*Presenter*) Nothing to Disclose
Settimo Caruso, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Gianluca Marrone, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Giovanni Gentile, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Roberto Miraglia, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Angelo Luca, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

MRI findings of Budd-Chiari Syndrome Dynamic enhancement patterns of hepatic regenerative nodules with Gd-BOPTA Hepatobiliary patterns of hepatic regenerative nodules with Gd-BOPTA

TABLE OF CONTENTS/OUTLINE

PURPOSE/AIMThe aim of this exhibit is to evaluate the Gd-BOPTA magnetic resonance imaging findings of hepatic regenerative nodules in Budd-Chiari syndrome, with emphasis on the hepatobiliary phase.CONTENT ORGANIZATION Introduction to Budd-Chiari Syndrome. Clinical presentation of the disease. Role of MRI and contraindications. Functional features of Gd-BOPTA and role of the hepatobiliary phase. MRI diagnosis of Budd-Chiari Syndrome. Dynamic enhancement of hepatic regenerative nodules: exhibit of different patterns. Hepatobiliary pattern of hepatic regenerative nodules: exhibit of different patterns. Differential diagnosis between hepatic regenerative nodules and hepatocellular carcinoma. Conclusions.

GI114-ED-X

Diagnostic and Management of Acute Mesenteric Ischemia: Central Role of Diagnostic and Interventional Radiologists

All Day Room: GI Community, Learning Center

Awards
Identified for RadioGraphics

Participants
Pauline Copin, MD, Clichy, France (*Presenter*) Nothing to Disclose
Sophie Beranger-Gibert, Paris, France (*Abstract Co-Author*) Nothing to Disclose
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Valerie Vilgrain, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Maxime Ronot, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To know the causes and clinical presentations of acute mesenteric ischemia (AMI)
To differentiate the imaging features of early and late-stage forms of AMI
To identify complications and pitfalls.
To understand the multidisciplinary treatment, and the central role of interventional radiologists.

TABLE OF CONTENTS/OUTLINE

Clinical presentations and risks factorsRole/utility of biological testsDifference between early and late-stageImaging features of AMI: bowel ischemia: decreased or absent wall enhancement, spontaneous wall hyperattenuation, thickened of thin bowel wall, feces sign, fat standing, ascites vascular insufficiency: arterial or venous occlusion or thrombosis, vascular engorgement, atheromatosis. complications: extraluminal gas, collections and abscesses, pneumatosis, portal venous gas underlying cause: spleen and kidney infarctions, atheromatosis, vasculitis or venous abnormalities.Sensitivity/specificity and inter-reader agreement of the different featuresPresentation of multidisciplinary treatment algorithm, role of interventional radiologyIllustration of simple and complex cases**Outline**Diagnostic and interventional radiologists play a central role in the up-to-date management of AMI. We present an extensive and illustrated overview of the experience of a dedicated mesenteric stroke center unit.

GI115-ED-X

Hepatic Morphology Abnormalities: Beyond Cirrhosis

All Day Room: GI Community, Learning Center

Participants
Giuseppe Mamone, MD, Palermo, Italy (*Presenter*) Nothing to Disclose
Vincenzo Carollo, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Mariapina Milazzo, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Settimo Caruso, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Sarah Aquilina, Naxxar, Malta (*Abstract Co-Author*) Nothing to Disclose
Kelvin Cortis, MD, FRCR, Msida, Malta (*Abstract Co-Author*) Nothing to Disclose
Angelo Luca, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The aim of this exhibit is to review the CT and MRI appearances of hepatic morphology abnormalities in the cirrhotic liver and other diseases, describing pathologic conditions that can mimic cirrhosis, with useful tips for the differential diagnosis. So the major teaching points are:- To review the imaging of the cirrhotic liver.- To review and describe the pathological entities that cause changes in the normal liver morphology, resulting in a radiological appearance that mimics cirrhosis. - To provide useful tips to differentiate these conditions from cirrhosis on CT and MRI.

TABLE OF CONTENTS/OUTLINE

CONTENT ORGANIZATION a) Introduction to hepatic morphology abnormalities.b) Hepatic signs of cirrhosis.c) Extrahepatic signs of cirrhosis: imaging of portal hypertension.d) Imaging findings of diseases that can cause liver morphology changes and mimic liver cirrhosis:e) Congenital hepatic fibrosis.f) Caroli disease.g) Budd-Chiari Syndrome.h) Hepatoportal sclerosis.i) Cavernous transformation of the portal vein.j) Metastatic disease and pseudocirrhosis.k) Subacute liver failure.l) Posttherapeutic morphologic changes in the liver.m) Conclusions.

GI116-ED-X

Pancreatic Masses: The Weird and the Wild

All Day Room: GI Community, Learning Center

Participants
Luyao Shen, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Taylor J. Choy, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Ely R. Felker, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Daniel J. Margolis, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
David S. Lu, MD, Los Angeles, CA (*Abstract Co-Author*) Consultant, Medtronic, Inc Speaker, Medtronic, Inc Consultant, Johnson & Johnson Research Grant, Johnson & Johnson Consultant, Bayer AG Research Grant, Bayer AG Speaker, Bayer AG
Steven S. Raman, MD, Santa Monica, CA (*Abstract Co-Author*) Nothing to Disclose
Barbara M. Kadell, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) To study the uncommon masses in the pancreas, which include rare path-proven lesions, weird presentations of common masses, and co-existent 2 or 3 separate pathologic entities in one pancreas.2) To study the complications of the pancreatic masses.

TABLE OF CONTENTS/OUTLINE

1) Common masses gone wild: A) Main duct intraductal papillary mucinous neoplasm (IPMN) causing biliary dilatation. B) Multiple growing cysts: IPMN vs. mucinous cystic neoplasm on path. C) Solitary papillary epithelial neoplasm (SPEN) with widespread metastasis. D) Adenocarcinoma with drop pelvic metastasis.2) Rare path-proven masses: A) mixed acinar-endocrine carcinoma. B) myofibroblastic sarcoma. C) intraductal oncocytic papillary neoplasm (IOPN). D) multifocal acinar cell cystadenoma.3) Multiple entities in one pancreas: A) serous cystadenoma and IPMN. B) adenocarcinoma and IPMN. C) serous cystadenoma and adenocarcinoma. D) neuroendocrine, serous cystadenoma, and simple cysts in Von Hippel-Lindau (VHL)4) Secondary involvement: A) plasmacytoma. B) B-cell lymphoma. C) lung metastasis.

GI117-ED-X

The Good, the Bad, and the Ugly of Liver Transplantation: What You Need to Know!

All Day Room: GI Community, Learning Center

Participants
Neema J. Patel, MD, Jacksonville, FL (*Presenter*) Nothing to Disclose
Melanie P. Caserta, MD, Jacksonville, FL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Orthotopic liver transplant (OLT) is a complex procedure performed at select medical centers. An understanding of the basics of OLT and knowledge of expected postoperative findings and potential complications are important to appropriately manage transplant patients in the acute and long-term setting. Ultrasound (US) is routinely used to follow OLTs; however, multimodality imaging with CT, MR, and angiography can be complementary to each other in evaluating and managing patients with OLT In this exhibit, we will present a multimodality case based review of liver transplantation and its complications.

TABLE OF CONTENTS/OUTLINE

Review the basics of OLT including surgical technique Normal post-OLT imaging findings Post-OLT complications and treatment Vascular Structures Hepatic artery Hepatic vein / Inferior vena cava Portal vein Abnormalities Stenosis Thrombosis Other OLT Parenchyma Infarction Cirrhosis Liver lesions / hepatocellular carcinoma Rejection Biliary System Biliary stricture / obstruction Bile leak Ischemic cholangiopathy Primary sclerosing cholangitis Extrahepatic Fluid collection – hematoma, seroma, or abscess Summary: what you need to know!

GI118-ED-X

Diagnostic Errors When Interpreting Abdominopelvic Computed Tomography: How Often and Why Do They Occur?

All Day Room: GI Community, Learning Center

Participants

Seong Jong Yun, Cheongwon-gun, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hyun Cheol Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Dal Mo Yang, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sang Won Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To review the frequency and categorization of diagnostic errors2. To demonstrate the significance of the perceptual/interpretive errors of diagnostic errors during interpretation of abdominopelvic CT3. To discuss the various causes and subcategorization of perceptual/interpretive errors during interpretation of abdominopelvic CT4. To illustrate the various perceptual/interpretive errors for each subcategory5. To discuss possible solutions for minimizing perceptual/interpretive errors

TABLE OF CONTENTS/OUTLINE

1. Frequency and Categorization of Diagnostic Errors2. Significance of Perceptual/Interpretive Errors of Diagnostic Errors during Interpretation of Abdominopelvic CT3. Perceptual Error 1) Overlooking Other Lesions due to a Conspicuous Lesion 2) Missing a Small Lesion due to a Superimposed Lesion 3) Oversight of a Lesion Located in a Blind Spot 4) Failure to Detect Lesions due to Improper Use of the CT Window Settings4. Solutions for Minimizing Perceptual Errors5. Interpretive Error (Cognitive Error) 1) Misinterpretation due to Improper Patient Information 2) Mistaking a Non-Significant Finding for a Lesion 3) Diagnostic Difficulty due to Atypical Manifestation of a Lesion 4) Mistaking the Origination of a Lesion6. Solutions for Minimizing Interpretive Errors

GI120-ED-X

What's Your Gut Feeling? Acute, Emergent and Post-Surgical Disorders or Complications Involving the Jejunum

All Day Room: GI Community, Learning Center

Awards
Cum Laude

Participants
Deborah D. Brahee, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose
Dennis C. Monks Jr, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Matthew S. Hartman, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Paul R. Klepchick, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Rishi K. Maheshwary, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Kamyar Ilkhanipour, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. The jejunum is an area of bowel easily overlooked on imaging. Review of pertinent cases demonstrating acute pathology of the jejunum may improve detection, understanding, and often the treatment/outcome of these pathologies.
2. Quiz cases are intended to challenge the radiologist, to improve diagnostic skill in interpretation, and knowledge of jejunal pathology.
3. Pertinent imaging, pathophysiology and post-diagnosis options will be discussed.

TABLE OF CONTENTS/OUTLINE

Multimodality imaging with pathologic examples of acute, emergent and post-surgical disorders or complications involving the jejunum will be presented in a quiz format. The following cases will be included.Post-operative:
a) Gastrojejunal intussusception
b) Afferent loop syndrome
c) Marginal ulcer
d) Anastomotic leak
e) Graft versus host diseasePost-traumatic:
a) Laceration
b) HematomaInflammatory:
a) Dieulafoy lesion with gastrointestinal bleed
b) Acute diverticulitis with perforation
c) Bowel ischemia as a result of acute thrombosis
d) Ulcer with perforation
e) Diverticulosis with benign pneumatosis
f) Enteritis
g) IntussusceptionCongenital:
a) Paraduodenal hernia

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Matthew S. Hartman, MD - 2016 Honored Educator

GI121-ED-X

Fluid in the Peritoneal Space: Role of MRI in Characterizing Peritoneal Fluid and Differential Diagnoses

All Day Room: GI Community, Learning Center

Participants

Gustavo O. da Cunha, MD , Rio de Janeiro, Brazil (*Presenter*) Nothing to Disclose
Alice d. Queiroz, MD , Rio de Janeiro, Brazil (*Abstract Co-Author*) Nothing to Disclose
Leonardo K. Bittencourt, MD, PhD, Rio De Janeiro, Brazil (*Abstract Co-Author*) Nothing to Disclose
Romulo Varella, MD, Rio de Janeiro, Brazil (*Abstract Co-Author*) Nothing to Disclose
Sabrina O. Bernal, MD, Rio de Janeiro, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Fluid within the peritoneal space is fairly common in the daily practice, and can be caused by a multitude of factors, ranging from physiologic, observed in the normal female ovulatory cycle, to poor prognosis predictors, as usually seen in ovarian serous cistoadenocarcinoma.Its nature may vastly vary as well, from transudative composition to blood or even bile collections.MRI plays a very important role in characterizing peritoneal fluid, due to its capability of discerning components that no other imaging technique has. T1-weighted images with and without fat supression are useful for characterizing blood products and fat. DWI is fundamental to study abscesses, as well as gadolinium-enhanced images.

TABLE OF CONTENTS/OUTLINE

INTRODUCTIONTYPES OF PERITONEAL LIQUID WIITH SOME EXAMPLES AND ILLUSTRATIVE CASES- transudative composition: in patients with chronic liver disease.- hemoperitoneum: ruptured ovarian cyst, ectopic pregnancy, endometriosis or even rutpured aneurysm.- chiloperitoneum: iatrogenic biliary duct lesion.- fat: ruptured teratoma.- exsudative: pelvic inflammatory disease.- other: pseudomixoma peritonei, carcinomatosis.MRI IMAGING FEATURES OF PERITONEAL LIQUIDSTABLE WITH MAIN CAUSES OF LIQUIDS BASED ON MRI CHARACTERISTICS AS WELL AS LOCALIZATIONSUMMARY AND PRACTICAL TIPS

GI122-ED-X

Small Bowel, Big Problems - Acute Entities of the Small Bowel

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
Mark D. Sugi, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose
Douglas S. Katz, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Matt H. Kwon, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Vincent M. Mellnick, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Sanjeev Bhalla, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: To review the types of abdominal emergencies of the small bowel beyond simple obstruction. To illustrate, through case-based review, pertinent imaging findings in each of the categories of small bowel emergencies. To highlight the key clinical findings and differential diagnoses associated with each entity.

TABLE OF CONTENTS/OUTLINE

Types of Acute Entities of the Small Bowel Acute Mesenteric Ischemia Vasculitis Shock Bowel / Hypoperfusion Complex Angioedema Graft-Versus-Host-Disease Acute Radiation Enteritis Chemotherapy-Induced Enteritis Small Bowel Neoplasms Crohn's Disease (Perforation) Foreign Body Perforation

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Sanjeev Bhalla, MD - 2014 Honored Educator
Sanjeev Bhalla, MD - 2016 Honored Educator
Douglas S. Katz, MD - 2013 Honored Educator
Douglas S. Katz, MD - 2015 Honored Educator
Vincent M. Mellnick, MD - 2016 Honored Educator
Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator

GI124-ED-X

Pathophysiology and CT Imaging Features of Non Cirrhotic Portal Fibrosis

All Day Room: GI Community, Learning Center

Participants
Sharad Maheshwari, MD, Mumbai, India (*Presenter*) Nothing to Disclose
Abhijit A. Raut, MD, Mumbai, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Introduce entity known as non-cirrhotic portal fibrosis (NCPF) and its etiopathogenesis.2. Different entity from cirrhosis as there is no liver parenchymal disease. 3. Describe incidence and regional variation in the disease process. It is more comon in the east in a setting of low socio-economic background. Primarily seen in young males in third and fourth decade. 3. Describe the clinical guidelines to diagnose based on Ascia pacific Association for the study of liver (APASL).4. Describe Imaging Feature.5. Management including role of liver transplantation.

TABLE OF CONTENTS/OUTLINE

1. Defination of the entity2. Incidence and regional variation. 3. Etiopathogenesis.4. Differentiation from cirrhosis.5. Imaging features6. Clinical management.

GI125-ED-X

Biphenotypic Primary Liver Neoplasm: A Diagnostic Challenge, and How to Better Differentiate Biphenotypic Primary Liver Neoplasm from Hepatocellular Carcinoma and Cholangiocarcinoma

All Day Room: GI Community, Learning Center

Participants

Qiong Han, MD, Lexington, KY (*Presenter*) Nothing to Disclose
James T. Lee, MD, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose
Eun Y. Lee, MD, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose
Adrian A. Dawkins, MD, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose
Halemane S. Ganesh, MD, lexington, KY (*Abstract Co-Author*) Nothing to Disclose
Rashmi T. Nair, MD, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose
Joseph W. Owen, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Scott D. Stevens, MD, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose
Andres R. Ayoob, MD, Lexington, KY (*Abstract Co-Author*) Grant, Koninklijke Philips NV

TEACHING POINTS

Initially described in 1949, biphenotypic primary hepatic tumors comprise minority of primary hepatic neoplasm, while primary hepatocellular carcinoma and cholangiocarcinoma are the most common primary hepatic neoplasm.Biphenotypic primary liver neoplasm, also called hepatocholangiocarcinoma (HCC-CC), is a rare entity that imposes diagnosing challenges upon radiologists, because it often presents with image features that resemble both hepatocellular carcinoma (HCC) and cholangiocarcinoma (CC). Differentiating HCC-CC from other primary liver neoplasm can potentially alter patient's management: for example, while patients with HCC are considered candidate for liver transplant, patients with HCC-CC or CC are usually not treated with transplant. This educational exhibit will focus on the diagnostic challenge in differentiating biphenotypic primary liver neoplasm from primary hepatocellular carcinoma and intrahepatic cholangiocarcinoma.

TABLE OF CONTENTS/OUTLINE

Background. Review common imaging features that distinguish HCC and CC. Pathogenesis of mixed HCC-CC. Challenges in imaging diagnosis of mixed HCC-CC from HCC and CC. Clinical implications of mixed tumors. Summary.

GI126-ED-X

The Spectrum of Ischemic Colitis: Varying Etiologies, Manifestations and Radiographic-pathologic Findings

All Day Room: GI Community, Learning Center

Participants

Dae Hee Kim, MD, Burlington , MA (*Presenter*) Nothing to Disclose
Walter Champion III, MD, Burlington, MA (*Abstract Co-Author*) Nothing to Disclose
Francis J. Scholz, MD, Burlington, MA (*Abstract Co-Author*) Owner, FSpoon Company

TEACHING POINTS

First described by Boley in 1963, ischemic colitis is a common cause of acute abdominal pain and gastrointestinal bleeding. It is most commonly attributed to a non-occlusive, low-flow vascular state but can also be induced by numerous arterial or venous insults. It can have varying radiographic manifestations. It may be transient, segmental or regional. It may cause bowel perforation. It may heal without sequelae or with stricture formation. The purpose of this exhibit is to review the varying etiologies and imaging manifestations of ischemic colitis.

TABLE OF CONTENTS/OUTLINE

1. Introduction.2. Overview of colonic vasculature.3. Literature review of epidemiology and etiology of ischemic colitis.4. Early versus late acute ischemic colitis.5. Unusual distribution: A case of right colon ischemia.6. Unusual etiologies: Tumor, Hernia, endovascular abdominal aortic aneurysm repair and AVM.7. Chronic sequelae of ischemic colitis. 8. Summary.

GI127-ED-X

Abdominal Manifestations of Cystic Fibrosis: Role of Diagnostic and Interventional Radiology

All Day Room: GI Community, Learning Center

Participants
Sarah Aquilina, Naxxar, Malta (*Abstract Co-Author*) Nothing to Disclose
Settimo Caruso, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Kelvin Cortis, MD, FRCR, Msida, Malta (*Abstract Co-Author*) Nothing to Disclose
Christine J. Cannataci, MD, Msida, Malta (*Abstract Co-Author*) Nothing to Disclose
Giuseppe Mamone, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Roberto Miraglia, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Ambra di Piazza, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Vincenzo Carollo, MD, Palermo, Italy (*Presenter*) Nothing to Disclose

TEACHING POINTS

Advances in the management of the pulmonary complications of cystic fibrosis have led to increased patient survival in cystic fibrosis (CF), with more patients exhibiting CF related abdominal findings. Review the clinico-radiological spectrum of abdominal manifestations of CF, illustrated through multimodality imaging. Review the current data regarding the role of Transjugular Intrahepatic Portosystemic Shunt (TIPS) creation in CF patients.

TABLE OF CONTENTS/OUTLINE

Introduction: Pathophysiology of the abdominal complications of CF Hepatobiliary manifestations Hepatic steatosis Hepatic fibrosis and/or cirrhosis with imaging features of portal hypertension Biliary manifestations Focal biliary plugging and focal biliary cirrhosis Secondary sclerosing cholangitis Cholelithiasis TIPS in CF patients Pancreatic manifestations Complete fatty replacement, pancreatic duct strictures, and pancreatic exocrine insufficiency Pancreatic cysts Gastrointestinal manifestations Meconium ileus and meconium ileus equivalent Intussusception Colonic wall redundancy Pericolonic/mesenteric fat infiltration

GI128-ED-X

Mind the Gap: Pre and Post Operative Abdominal Wall Hernia Imaging - Are You Doing Justice?

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Aruna R. Patil, MD, FRCR, Bangalore, India (*Presenter*) Nothing to Disclose
Himansu S. Mohanty, MBBS, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose
Shrivalli Nandikoor, MBBS, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose
Govindarajan J. Mallarajapatna, MBBS, MD, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose
Ravishankar Bhat, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Abdominal wall hernias are encountered frequently and repair with or without mesh placement is a commonly performed procedure. This exhibit will provide an overview on the structured reporting of different abdominal wall hernias from the surgeons perspective. Pitfalls and subtleties in interpretation of abdominal wall hernias with focus on mesh apperances on imaging. Acquaint the radiologist with imaging features of various complications post repair .

TABLE OF CONTENTS/OUTLINE

The exhibit will cover the following :- Pre operative imaging assessment of various types of abdominal wall hernia with emphasis on a formatted reporting based on surgeons need – ventral hernia, lumbar hernia, inguinal, femoral hernias, traumatic and incisional hernias and associated complications such as bowel obstruction, strangulation and incarceration. Pitfalls / mimics of hernia – fatty inguinal canal, recti divarication, parietal wall lipomas, umbilical sinus, bladder ear , rectus hematoma, tumors etc. Imaging appearances of various types of mesh, a knowledge of which is very important to avoid misinterpretation. Post op complications including, a. Hematoma / Seroma, b.Mesh infection, sinus formation c.Migrated mesh, d.Recurrent hernia , e. Fistulization with adjacent viscera.

GI129-ED-X

The Problematic Pancreas: Pitfalls in Pancreatic Imaging

All Day Room: GI Community, Learning Center

Participants
Carrie K. Gomez, DO, Rochester, NY (*Presenter*) Nothing to Disclose
Deborah J. Rubens, MD, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Luann T. Jones, MD, Pittsford, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Pancreatic adenocarcinoma constitutes 80-90% of all pancreatic tumors. Recognition of early imaging features for de novo diagnosis and disease recurrence is of paramount importance. Loss of the mottled/lobular appearance and contour deformities of the pancreas, subtle dilation of the pancreatic duct, and changes in shape or caliber of the SMV are subtle or indirect signs of disease. Reversal of pancreatic atrophy, while not commonly seen, is typically an unrecognized sign of infiltrative metastatic recurrence. Alternate diagnoses must be considered for large tumors which do not cause pancreatic ductal dilatation, including undifferentiated carcinoma of the pancreas with osteoclast-like giant cells, solid pseudopapillary epithelial neoplasm (SPEN), acinar cell carcinoma, and lymphoma.

TABLE OF CONTENTS/OUTLINE

Portray subtle findings in subsequently proven cases of pancreatic adenocarcinoma that went unrecognized. Show frequently missed early signs of disease recurrence post Whipple. Portray examples of less common pancreatic tumors initially misinterpreted as pancreatic adenocarcinoma including undifferentiated carcinoma of the pancreas with osteoclast-like giant cells, SPEN, acinar cell carcinoma, lymphoma, and metastatic disease..

GI131-ED-X

Integration of Bremsstrahlung SPECT/CT in the Interpretation of Post-SIRT Imaging

All Day Room: GI Community, Learning Center

Participants

Joanna Jeong, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
Harsha V. Nalluri, MD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Charles P. Young, MD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Ross L. Ristagno, MD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Aboulemagd Makramalla, cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Jennifer L. Scheler, MD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Bruce Mahoney, MD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Shimul Shah, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Kyuran A. Choe, MD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review of Bremstrahlung (BS) SPECT/CT following Y-90 SIRT. Demonstrate the role of BS SPECT/CT in identifying the region of Y-90 therapy. Demonstrate the role of BS SPECT/CT in identifying regions of non target Y-90 distribution and effects. Discuss the role of BS SPECT/CT in the interpretation of post therapy imaging and differentiation of post treatment changes from disease recurrence or progression.

TABLE OF CONTENTS/OUTLINE

Background information on SIRT Background information on Bremsstrahlung SPECT/CT Review of Post SIRT imaging findings In the tumor bed change in tumor size peripheral hyperenhancement Beyond the tumor bed geographic area of hypoattenuation parenchymal hyperattenuation transient perivascular edema perihepatic ascites volumetric changes in the liver complications Summary and conclusion

GI132-ED-X

Synoptic Reporting for MRI of Perianal Fistulas

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Seng Thipphavong, MD, Toronto, ON (*Presenter*) Nothing to Disclose
Andreu F. Costa, MD, FRCPC, Halifax, NS (*Abstract Co-Author*) Nothing to Disclose
Boraiah Sreeharsha, FRCPC, Liverpool, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Proper characterization of perianal fistula disease on MRI is essential for guiding appropriate surgical management and monitoring treatment response. A standardized assessment and reporting method for perianal fistulas on MRI ensures that essential information affecting treatment are communicated to surgeons in a concise, consistent, and complete manner.

TABLE OF CONTENTS/OUTLINE

Background. Review MRI protocol. Review perianal MRI anatomy. Parks classification. St James MRI classification. Presentation of synoptic reporting for perianal fistulas, with illustrative how-to-do-it examples.

GI133-ED-X

Bowel Preparation in CT Colonography: Interactive Case Based Presentation

All Day Room: GI Community, Learning Center

Participants
Nasir M. Jaffer, MD, Toronto, ON (*Presenter*) Nothing to Disclose
Patrik Rogalla, MD, Toronto, ON (*Abstract Co-Author*) Research Grant, Toshiba Corporation; Speakers Bureau, Bayer AG
Tanya P. Chawla, MBBS, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Lawrence A. Stein, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Luis S. Guimaraes, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

•Learn Principles,types & pitfalls of bowel preparation

•Learn different regimens of Bowel Preparation in CT Colonography

•Discuss unique Bowel Preparation for patients with granulomatous inflammatory bowel disease

TABLE OF CONTENTS/OUTLINE

•This interactive presentation will use clinical scenarios to assess your background knowledge of and discuss the types, physiology, utility and limitations of different laxatives.INSTRUCTIONS FOR INTERACTIVE SESSSION:• Hyperlinks on possible choices for each question, and Selecting correct answer will allow to move the next side
CASES WILL INCLUDE THE FOLLOWING CLINICAL SCENARIOSCASE 1 Anxious Patient requiring information about safety, and comfort of CTC procedure CASE 2: Pt with medical comorbiditiesCASE 3: Severely constipated patient CASE 4: Pt with colostomy CASE 5: Pt with IBD and stenosis CASE 6: CTC immediately after Incomplete colonoscopeCASE 7: Minimum volumes i(Laxative and fecal agents) ingested by PT undergoing CTC

GI134-ED-X

Magnetic Resonance Imaging of Liver Fibrosis: A Pictorial Essay

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Leonie Petitclerc, MSc, Montreal, QC (*Presenter*) Nothing to Disclose
Guillaume Gilbert, PhD, Montreal, QC (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Jessica Murphy-Lavallee, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Damien Olivie, MD, MS, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Guy Cloutier, PhD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
An Tang, MD, Montreal, QC (*Abstract Co-Author*) Advisory Board, Imagia Cybernetics Inc

TEACHING POINTS

To review imaging-based techniques for the quantification of liver fibrosis. To compare the diagnostic accuracy of these techniques for staging liver fibrosis. To discuss the advantages and limitations of these imaging methods.

TABLE OF CONTENTS/OUTLINE

Clinical relevance: epidemiology and etiology of liver fibrosis. Liver biopsy: advantages and limitations for diagnosis and staging of liver fibrosis. Clinical need: imaging techniques for staging and monitoring of liver fibrosis. Classification of techniques by imaging modality: US, CT and MRI. Review of imaging methods, with focus on MR-based methods: elastography, diffusion, perfusion, texture analysis, hepatocellular function, T1ρ, cine-tagging. For each imaging method: summary of concept, diagnostic accuracy, advantages and limitations. Future directions: unmet clinical needs, confounding effects of fat and inflammation, MR sequences more robust to iron deposition in liver, need for faster methods and the emerging role of multi-parametric MRI.

GI135-ED-X

Don't Always Go with Your Gut: A Case-Based Review of Gastrointestinal Mimics of Malignancy

All Day Room: GI Community, Learning Center

Participants
Christina Ma, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Monica Deshmukh, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Anokh Pahwa, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Shaden F. Mohammad, MD, Sylmar, CA (*Abstract Co-Author*) Nothing to Disclose
Cecilia M. Jude, MD, Los Angeles, CA (*Abstract Co-Author*) Author, UpToDate, Inc
Maitraya K. Patel, MD, Sylmar, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Malignancy in the gastrointestinal tract is one of the top differential diagnoses, presenting with a variety of focal or diffuse imaging manifestations. However, many non-neoplastic diseases can show similar patterns. An understanding of normal variants and alternate diagnoses can reduce the frequency of malignancy misdiagnoses. This case-based review will assist the radiologist at all levels of training in identifying key clinical and imaging features that help identify these non- neoplastic conditions and make appropriate recommendations to the referring clinician.

TABLE OF CONTENTS/OUTLINE

Multimodality case-based review of inflammatory and infectious diseases and normal variants mimicking gastrointestinal malignancy. The following cases will be presented with discussion of pertinent clinical presentation, treatment, and differential diagnosis:1. Liver: fulminant liver failure, sarcoidosis, biliary hamartomas2. Gallbladder: xanthogranulomatous cholecystitis, adenomyomatosis, tumefactive sludge3. Spleen: sarcoidosis, candidiasis, siderotic nodules, splenosis4. Pancreas: focal, chronic, and autoimmune pancreatitis, fat saponification, focal pancreaticatrophy, intrapancreatic splenule5. Bowel: inflammatory entities, bezoar6. Peritoneum and mesentery: endometriosis, gossypiboma

GI136-ED-X

Imaging of the Greater Omentum: Protective Mechanism and Pathologic Condition

All Day Room: GI Community, Learning Center

Participants

Akitoshi Inoue, MD, Shiga, Japan (*Presenter*) Nothing to Disclose
Shinichi Ota, MD,PhD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Kenji Furuichi, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Hisayasu Matsuo, MD, Shiga, Japan (*Abstract Co-Author*) Nothing to Disclose
Michio Yamasaki, MD, Ritto, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuki Tomozawa, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Shobu Watanabe, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Akira Furukawa, MD, PhD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Norihisa Nitta, MD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Kiyoshi Murata, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The greater omentum constructed by four-layered peritoneum, fat tissue, lymph system, and vessels attaches to the greater curvature of stomach and the transverse colon. The omentum is mobile and protect spread of inflammation or tumor, therefore, it is also known as “Police in Abdomen”.The aim of this presentation include the following:1, To review anatomy and histology of the greater omentum2, To learn protective mechanism for inflammatory and neoplastic process and omental plug for treatment of gastrointestinal perforation and inflammatory disorder3, To describe various disease of the greater omentum

TABLE OF CONTENTS/OUTLINE

1, Introduction2, Gross anatomy and imaging anatomy3, Protective mechanism4, Omental plug5, Various disease 5-1, Abnormal location such as external hernia 5-2, Bowel obstruction due to the greater omentum 5-3, Infarction 5-4, Inflammation 5-5, Vascular lesion 5-6, Neoplasm6, Summary

GI138-ED-X

Stercoral Colitis: A Review of Imaging Features and Complications

All Day Room: GI Community, Learning Center

Participants
Amandeep Singh, MD, New Hyde Park, NY (*Presenter*) Nothing to Disclose
John J. Hines JR, MD, New Hyde Park, NY (*Abstract Co-Author*) Nothing to Disclose
Barak Friedman, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Douglas S. Katz, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The learner will accomplish the following goals:1.) Understand the basic pathophysiology and risk factors of stercoral colitis such as patients with chronic constipation and fecal impaction in elderly, institutionalized patients, diabetics, narcotic, anticholinergic users.2.) Familiarize themselves with the imaging findings of stercoral colitis and its associated complications such as colonic ischemia, perforation, feculent peritonitis and death, with the help of relevant cases.3.) Review the imaging mimics of stercoral colitis, which in general are more common; these include diverticulitis, infectious colitis, inflammatory bowel disease, and ischemic colitis, and understand the distinguishing features.4.) Learn the importance of early diagnosis and timely management of stercoral colitis.

TABLE OF CONTENTS/OUTLINE

- Risk factors, clinical presentation and pathophysiology of stercoral colitis- Case-based review of imaging findings of uncomplicated and complicated stercoral colitis- Imaging mimics of stercoral colitis and distinguishing features- Management of stercoral colitis- Summary

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Douglas S. Katz, MD - 2013 Honored Educator
Douglas S. Katz, MD - 2015 Honored Educator

GI139-ED-X

Laparoscopic Sleeve Gastrectomy: Everything the Radiologist Needs to Know

All Day Room: GI Community, Learning Center

Participants

Tulay Ekinci, MD , Bronx, NY (*Presenter*) Nothing to Disclose
Marjorie W. Stein, MD, New Rochelle, NY (*Abstract Co-Author*) Nothing to Disclose
Fernanda S. Mazzariol, MD, Bronxville, NY (*Abstract Co-Author*) Nothing to Disclose
Ellen L. Wolf, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Sleeve gastrectomy is an effective weight loss surgery due to gastric restriction in addition to metabolic and hormonal factors.2. UGI series with water-soluble contrast is generally performed in the early post-operative period to detect a leak and may be followed with barium if a leak is not demonstrated.3. The most common site of leakage is from the proximal staple line. Contrast may be seen in a track, collection, and/or drain or free in the peritoneal cavity4. CT scan is useful to detect leak, hemorrhage, splenic injury, abscess, and thromboembolic disease.5. Focal strictures may be treated with endoscopic dilatation, but long strictures often require surgical revision.

TABLE OF CONTENTS/OUTLINE

1. Review of the surgical technique and mechanisms of weight loss in sleeve gastrectomy.2. Normal radiographic anatomy3. Multimodality review of complications of laparascopic sleeve gastrectomy including: A. LeakB. AbscessC. FistulaD. HemorrhageE. StrictureF. Splenic injuryG.Gastric dilatationH.Gastroesophageal reflux diseaseI.Wound complicationsJ.Venous thromboembolismK.Trocar Hernia

GI140-ED-X

CT Findings of Blister Pack Ingestion

All Day Room: GI Community, Learning Center

Participants
Aoi Uchida, MD, Tokyo, Japan (*Presenter*) Nothing to Disclose
Takashi Katayama, MD, PhD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Juri Miyaji, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Mayuko Sato, Ome-Shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Etsuo Yamazaki, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Blister pack ingestion is a common problem in emergency rooms. Computed tomography (CT) can confirm the location, size and the state of ingested object and can be used to guide further patient management, such as an endoscopy, or surgery. The sensitivity of CT depends on the material from which the blister pack is made. Several kinds of materials can be used to form such films, including polyvinyl chloride (PVC) and polypropylene (PP). The pills themselves also exhibit their own attenuations, such findings can be helpful for identifying an ingested blister pack in cases where the packaging cannot be visualized using CT. We will report 14 cases of blister pack ingestion and describe the in vitro CT findings for both the pills and the blister packs. We discuss the radiologic feature and pitfalls of blister pack ingestion.

TABLE OF CONTENTS/OUTLINE

1. Introduction: Clinical importance of the ingestion of blister packs Structural feature and materials of blister packs Common findings of blister pack ingestion on CT2. In vitro study of blister pill packs on CT: packaging (including 7 kinds of materials) pills (60 tablets and 10 capsules)3. Case series: 14 cases of ingested blister packs4. Discussion: CT findings and pitfalls for diagnosis of blister back ingestion. Information about the materials of blister packs

GI141-ED-X

Hepatocellular Carcinoma with Venous Invasion: Imaging Features and Implications on Management

All Day Room: GI Community, Learning Center

Participants

Scott M. Thompson, MD, PhD, Rochester, MN (*Presenter*) Research collaboration, Synta Pharmaceuticals Corp
Michael L. Wells, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Eric C. Ehman, MD, Pacifica, CA (*Abstract Co-Author*) Nothing to Disclose
James C. Andrews, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Christopher L. Hallemeier, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Lewis R. Roberts, MBChB, PhD, Rochester, MN (*Abstract Co-Author*) Research Grant, Ariad Pharmaceuticals, Inc Research Grant, Bayer AG Research Grant, Bristol-Myers Squibb Company Research Grant, Gilead Sciences, Inc Consultant, Gilead Sciences, Inc Research Grant, Inova Diagnostics, Inc Consultant, Inova Diagnostics, Inc Consultant, Nordion, Inc Research Grant, Nordion, Inc Research Grant, Wako Life Sciences, Inc Consultant, Wako Life Sciences, Inc
Sudhakar K. Venkatesh, MD, FRCR, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Learn the imaging appearance of hepatocellular carcinoma (HCC) with venous invasion on ultrasound (US), computed tomography (CT), magnetic resonance imaging (MRI) and angiography.
2. Understand the implications of venous invasion on management of HCC including locoregional, surgical, radiation and medical therapy.

TABLE OF CONTENTS/OUTLINE

1. Imaging appearance of HCC with venous invasion: Enhancement of HCC in the dynamic phase differs from classical HCC Differentiation of bland thrombus from tumor thrombus Identification of arterioportal and arteriovenous shunting2. Implications of HCC with venous invasion on management: An arterioportal or arteriovenous shunt increases risk of non-target embolization within liver and/or abdomen in patients undergoing transarterial chemoembolization (TACE) or radioembolization (TARE). Select patients may be a candidate for super-selective TACE. An arteriovenous shunt increases the risk of lung irradiation with TARE Alternative treatment options –surgical resection, transplant, stereotactic body radiation therapy (SBRT), molecular-targeted therapy with Sorafenib.

Honored Educators

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Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

GI142-ED-X

MR Imaging Techniques of Chronic Pancreatitis; How to Do Quantitative, Qualitative and Dynamic Imaging

All Day Room: GI Community, Learning Center

Participants

Temel Tirkes, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose
Sudhakar K. Venkatesh, MD, FRCR, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Kumaresan Sandrasegaran, MD, Carmel, IN (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Conventional and new MR imaging techniques of fibrosis How to do dynamic MR imaging of pancreas? How to do quantitative imaging of pancreas? Criteria used for quantitative and qualitative analysis of chronic pancreatitis How to determine tissue stiffness of the pancreas How do we detect steatosis in the pancreas? Criteria used for grading of chronic pancreatitis

TABLE OF CONTENTS/OUTLINE

Viewers of this presentation will have knowledge of these imaging techniques of the pancreas What is qualitative and quantitative imaging? T1-weighted gradient echo imaging for measurement of T1 signal T1-weighted DIXON imaging for fat quantification T1 mapping for quantitative imaging of pancreas Secretin enhanced MRCP (S-MRCP) for pancreatic exocrine function and ductal imaging Cambridge classification for interpretation of ductal changes Diffusion weighted imaging (DWI) for assessing fibrosis MR elastography (MRE) for measurement of pancreatic tissue stiffness

Honored Educators

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Temel Tirkes, MD - 2013 Honored Educator
Temel Tirkes, MD - 2014 Honored Educator
Kumaresan Sandrasegaran, MD - 2013 Honored Educator
Kumaresan Sandrasegaran, MD - 2014 Honored Educator
Kumaresan Sandrasegaran, MD - 2016 Honored Educator

GI143-ED-X

GI Motility Assessment: Techniques and Clinical Relevance

All Day Room: GI Community, Learning Center

Participants
Samita Garg, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Michael C. Gates, MD, Shreveport, LA (*Abstract Co-Author*) Nothing to Disclose
James Walton, Aurora, CO (*Abstract Co-Author*) Nothing to Disclose
Kavita Garg, MD, Denver, CO (*Presenter*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:1. To review various GI motility disorders2. To illustrate the role of various imaging techniques (including fluorocopic, nuclear medicine, CT or MR enterography or defecography) using sample cases from clinical practice3. Briefly discuss newer imaging techniques and their clinical relevance including smart pill to diagnose functional abnormalities

TABLE OF CONTENTS/OUTLINE

Overview of GI motility: normal vs abnormalPathophysiology, causes and imaging of gastroparesisNewer imaging techniques including CT or MR entrography and defecography to rule out structural abnormalities such as inflammatory bowel disease, enterocele, rectal prolapse, dyssynergiaBrief illustration of endoscopic evaluation using Smart Pill and clinical relevance

GI144-ED-X

Cross Sectional Imaging of Intrahepatic Cholangiocarcinoma: Development, Growth, Spread, and Prognosis

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Nieun Seo, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jin-Young Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yong Eun Chung, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Mi-Suk Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myeong-Jin Kim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Bayer AG
Ki Whang Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To introduce recent updates in epidemiology and pathologic concepts of intrahepatic cholangiocarcinoma (ICC)
2. To present an imaging atlas of ICC with radiologic-pathologic correlation and differential diagnosis
3. To describe imaging features of ICC using advanced MR technology
4. To discuss the prognostic imaging features of ICC

TABLE OF CONTENTS/OUTLINE

1. Epidemiology2. Pathologic considerations and cholangiocarcinogenesis (1) Gross morphology (2) New pathologic subclassification i. Perihilar large duct type ICC ii. Peripheral small duct type ICC (3) Premalignant lesions of ICC (4) Relationship with pancreatic counterparts3. Updated imaging features and differential diagnosis (1) Technical considerations of CT and MRI (2) Typical imaging features and its differential diagnosis i. Mass-forming ICC ii. Periductal infiltrating ICC iii. Intraductal growing ICC4. Prognostic implications of imaging features (1) Prominent arterial enhancement (2) Delayed enhancement

GI145-ED-X

Bariatric Surgery: Normal Findings and Complications

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
CARLOS GALVEZ GARCIA, PhD, SEVILLE, Spain (*Presenter*) Nothing to Disclose
Antonio Talegon Melendez, Seville, Spain (*Abstract Co-Author*) Nothing to Disclose
Rafael F. Ocete, MD, Seville, Spain (*Abstract Co-Author*) Nothing to Disclose
Blanca Vargas Serrano, Seville, Spain (*Abstract Co-Author*) Nothing to Disclose
Javier Castell, MD, Valencina De La Concepcion, Spain (*Abstract Co-Author*) Nothing to Disclose
Carlos Gutierrez, Seville, Spain (*Abstract Co-Author*) Nothing to Disclose
Alberto J. Rodriguez, Sevilla, Spain (*Abstract Co-Author*) Nothing to Disclose
Juan Jurado Serrano, MBBS, Seville, Spain (*Abstract Co-Author*) Nothing to Disclose
Alejandro Ramiro Cueva, Seville, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Revise de main surgical techniques for weight reduction in patient with morbid obesity (laparoscopic Roux-en-Y gastric bypass, laparoscopic adjustable gastric banding, and laparoscopic sleeve gastrectomy).
Describe the normal imaging findings and surgical anatomy of these techniques in TC and fluoroscopic upper gastrointestinal examinations. Describe the early and late major complications after these procedures.

TABLE OF CONTENTS/OUTLINE

Surgical technique: we will analyse these procedures using pictures and diagrams. Surgical anatomy: we will describe the surgical anatomy and normal imaging findings for these bariatric procedures at fluoroscopic examinations and CT. Complications: the imaging features of complications of bariatric surgery are discussed and illustrated: Laparoscopic Roux-en-Y Gastric Bypass:Leaks; Anastomotic narrowing and strictures (gastrojejunal anastomosis and the Roux limb), Small bowel obstruction (adhesions vs internal hernias), Intussusception; Recurrent weight gain. Laparoscopic Sleeve Gastrectomy: Gastric leaks; Gastric dilation,Gastric strictures and gastroesophageal reflux. Laparoscopic Adjustable Gastric Banding: Malpositioned band and Pouch dilation.

GI146-ED-X

Liver Transplant Evaluation: A Review of Technique, Normal Imaging Appearance and Complications

All Day Room: GI Community, Learning Center

Participants
Amit B. Desai, MD, Rochester, NY (*Presenter*) Nothing to Disclose
Shweta Bhatt, MD, MBBS, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Akshya Gupta, MD, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

By viewing this exhibit, the viewer will be able to :1. Understand the normal expected appearances on imaging in a liver transplant. 2. Identify the complications in liver transplant in the early and chronic post operative period.3. Identify the etiology for the complications

TABLE OF CONTENTS/OUTLINE

1. Surgical technique2. Normal expected findings in liver transplant on imaging, with emphasis on ultrasound 3. Complications - Arterial(obstructive disease, aneurysm, AVF) -Venous (porta, hepatic, IVC) - Biliary -Neoplastic (recurrence of HCC, PTLD) Parenchyma and perihepaticSample cases and discussion of each

GI147-ED-X

Radiologic Evaluation of Pancreas Transplant and Its Complications

All Day Room: GI Community, Learning Center

Participants
Paula Gallego Ferrero, MD, Santander, Spain (*Presenter*) Nothing to Disclose
Juan Crespo Del Pozo, Santander, Spain (*Abstract Co-Author*) Nothing to Disclose
Victor Fernandez Lobo, Santander, Spain (*Abstract Co-Author*) Nothing to Disclose
Beatriz Garcia Martinez, BDS, Santander, Spain (*Abstract Co-Author*) Nothing to Disclose
Amaya Iturralde Garriz, santander, Spain (*Abstract Co-Author*) Nothing to Disclose
Francisco Gonzalez Sanchez, Santander, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the most commonly used pancreas transplantation surgical procedures. To illustrate the normal post-operative anatomy and the imaging appearance of the pancreatic graft. To recognize the radiographic features of the most frequent complications following a pancreas transplantation.

TABLE OF CONTENTS/OUTLINE

Introduction to the pancreas transplant, different surgical techniques and normal postoperative imaging appearance. Most common postoperative complications: Anastomotic leakage. Hemorrhage. Infection. Vascular thrombosis. Most common nonsurgical complications: immunologic complications, being the graft rejection one of them. The evaluation of these patients can include ultrasound, computed tomography and magnetic resonance imaging. Main teaching point: an accurate and early diagnosis of pancreas transplant complications is essential to start the adequate treatment and increase the chances of graft survival.

GI148-ED-X

Imaging of Non-Neoplastic True Pancreatic Cysts: Diagnostic Key for the Distinction from Pancreatic Cystic Neoplasms

All Day Room: GI Community, Learning Center

Participants

Kousei Ishigami, MD, Iowa City, IA (*Presenter*) Nothing to Disclose
Akihiro Nishie, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
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Yukihisa Takayama, MD, Fukuoka, Japan (*Abstract Co-Author*) Research Grant, FUJIFILM Holdings Corporation
Hiroshi Honda, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Daisuke Okamoto, MD, Fukuoka City, Japan (*Abstract Co-Author*) Nothing to Disclose
Nobuhiro Fujita, MD, PhD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Masakazu Hirakawa, MD, Beppu, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Lymphoepithelial cyst (LEC) commonly presents as an exophytic multilocular cystic mass, containing high intensity component on T1-weighted and diffusion weighted (DW) images. The presence of microscopic fat may be specific for LEC. Epidermoid cyst (EDC) commonly presents as a uni- or multilocular cystic mass at the edge of the pancreatic tail, and the cyst wall of EDC is typically uniform. DW image with and without superparamagnetic iron oxide (SPIO) is helpful to confirm the presence of an accessory splenic tissue, from which EDC originates. Multilobulated shape is more suggestive for cystic neoplasms (e.g., mucinous cystic neoplasm) rather than EDC.

TABLE OF CONTENTS/OUTLINE

LEC of the pancreas and its mimickers: serous cystic neoplasm, mucinous cystic neoplasm, tuberculous lymphadenitis, and hepato-biliary cystic neoplasms. EDC with accessory splenic tissue: usefulness of the combination of DW image with and without SPIO. EDC without solid component and its mimickers: mucinous cystic neoplasm and cystic neuroendocrine neoplasm. Differential diagnosis of pancreatic cysts with T1-shortening and restricted diffusion. Diagnostic keys for the differential diagnosis between non-neoplastic pancreatic true cysts and cystic neoplasms of the pancreas.

GI149-ED-X

A Low-hanging Fruit from the Biliary Tree: Biliary Imaging Post Intervention

All Day Room: GI Community, Learning Center

Participants
Almamoon I. Justaniah, MD, Boston, MA (*Presenter*) Nothing to Disclose
Olga R. Brook, MD, Boston, MA (*Abstract Co-Author*) Research Grant, Toshiba Medical Systems Corporation

TEACHING POINTS

The learner will be able to:-Identify the etiology of recurrent cholangitis in liver transplant patients
-Understand the significance of pneumobilia post biliary intervention and how does it pertain to patient's care
-Recognize that hemobilia can masquerade as hematemesis, melena or hematochazia and the fastest route to diagnosis is to have a high index of suspicion
-Suspect and identify the source of biliary-related bleeding post intervention
-Diagnose post TACE chemical cholecystitis and help care providers with the management plan
-Appreciate the importance of careful catheters and stents evaluation

TABLE OF CONTENTS/OUTLINE

Images will be shown. Questions will be asked. Explanation and discussion will follow each case including tips and tricks. Management plans will be provided when possible. Supportive points will be drawn from the literature.The cases include:-
Ischemic cholangiopathy post liver transplant due to hepatic arterial thrombosis
-Recurrent cholangitis due to anastomotic stricture at the hepaticojejunostomy
-Hemobilia post percutaneous biliary drain placement due to hepatic artery pseudoaneurysm
-Hemoperitoneum post percutaneous biliary drain placement due to hepatic arterial injury
-Post TACE chemical cholecystitis
-Multiple cases of dislodged, migrated, or removed biliary catheters that have gone unnoticed

GI150-ED-X

Ultrasound of Hyperechoic Masses in the Liver: Pathologically Categorized Differential Diagnosis

All Day Room: GI Community, Learning Center

Participants
Yumi Matsui, Kashihara, Japan (*Presenter*) Nothing to Disclose
Masayo Ogawa, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
Toshiko Hirai, MD, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
Nagaaki Marugami, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
Kimihiko Kichikawa, MD, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) To understand why the hepatic masses show high echo on US in terms of pathology.2) To illustrate the spectrum of hepatic hyperechoic masses with CT and MR images to make a diagnosis.

TABLE OF CONTENTS/OUTLINE

We classify hepatic hyperechoic masses according to pathological features as follows; 1) multiple micro cystic muss and vascular mass: Bile duct hamartoma, and Hemangioma.2) infectious or fibrous masses: inflammatory pseudotumor, abscess, and hepatic contusion.3) fat-containing masses: Focal fatty change, Angiomyolipoma, Focal nodular hyperplasia, Liver adenoma, Granular Echinococcosis, and Hepatocellular carcinoma (well-differentiated cancer, moderately-differentiated cancer, and small nodule).4) calcified mass, coagulative necrosis, and heterogeneous mass: metastatic tumors (sigmoid cancer, renal pelvis cancer, and carcinoid cancer).Hepatic hyperechoic masses are produced by the multiple reflection effect. We examine pathological features of hepatic hyperechoic masses and summarize their radiological diagnostic flow chart.

GI151-ED-X

Liver Imaging Reporting and Data System: An Interactive Tutorial

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Victoria Chernyak, MD, Bronx, NY (*Presenter*) Nothing to Disclose
Cynthia S. Santillan, MD, San Diego, CA (*Abstract Co-Author*) Consultant, Robarts Clinical Trials, Inc
Jonathan C. Hooker, BS, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;

TEACHING POINTS

Hepatocellular carcinoma (HCC) is the most common primary liver neoplasm and the most rapidly rising cause of cancer death in the United States. While various guidelines for imaging-based diagnosis of HCC exist, the Liver Imaging Reporting and Data System (LI-RADS) is the most comprehensive and the only one providing standardized terminology for interpretation and reporting. The purpose of this exhibit is to familiarize radiologists with the LI-RADS algorithm and its key terminology and to increase their comfort level with using LI-RADS. At the conclusion of this live activity, participants will be able to: Define key LI-RADS terminology including major features and ancillary features Apply major features, ancillary features, and tie-breaking rules using the LI-RADS algorithm to assign categories

TABLE OF CONTENTS/OUTLINE

This presentation will begin with review slides highlighting key points of LI-RADS algorithm. After that, illustrative cases covering a spectrum of LI-RADS categories will be presented in a quiz format.The presentation outline is as follows: LI-RADS Major features Arterial phase iso-, hypo- and hyperenhancement Diameter "Washout" "Capsule" Threshold growth LI-RADS Ancillary features LI-RADS Algorithm, including use of ancillary features and tie-breaking rules Practice cases: LR 1-5, LR-M, LR-V

GI152-ED-X

Six-step Predisposal to Achieve High Quality CT Images of Gastric Cancer: How We to Do

All Day Room: GI Community, Learning Center

Participants

Lei Tang, MD, Beijing, China (*Presenter*) Nothing to Disclose
Yan-Xia Sun, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Jia Fu, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xiao-Ting Li, Peking City, China (*Abstract Co-Author*) Nothing to Disclose
Xiao-Ting Li, Peking City, China (*Abstract Co-Author*) Nothing to Disclose
Ying-Shi Sun, MD, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To introduce the six-step predisposal to improve the imaging quality of gastric cancer CT. 2. To explain the reasons for the set-up of crucial steps.3. To introduce the quality control (QC) procedures to guarantee the image quality.

TABLE OF CONTENTS/OUTLINE

1. Predisposal procedures:Step 1: 20 mg anisodamine was administered 15-20 min prior to CT examination.Step 2: ask if the patients feel thirsty and flushing, to make sure the hypotonic effect.Step 3: breath-hold training for 2-3 times, using both eye (observe) and hand (touch), to make sure motionless abdominal wall.Step 4: moisten the oral cavity, to relieve the thirsty caused by hypotonic and facilitate the chew of effervescent granules.Step 5: the patients sit on the scanning table, swallow the effervescent granules, avoid the spurt out of the gas.Step 6: the patients drink 2ml water and immediately change to supine for scanning, to facilitate the uniform distribution of the gas.2. Key points for three-level QC:(1) The nurses should record if the patients feel thirsty and have flushing.(2) The technologists should judge the filling degree and determine whether to supplement effervescent agent.(3) The radiologists should evaluate the image quality, to judge if the gastric lumen fully expanded, and if peristalsis and stair step artifacts eliminated.

GI153-ED-X

Imaging Features of Gastrointestinal Neoplasm in Patients with Inflammatory Bowel Disease

All Day Room: GI Community, Learning Center

Participants
Hussein Jaffer, Toronto, ON (*Presenter*) Nothing to Disclose
Luis S. Guimaraes, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Seng Thipphavong, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Richard Kirsch, MD, PhD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Nasir M. Jaffer, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The learning objectives of this educational presentation are as follows: 1) To learn types of intestinal neoplasms that occur in Crohn's disease and ulcerative colitis patients, specifically colorectal cancer, small bowel adenocarcinoma, and intestinal lymphoma;2) To learn distinctive radiographic appearances of neoplasms in IBD, and their histopathological features; and 3) To understand the unique surveillance and management of neoplasms in IBD.

TABLE OF CONTENTS/OUTLINE

IBD and Cancer: Epidemiology and Surveillance Colorectal Cancer in IBD: Risk Factors Imaging Modalities and Indications Colorectal Cancer in Ulcerative Colitis: Imaging Findings Small Bowel Neoplasms in Crohn's Disease Pitfalls of Imaging in IBD with Lesions Other Neoplasms in IBD: Anal Cancer & Lymphoma Cases: A series of cases from our institution of gastrointestinal neoplasms in IBD patients History Imaging Findings Pathology Conclusion.

GI154-ED-X

Looking beyond the 'GIST' of Gastrointestinal Stromal Tumors: A Review of Associated Tumors

All Day Room: GI Community, Learning Center

Participants

Joshua K. Kuroiwa, DO, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Christopher J. Lisanti, MD, Schertz, TX (*Presenter*) Royalties, Wolters Kluwer nv
Nathaniel E. Smith, MD, Ft. Sam Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Ryan B. Schwope, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Kyle R. Walker, DO, Universal City, TX (*Abstract Co-Author*) Nothing to Disclose
Liem T. Mansfield, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Once GIST is diagnosed, radiologists must search for synchronous tumors due to: A. Higher incidence of non-syndromic tumors at and after GIST diagnosis, and B. GIST occur in syndromes (5% of GIST) associated with NF-1, Carney triad, or Carney-Stratakis Syndrome2. Goals of post-therapy imaging are: A. Evaluate for response to treatment B. Evaluate for recurrent or metastatic disease C. Search for metachronous tumors

TABLE OF CONTENTS/OUTLINE

1. Review GIST epidemiology, pathophysiology and common imaging findings2. Definitions of synchronous, metachronous, and metastatic tumor3. Syndromes involving GIST: 5% occur in patients with NF-1 syndrome, Carney triad, or Carney-Stratakis4. Non-syndromic synchronous and metachronous tumors occur at higher rates in patients with GISTa. Standardized Incidence Ratio (SIR) ≥ 6: ovarian carcinomab. SIR >/= 4, < 6: sarcomas, neuroendocrine-carcinoid, small intestine adenocarcinoma, papillary thyroid cancer, renal cell carcinomaSIR >/= 2, < 4: adenocarcinomas (colorectal, hepatobiliary, gastric, pancreatic)SIR >1, < 2: Non-Hodgkin lymphoma, uterine adenocarcinoma, non-small cell lung cancer, urothelial carcinoma of the bladder5. Review c-KIT expression of GIST tumors and their related syndromic and non-syndromic tumors

GI155-ED-X

US of the Bowel in Inflammatory Bowel Disease: The Recent Contributions of Contrast Enhanced Ultrasound (CEUS) and Shear Wave Elastography (SWE)

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Awards
Certificate of Merit

Participants
Christine Merrill, Calgary, AB (*Abstract Co-Author*) Nothing to Disclose
Cathy Lu, MD, Edmonton, AB (*Abstract Co-Author*) Nothing to Disclose
Alexandra Medellin-Kowalewski, MD, Calgary, AB (*Abstract Co-Author*) Nothing to Disclose
Kerri Novak, MD, Calgary, AB (*Abstract Co-Author*) Research Grant, AbbVie Inc Research Grant, Johnson & Johnson
Stephanie R. Wilson, MD, Calgary, AB (*Presenter*) Equipment support, Siemens AG; Equipment support, Koninklijke Philips NV

TEACHING POINTS

Sonographic assessmsent of IBD is a safe, cost effective and accurate method allowing exquisite spatial and temporal resolution for diagnosis, determination of disease activity and identification of common complications. .
Evaluation of wall thickness, inflammatory fat, and blood flow allows for an ultrasound global assessment by grading each parameter from 0, no observation, through to 3, showing severe abnormality.
CEUS is more sensitive than color Doppler imaging for the identification of mural blood flow as a reflection of disease activity, showing blood flow at the perfusion level.
CEUS is invaluable for differentiation of inflammatory masses with avascularity shown for abscess and hyperenhancement for phlegmon.
SWE and CEUS are objective biomarkers improving the management of strictures..
SWE values correlate inversely with CEUS values and directly with smooth muscle hypertrophy in strictures in our own population with surgical resection.

TABLE OF CONTENTS/OUTLINE

Images of tandard parameters on greyscale and Doppler imaging for assessing disease activity, Fig 1 Our activity Assessments: USGA grading chart, Fig 2.Contribution of CEUS to disease activity assessment and differentiation of inflammatory masses, Fig 3 and 4Stricture evaluation including stiffness measurements on SWE and activity assessments on CEUS, Fig 5

GI156-ED-X

Imaging of Anomalous Pancreatobiliary Ductal Junction in Adult Patients and Its Concomitant Diseases

All Day Room: GI Community, Learning Center

Participants

Takaharu Tsuda, MD, PhD, Toon, Japan (*Presenter*) Nothing to Disclose
Megumi Matsuda, MD, Toon, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroaki Tanaka, MD, Onsen-Gun, Japan (*Abstract Co-Author*) Nothing to Disclose
Teruhito Mochizuki, MD, Toon, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshifumi Sugawara, MD, Matsuyama, Japan (*Abstract Co-Author*) Nothing to Disclose
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Sohei Kitazawa, Toon, Ehime Prefecture, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Anomalous pancreatobiliary ductal junction (APBDJ) is an congenital anomaly in which the main pancreatic duct and common bile duct are joined outside the duodenal wall and form a long common channel. Recent advancement of CT and MRI has enabled us to detect this anomaly preoperatively in patients with gall bladder and bile duct diseases, who does not show significant dilatation of bile duct. Several studies have shown that non-dilated type patients with APBDJ have high risk of gall bladder cancer. In this exhibit, we show both benign and malignant conditions in bile duct and gall bladder diseases in patients with APBDJTeaching point of this exhibit is:1. To know types of APBDJ (based on Todani's classification).2. To know imaging techniques using MDCT (including drip infusion cholangiography CT and contrast-enhanced CT) and MRCP.3. To know various disease conditions derive from APBDJ in adult patients with choledochal cyst and without dilated common bile duct (non-dilated type).

TABLE OF CONTENTS/OUTLINE

Table of Content1. Type of APBDJ.2. Data acquisition and imaging technique of CT and MRI3. Choledochal cyst in adult patients4. Disease conditions of gall bladder and bile duct derive from APBDJ

GI157-ED-X

A New Era in the Pancreas: Functional Imaging

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Sandra Baleato Gonzalez, MD, PhD, Santiago, Spain (*Presenter*) Nothing to Disclose
Roberto Garcia Figueiras, MD, PhD, Santiago de Compostela, Spain (*Abstract Co-Author*) Nothing to Disclose
Maria Antonietta Bali, MD, PhD, Brussel, Belgium (*Abstract Co-Author*) Nothing to Disclose
Gabriel C. Fernandez-Perez, PhD, MD, Avila, Spain (*Abstract Co-Author*) Nothing to Disclose
Joan C. Vilanova, MD, PhD, Girona, Spain (*Abstract Co-Author*) Nothing to Disclose
Antonio Luna, MD, Jaen, Spain (*Abstract Co-Author*) Nothing to Disclose
Julio Iglesias, Santiago de Compostela, Spain (*Abstract Co-Author*) Nothing to Disclose
Concepcion M. Martinez, MD, Vigo, Spain (*Abstract Co-Author*) Nothing to Disclose
Jose Larino, Santiago de Compostela, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The evaluation of pancreas has traditionally been made based on morphologic imaging. Recent developments in imaging techniques have improved the ability to evaluate pancreatic entities. Beside this, functional and molecular imaging (FMI) improves detection and characterization of different pancreatic pathologies.The aim of this exhibit is:- To illustrate the added value of FMI of the pancreas- To show the imaging findings of benign and malignant pancreatic entities using these techniques.- To discuss the tradeoffs and limitations of FMI techniques.- To review the added value of FMI in clinical practice.

TABLE OF CONTENTS/OUTLINE

1. Anatomical imaging2. FMI modalities1.1. Ultrasound Elastography1.2. Dual energy CT1.3. DCE imaging techniques: Perfusion CT, DCE-MRI, DCE-US1.4. Diffusion1.4.1. Monoexponential model1.4.2. Biexponential model: IVIM, kurtosis 1.5. MR Spectroscopy 1.6. Nuclear Imaging2. Clinical setting:2.1. Acute pancreatitis2.2. Chronic pancreatitis2.3. Cystic tumors2.4. Solid tumors2.5. Metastases2.6. Others

GI158-ED-X

Uncommon Localized Cystic Lesions of Liver: Clue to Diagnosis

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
Jooae Choe, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Kyoung Won Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yong Moon Shin, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eunsil Yu, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jihun Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung Gyu Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To illustrate multimodality imaging features of uncommon localized cystic lesions of the liver, with some radiologic-pathologic correlation.2. To discuss the clues to radiologic differential diagnosis in atypical cystic liver lesions.

TABLE OF CONTENTS/OUTLINE

Uncommon Localized Cystic Lesions of the Liver: Multimodality imaging featuresI. Nontumorous cystic lesions:1. Localized biliary hamartoma2. Localized Caroli disease3. Mesenchymal hamartoma4. Hepatic foregut cyst5. Hydatid cyst6. Post-traumatic pseudocystII. Tumorous cysts:1. Biliary cystadenoma/carcinoma2. Intraductal papillary neoplasm of bile duct3. Cholangiocarcinoma arising from biliary hamartoma4. Cystic hepatocellular carcinoma5. Embryonal sarcoma6. Cystic metastasis7. Metastatic gastrointestinal stromal tumor with cystic change8. Atypical benign liver tumors with cystic changeIII. Summary: clues to the differential diagnosis

GI159-ED-X

Cystic Pancreatic Lesions: Appearance and Characteristics on Cross-Sectional Imaging, and When Endoscopic Ultrasound Correlation is Appropriate

All Day Room: GI Community, Learning Center

Participants

Sopo Lin, MD, Hershey, PA (*Presenter*) Nothing to Disclose
Jeffrey S. Chen, MD, Hershey, PA (*Abstract Co-Author*) Nothing to Disclose
Christine M. Peterson, MD, Hummelstown, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- Review cross-sectional imaging features of pancreatic cystic lesions, as accurate characterization is essential for guidance of further management- Understand limitations of cross-sectional imaging, and identify the select group of lesions for which endoscopic ultrasound evaluation may be appropriate

TABLE OF CONTENTS/OUTLINE

IntroductionReview of cross sectional imaging characteristics of cystic pancreatic lesions- Mucinous cystic neoplasm- Serous cystadenoma- IPMNs- Pancreatic adenocarcinoma with cystic degeneration- Pseudocyst- Other Identification of cases in which recommendation with endoscopic ultrasound is appropriate- Macrocystic lesions- Cyst with septations- Difficult to characterize lesions- Endoscopic ultrasound image correlation Summary & Conclusions

GI160-ED-X

Splenomegaly: A Systematic Clinicoradiologic Approach to the Differential Diagnosis

All Day Room: GI Community, Learning Center

Participants

Brett Sjoberg, MD, Salt Lake City, UT (*Abstract Co-Author*) Nothing to Disclose
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Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Vincent M. Mellnick, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (*Presenter*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV

TEACHING POINTS

- Review the major pathophysiological causes of splenomegaly in adults- Present an approach to diagnosis that incorporates all relevant clinical and radiologic data- Demonstrate a series of clinical imaging examples of splenomegaly by the various underlying causes

TABLE OF CONTENTS/OUTLINE

Definition of splenomegaly - Imaging modalities - Issues related to measurement and diagnosisCategorical causes of splenomegaly - Portal hypertension, infections, neoplasms, hemolytic anemia, extramedullary hematopoiesis, storage diseases, sequestration, trauma, idiopathic - Sample casesSystemic clinico-radiologic approach to the patient with splenomegaly

Honored Educators

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Perry J. Pickhardt, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Vincent M. Mellnick, MD - 2016 Honored Educator

GI161-ED-X

Cholangiocarcinogenesis: Role of Imaging for Premalignant Detection with Pathologic Correlation

All Day Room: GI Community, Learning Center

Participants
Surachate Siripongsakun, MD, Laksi, Thailand (*Presenter*) Nothing to Disclose

TEACHING POINTS

1. New WHO classification of dysplastic bile duct changes includes Biliary intraepithelial neoplasia (Bil-IN) and Intraductal Papillary Neoplasm of Biliary tract (IPNB). Imaging findings of BIl-INs appear non-specific and present as thickened and enhancing bile duct wall. High grade lesions may associate with bile duct narrowing and obstruction. 2. In pathological specimen Bil-IN shows psuedostratification of bile duct epithelium, increase nuclear cytoplasmic ratio and atypia therefore present as thickening of bile duct wall. Bil-IN typically progress into periductal infiltrating type growth pattern of cholangiocarcinoma.3. IPNB presents as polypoid intraductal growth, with pathological hallmark of fibrovascular core covered by dysplastic epithelium and often produce mucin. The imaging patterns includes polypoid nodule, flat or pedenculated type, oftently produce mucin content that cause mucinous obstruction.

TABLE OF CONTENTS/OUTLINE

Risk factors for Cholangiocarcinomas (CCA)
Evolution of CCA
WHO classification of premalignant lesions of CCA including Bil-IN and IPNB
Bil-IN: imaging and pathological correlation
Imaging patterns of Bil-IN
IPNB: imaging and pathological correlation
Imaging patterns of IPNB
Natural history of Bil-IN and IPNB
Grown pattern of Cholangiocarcinoma (CCA), Bil-IN and IPNB
Summary: imaging pattern of Bil-IN, IPNB & CCA

GI162-ED-X

Radiologic Evaluation in Acute and Chronic Complications of Percutaneous Feeding Tubes

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Charles Nhan, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Nasir M. Jaffer, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Robert Beecroft, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Seng Thipphavong, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Luis S. Guimaraes, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review indications and the types of gastrostomy and gastrojejunostomy tubes Review percutaneous placement technique of feeding tubes Discuss the common acute and chronic complications of gastrostomy and gastrojejunostomy tubes Discuss the utility of different radiographic techniques in the assessment of tube complications

TABLE OF CONTENTS/OUTLINE

Background Indications for percutaneous feeding tubes Types of percutaneous feeding tubes Percutaneous gastrostomy/gastrojejunostomy technique Acute and chronic complications Radiologic assessment of tube complications Cases Case 1: Malposition of gastrostomy tube Case 2: Dislodgement of catheter into peritoneal space Case 3: Unrecognized dislodgement of gastrostomy tube Case 4: Retrograde retraction of gastrojejunostomy tube Case 5: Gastrostomy tube migration causing acute pancreatitis Case 6: Occlusion of gastrojejunostomy tube Case 7: Kinked gastrojejunostomy tube Case 8: Fractured gastrostomy tube Case 9: Gastric perforation Case 10: Gastrojejunostomy tube causing small bowel insussusception Case 11: Intussusception recognized as "flipped" gastrostomy tube Case 12: Pseudo-obstruction complicated by colonic ischemia Case 13: Pseudo free air after gastric pull up

GI163-ED-X

Duct Tales: The Wide Spectrum of Intraluminal Pancreatic Ductal Pathology

All Day Room: GI Community, Learning Center

Participants

Maxine E. Darke, MD, Columbia, MO (*Presenter*) Nothing to Disclose
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Varaha Tammisetti, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
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Ka-Kei Ngan, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Anil K. Dasyam, MD, Pittsburgh, PA (*Abstract Co-Author*) Book contract, Reed Elsevier

TEACHING POINTS

To review abnormal contents/filling defects in the pancreatic ductal lumen including those that form within the duct and extraneous elements that gain access to the duct To discuss the role of imaging modalities such as CT, MRI/MRCP, EUS and ERCP in assessing the duct and in identifying the abnormal intraluminal contents as well as the etiology of the underlying pathological process To discuss clinical implications of the altered pancreatic ductal luminal environment

TABLE OF CONTENTS/OUTLINE

Normal pancreatic ductal anatomy and histology, and major anatomical aberrations of the pancreatic duct Role of imaging in assessing pancreatic duct morphology – pros and cons of the major imaging modalities including CT, MRI/MRCP, EUS and ERCP Richly illustrated spectrum of pathological entities affecting the pancreatic duct with emphasis on alteration of the intraluminal environment Abnormal contents forming in the lumen of the pancreatic duct - protein plugs, calculi, mucin, Pan-INs, mural nodules in IPMN Extraneous elements gaining access to the pancreatic ductal lumen – gas, hemosuccus pancreaticus from intra or peripancreatic aneurysms and pseudocysts, tumors invading and thriving in the ductal lumen, therapeutic stent etc Clinical implications of the alteration in the pancreatic luminal content Summary

Honored Educators

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Venkata S. Katabathina, MD - 2012 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

GI164-ED-X

Depiction of 2D Shear Wave Color Mapping Artifacts Using Shear Wave Propogation Imaging

All Day Room: GI Community, Learning Center

Participants
Theodore J. Dubinsky, MD, Seattle, WA (*Presenter*) Stockholder, Global Cancer Technology; Grant, Toshiba Corporation

TEACHING POINTS

1. To explain what shear wave propagation images demonstrate.
2. To demonstrate how propagation images correlate with what is seen on 2D shear wave color map images.
3. To present a variety of 2D shear wave artifacts and the explanation for them as demonstrated on propagation images.
4. To demonstrate how 2D shear wave measurments of liver stiffness can be over or underestimated..

TABLE OF CONTENTS/OUTLINE

1. Normal propation images and a review of what they demonstrate
2. Under and overestimation of liver stiffness; an explanation using shear wave propagation images
3. A variety of 2D shear wave artifacts and the explanation for them using propagation images
4. Conclusions regarding the utility of shear wave propagation imaging as a complement to 2D shear wave imaging

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Theodore J. Dubinsky, MD - 2012 Honored Educator
Theodore J. Dubinsky, MD - 2013 Honored Educator

GI166-ED-X

A Bump in the Wall-Palpable Masses in the Abdominal Wall

All Day Room: GI Community, Learning Center

Awards
Cum Laude

Participants
Nirvikar Dahiya, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Mark D. Sugi, MD, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
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Maitray D. Patel, MD, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
Yania M. Lopez-Alvarez, MD, San Juan, PR (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Palpable masses in abdominal wall may arise from the skin, subcutaneous fat, muscles or fascia. The reader will be able to list the differntial diagnosis for these masses and their charachteristic differentiating features on ultrasound. 2. Palpable masses in the abdominal wall could also be secondary to masses within the parietal peritoneum or due to a defect in the wall, hernias. The readers of the exhibit will be able to list these masses and their differentiating features including the use of dynamic ultrasound to categorize different type of hernias.

TABLE OF CONTENTS/OUTLINE

1. Anatomy of the abdominal wall. 2. Sonographic appearance of different layers of the abdominal wall with and without contraction of muscles. 3. Illustrative examples of abdominal wall lesions will include a discussion on the following: Epidermoid cyst with its classic dermal imprint pattern, Lipomas Vs Liposarcoma, Desmoid tumors, metatstatic lesions,lymphoma,neuroma, scar endometrioma, suture granuloma and others, 4. Dynamic evaluation for masses that are hernias. 5. Algorithm for further evaluation/management6. Conclusion

GI167-ED-X

Imaging of Peritoneal Carcinomatosis: Review the Common and Critical Findings to Improve the Radiological Report

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
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TEACHING POINTS

Review the anatomy of peritoneal cavity and the main peritoneal malignancies.Describe CT and MR appearance of peritoneal carcinomatosis and its pitfalls.Highlight the critical findings and their importance to treatment decision.

TABLE OF CONTENTS/OUTLINE

. Peritoneal anatomy and the dynamic flow of peritoneal fluid.. The most common malignancies with peritoneal involvement.. Patterns of peritoneal carcinomatosis: ascites, diffuse and nodular peritoneal thickening, omental cake, mass like and infiltration of the mesentery.. Morphological types of implants: cystic, solid, calcified, mucinous.. The common and critical sites of peritoneal carcinomatosis. Imaging pitfalls: benign conditions that mimic peritoneal carcinomatosis.

GI168-ED-X

Multimodality Imaging of Pancreatic Transplants: A Review

All Day Room: GI Community, Learning Center

Participants
Jonathan Steinman, MD, New York, NY (*Presenter*) Nothing to Disclose
Sherelle L. Laifer-Narin, MD, Englewood, NJ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To summarize the various types of pancreatic transplant procedures To delineate indications and contraindications for pancreatic transplant To discuss multimodality evaluation (Ultrasound, CT) of the post-transplant pancreas To review patient outcomes and complications following transplant

TABLE OF CONTENTS/OUTLINE

Types of pancreatic transplant Pancreas and kidney tranpslant Simultaneous pancreas-kidney(SPK) transplantation Living donor kidney transplant alone (LDKTA) followed by pancreas after kidney (PAK) transplant Simultaneous pancreas and living donor kidney transplantation (SPLK) Pancreas transplant Pancreas transplant alone (PTA)- Indications for transplant Type 1 diabetes mellitus Evidence of at least one type of irreversible secondary complication Extremely labile glycemic control Consider kidney transplant if patient has End-Stage Renal Disease (ESRD) Type 2 diabetes mellitus Rare, in select cases Contraindications for pancreas transplant Absolute Relative Imaging modalities for post-transplant evaluation Computed tomography (CT) Ultrasound Complications of pancreas transplant Rejection Graft-related Anastomotic leak Infection Pancreatitis Hemorrhage

GI169-ED-X

Therapy Evaluation of Hepatocellular Carcinoma after Radio-frequency Ablation and Stereotactic Body Radiotherapy by CT, MR and US: Updated Interpretation

All Day Room: GI Community, Learning Center

Participants

Masahiro Okada, MD, Nishihara-Cho, Japan (*Presenter*) Nothing to Disclose
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Sadayuki Murayama, MD, PhD, Nishihara-Cho, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation

TEACHING POINTS

1. To know the methods of HCC therapies, such as radio-frequency ablation (RFA) and stereotactic body radiotherapy (SBRT).2. To know guidelines of response evaluation after HCC therapies.3. To define diagnostic accuracy and difficulty for HCC recurrence on CT, US and MRI.4. To know pitfalls and limitations of the imaging evaluation after RFA/SBRT.

TABLE OF CONTENTS/OUTLINE

1 General information of local therapy of HCC a) RFA, b) SBRT, c) Complications of RFA and SBRT2 Modality of the reccurence diagnosis of HCC a) Dynamic CT, b) Contrast-enhanced US, c) Gd-EOB-DTPA enhanced MRI3 Important findings of HCC recurrence a) Early stain at arterial phase, b) Washout at the portal-dominant or equilibrium phase, c) Decreased uptake at the hepatocyte phase / Kupffer phase4 Confusing liver parenchymal change (around HCC) after RFA and SBRT a) Arterial-portal shunting, b) Focal liver reaction (FLR), Radiation-induced liver disease (RILD)5 Guidelines of response evaluation a) Modified Response Evaluation Criteria in Solid Tumors (RECIST), b) Response Evaluation Criteria in Cancer of the Liver (RECICL)6 Pitfalls and limitations of the evaluation by CT, US and MRI after therapy of HCC

GI170-ED-X

Essential Items for Structured Reporting of Rectal Cancer MRI: 2016 Consensus from the Korean Society of Abdominal Radiology (KSAR) Study Group for Rectal Cancer

All Day Room: GI Community, Learning Center

Participants
Youngseo Cho, MD, Kuri, Korea, Republic Of (*Presenter*) Nothing to Disclose
Seong Ho Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, DONGKOOK Pharmaceutical Co, Ltd

TEACHING POINTS

1. To present an evidence-based expert consensus on how to report rectal MRI performed to stage a rectal cancer.2. To list essential imaging findings on rectal MRI and to explain how they should be described in a structured format.3. To explain the rationale and clincial relevance regarding each reporting items and its format.

TABLE OF CONTENTS/OUTLINE

1. How KSAR expert consensus was made? Explanations on the modified Delphi process.2. Table to show the structured reporting form recommended by KSAR.3. Explanations on each essential reporting item (1 through 12) with example figures, each in a unified format that includes a) suggested reporting form with % agreement among the experts, b) example figures with appropriate surgical/pathological correlation, and c) rationale and clinical relevance. Distance of the lowest tumor margin from the anal verge Distance of the lowest tumor margin from the anorectal junction Tumor relationship to the anterior peritoneal reflection Circumferential tumor location Longitudinal tumor size T stage (AJCC) Maximum extramural depth of tumor invasion Shortest tumor distance from the mesorectal fascia or the levator Anal sphincter involvement Mesorectal lymph node spread Extramesorectal lymph node spread Extramural venous invasion (EMVI)4. Interactive quiz cases for self test.

GI171-ED-X

The Ins and Outs of Hepatic Capsular Retraction

All Day Room: GI Community, Learning Center

Participants
Ryan Ward, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Christopher P. Coppa, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Peter S. Liu, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Define hepatic capsular retraction and describe its utility in identifying liver lesions.
2. Provide multimodality examples of common and uncommon causes of hepatic capsular retraction.
3. Describe key imaging findings to differentiate between look-a-like lesions.

TABLE OF CONTENTS/OUTLINE

Background - define capsular retraction, explain underlying pathophysiology Categorical approach to etiology of capsular retraction – describe several broad categories of disease and disease-mimics that can result in capsular retraction Case examples – multimodality case examples which illustrate the various categories/etiologies, including capsular retraction related to: Malignant hepatic tumors including hepatocellular carcinoma, intrahepatic cholangiocarcinoma, and epitheliod hemangioendothelioma Benign hepatic tumors including sclerosed hemangioma Prior therapy – post-chemotherapy, prior TIPS or chemoembolization Confluent hepatic fibrosis Mimics/pseudoretraction – accessory fissure, exophytic masses simulating cleft of retraction Conclusion

GI172-ED-X

Imaging Features of Crohn Disease: Correlation of Ultrasound and MR-Enterography

All Day Room: GI Community, Learning Center

Awards
Cum Laude

Participants
Tomas Ripolles, MD, Valencia, Spain (*Presenter*) Nothing to Disclose
Gregorio Martin, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Mj Martinez-Perez, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Fructuoso Delgado, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Jose Vizuete, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Jose M. Paredes, MD, PhD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Ronny Rodelo, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:1- To describe the main imaging features of Crohn's disease (CD) with ultrasound (US) 2.- To show the correlation between US and MR-enterography findings in patients who underwent both imaging techniques on the same day3- To illustrate features by examples of imaging-pathologic correlation

TABLE OF CONTENTS/OUTLINE

1.-Representative bowel US and correlative MRE images will be presented based on our experience in 150 patients who underwent the same day both imaging techniques.2.-Bowel US technique will be presented.3.-The main features of CD that will be presented are: a) Mural findings:-parietal thickening, -deep ulcers, -increased Doppler flow, -mural enhancement after contrast administration, -strictures, -bowel dilatation, b) Mesenteric features-fibrofatty proliferation, -perienteric inflammation or hyperemia,-regional lymphadenopathy c) Transmural complications:-sinus tracts, -fistulas, -phlegmon,-abscess.ConclusionsOur exhibit shows that bowel US is a reliable technique to demonstrate bowel and mesenteric features in patients with Crohn disease and that US findings have a high degree of correlation with MR imaging findings.

GI173-ED-X

Spectrum of Imaging Findings in Non Cirrhotic Portal Hypertension: 'When Cirrhosis is Not Guilty'

All Day Room: GI Community, Learning Center

Awards
Identified for RadioGraphics

Participants
Diego M. Haberman, MD, Buenos Aires, Argentina (*Presenter*) Nothing to Disclose
Lucrecia Micheli, MD, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Lucia Pavlove, Caba, Argentina (*Abstract Co-Author*) Nothing to Disclose
Victoria Franco, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Victor Llanquipacha, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Mariano Volpacchio, MD, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Non Cirrhotic Portal Hypertension (NCPH) encompass an heterogeneus group of disorders, usually of vascular etiology, resulting in portal hypertension in the abscense of liver cirrhosis.These disorders tend to mimic the clinical presentation of cirrhosis. However, substantial differences exists both in their ethiopathogenesis as well as in their treatment management and prognosis.To determine a proper differential diagnosis of each of these condtions is critical and imaging plays a relevant role in both diagnosis and management.The purpose of this exhibit is:1) To review pathophysiologic concepts underlying different conditions causing Non Cirrhotic Portal Hypertension.
2) To present an imaging overview of NCPH using Multidetector Computed Tomography (MDCT) and Magnetic Resonance Imaging (MRI) with an emphasis on findings relevant to suggest a specific ethiology.

TABLE OF CONTENTS/OUTLINE

Pre-hepatic disorders.Extrahepatic portal vein obstruction (Portal cavernoma).***Intrahepatic disorders.***Presinusoidal:** Arterioportal fistula.Congenital hepatic fibrosis.Sclerosing Cholangitis.Obliterative portal venopathy (hepatoportal sclerosis)**Sinusoidal:** Gaucher disease.**Postsinusoidal:**Budd Chiari Syndrome.Sarcoidosis.***Post-hepatic disorders.***Constrictive pericarditis.Severe right heart failure.

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GI176-ED-X

Multiple Endocrine Neoplasia (MEN): Spectrum of Radiological Findings of Abdominal Manifestations

All Day Room: GI Community, Learning Center

Awards
Identified for RadioGraphics

Participants
Kinan Alhalabi, Scottsdale, AZ (*Presenter*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Venkata S. Katabathina, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Amy K. Hara, MD, Scottsdale, AZ (*Abstract Co-Author*) Royalties, General Electric Company;
Khaled M. Elsayes, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV

TEACHING POINTS

1. Discuss the common and uncommon abdominal neoplasms associated with Multiple Endocrine Neoplasia (MEN) subtypes.2. Describe the imaging features of abdominal manifestations of Multiple Endocrine Neoplasia (MEN) and the importance of different imaging modalities in the diagnosis.3. Discuss clinical presentation and treatment options for the different neoplasms.

TABLE OF CONTENTS/OUTLINE

Multiple Endocrine Neoplasia (MEN) is a family of tumor syndromes that involve two or more organs of the endocrine system in the body. All MEN syndromes are genetic disorders and have autosomal dominant inheritance. Two major subtypes of MEN are recognized, MEN type 1 (Wermer's Syndrome), and MEN type 2, which is further subdivided into MEN type 2A (Sipple's Syndrome), and MEN type 2B (also called MEN type 3). Imaging plays a significant role in diagnosing MEN syndromes along with laboratory tests. This exhibit will focus on the abdominal neoplasms associated with all subtypes of MEN, describing the characteristic imaging features, presentation, and management for each manifestation.

Honored Educators

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Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
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Christine O. Menias, MD - 2016 Honored Educator
Venkata S. Katabathina, MD - 2012 Honored Educator
Amy K. Hara, MD - 2015 Honored Educator
Khaled M. Elsayes, MD - 2014 Honored Educator
Perry J. Pickhardt, MD - 2014 Honored Educator

GI177-ED-X

Masses Behaving Badly: The Ruptured Abdominopelvic Mass-Test Your Knowledge!

All Day Room: GI Community, Learning Center

Participants

Spencer T. Lake, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Benjamin M. Yeh, MD, San Francisco, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Author with royalties, Oxford University Press; Shareholder, Nextrast, Inc;
Spencer C. Behr, MD, Burlingame, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Consultant, General Electric Company; Consultant, Navidea Biopharmaceuticals, Inc; Grant, Navidea Biopharmaceuticals, Inc

TEACHING POINTS

Rupture of abdominal masses can be a catastrophic event leading to complications including hemorrhage, peritoneal soilage and sepsis, and peritoneal tumor spread, as well as dramatic change in clinical stability, staging, and prognosis. The presence of a ruptured mass can also be a key diagnostic finding, thereby narrowing the differential diagnosis, as some tumor types are prone to rupture. Our exhibit will provide illustrative cases that demonstrate the clinical consequences of mass rupture and highlight the diagnostic information it can provide.

TABLE OF CONTENTS/OUTLINE

The exhibit will be presented in case-based quiz format. Focused didactics will highlight the key diagnostic points and clinical significance of rupture in each case. Categories include:Liver tumors - Focus on HCC, adenoma, angiosarcoma. Highlight features that make a mass prone to rupture (e.g. location in liver, prior treatment such as TACE/RFA), and consequences of rupture.
Mucinous tumors - Focus on appearance and clinical consequences of pseudomyxoma peritonei, and which tumors can give rise to it.
Gynecologic tumors- Focus on complications of rupture, such as chemical peritonitis from ruptured ovarian dermoid.Associated with each case will be images from our institution demonstrating findings of mass rupture on CT and MRI. When appropriate, iatrogenic rupture will be addressed.

GI178-ED-X

MRI in the Fields of Research on Obesity and Bariatric Surgery (Blinded)

All Day Room: GI Community, Learning Center

Participants
Nicolas Linder, Leipzig, Germany (*Presenter*) Nothing to Disclose
Alexander Schaudinn, MD, Leipzig, Germany (*Abstract Co-Author*) Nothing to Disclose
Nikita Garnov, Leipzig, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas Rakete, Leipzig, Germany (*Abstract Co-Author*) Nothing to Disclose
Sophia Michel, Leipzig, Germany (*Abstract Co-Author*) Nothing to Disclose
Nora Dipper, Leipzig, Germany (*Abstract Co-Author*) Nothing to Disclose
Kilian Solty, Leipzig, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas K. Kahn, MD, Leipzig, Germany (*Abstract Co-Author*) Nothing to Disclose
Harald F. Busse, PhD, Leipzig, Germany (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this educational exhibit is to present and discuss MR-biomarkers for characterization of obesity and its comorbidities Semiautomatic segmentation for quantification of adipose tissue in obesity Clinical application of liver spectroscopy in hepatic steatosis

TABLE OF CONTENTS/OUTLINE

1. Background: Obesity and the metabolic syndrome2. Compartments of adipose tissue and ectopic storage: Visceral adipose tissue (VAT), subcutaneous adipose tissue (SAT)3. Bariatric surgery and other treatment options: Concept, procedure and efficacy of current conventional and surgical therapies4. Imaging adipose tissue4.1 Technical aspects: MRI techniques for characterization of obesity: Chemical shift, mDixon, Proton-Sprectroscopy4.2 Quantification of VAT, SAT and other ectopic fat depots4.3 Principles and pitfalls of segmentation (manual, semi- or fully-automated)4.4 Evaluation of hepatic lipid storage and NAFLD: Multi-Echo Dixon, Proton Spectroscopy, Ultrasound5. Clinical application of imaging parameters: Phenotyping in clinical studies, therapy monitoring, limitations6. Beyond established techniques: New image derived biomarkers (sarcopenic obesity) and interventiional treatment of obesity (embolization of gastric artery), overcoming current limitations (SAT quantification at limited FOV)

GI179-ED-X

Radiologic Features of High Grade Liver Injuries and Those Complications

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

So Hyun Park, MD, Incheon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung Joon Choi, Incheon, Korea, Republic Of (*Presenter*) Nothing to Disclose
Young Sup Shim, MD, Incheon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyung Sik Kim, MD, Incheon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Bohyun Kim, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kyoung Won Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
So Yeon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To introduce high grade liver injuries and complexity of those various complications2. To emphasize the importance of reviewing radiologic features of biliary, venous and infectious complications in high grade liver injuries3. To explain multidisciplinary approach of treatment of liver related complications

TABLE OF CONTENTS/OUTLINE

1. Introduction of high grade liver injuries2. Radiologic and clinical features of high grade liver injuries and those complications (1) high grade liver injuries with active bleeding and hemoperitoneum (2) biliary complications: leaks, necrosis, strictures, biloma (3) infectious complications: hepatic, perihepatic abscess (4) delayed bleeding (5) hepatic failure3. Benefits of multidisciplinary approach of treatment of high grade liver injuries and those complications in angiointervention, endoscopic retrograde cholangiopancratography (ERCP), percutaneous transhepatic biliary drainage (PTBD), percutaneous drainage (PCD)

GI180-ED-X

Tumor Quantification and Response Criteria for Assessment of Treatment Response in Hepatocellular Carcinoma Treated with Targeted Therapy

All Day Room: GI Community, Learning Center

Participants

Guobin Hong, MD, PhD, ZHUHAI, China (*Presenter*) Nothing to Disclose
Wenli Cai, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anand K. Singh, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Gordon J. Harris, PhD, Boston, MA (*Abstract Co-Author*) Medical Advisory Board, Fovia, Inc; Stockholder, IQ Medical Imaging LLC;

TEACHING POINTS

In this exhibit,we present an overview about the state-of-the-art and future trends of tumor quantification and response criteria for assessment of hepatocellular carcinoma (HCC) treated with targeted therapies.The teaching points of this exhibit are:1.Tumors treated with targeted therapies do not necessarily demonstrate the same imaging findings as those treated with cytotoxic therapy.
2.Conventional linear measurement and its response criteria such as RECIST and WHO unveil their inadequacy to accurate assessment of HCC treated with targeted therapies.
3.Revised versions of linear measurement and response criteria such as mRECIST or EASL remedy the deficiency in conventional versions.4.Volumetric quantification is sensitive to detect early change of HCC and to accurately assess treatment response.

TABLE OF CONTENTS/OUTLINE

1.Comparison of imaging findings between HCCs treated with targeted therapy and cytotoxic therapy.
2.Review of the existing linear measurement and the response criteria (mRECIST, EASL) in HCC, and discussion of the limitations and the clinical challenges.
3.Recent technical advances of HCC volumetric quantification and clinical evaluations for assessment of treatment response and prediction of patient survivals. 4.Recommended clinical guidelines using volumetric assessment for HCC treated with targeted therapy.

GI181-ED-X

How to Interpret Post-Radioembolization Findings in the Liver on CT and MRI: Everything You Need to Know in 10 Cases

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Mathew P. Bligh, MD, BEng, Halifax, NS (*Presenter*) Nothing to Disclose
J. P. King, MD, Halifax, NS (*Abstract Co-Author*) Nothing to Disclose
Robert F. Berry, MD, Halifax, NS (*Abstract Co-Author*) Nothing to Disclose
Steven C. Burrell, MD, Halifax, NS (*Abstract Co-Author*) Nothing to Disclose
Judy A. Rowe, MD, Halifax, NS (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Develop a confident, comprehensive multimodality approach to assessing tumor response on CT and MRI following transarterial radioembolization (TARE). Understand defining features of necrosis and viable tumor and accurately classify response using currently accepted criteria. Recognize common pitfalls that can lead to misdiagnosis of tumor progression or response. Identify common complications and other sequelae of non-target radioembolization.

TABLE OF CONTENTS/OUTLINE

Follow-up imaging strategies post-TARE: roles of CT, MRI and PET/CT. Spectrum of post-TARE tumor findings at early and late follow-up. Beyond RECIST: How to accurately characterize tumor response using current objective assessment tools and how to avoid pitfalls. Identifying and managing non-target sequelae of TARE. Review of 10 clinical cases demonstrating a variety of pathology, focusing on key imaging findings and response classification.

GI182-ED-X

I ain't No Nice Guy: Imaging of Meckels Diverticulum Related Complications

All Day Room: GI Community, Learning Center

Participants
Aruna R. Patil, MD, FRCR, Bangalore, India (*Presenter*) Nothing to Disclose
Shrivalli Nandikoor, MBBS, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose
Suprabath HN, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose
Hema Tadimari, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the embryology of Meckels diverticulum To discuss the various complications of Meckels diverticulum, its imaging mimics.

TABLE OF CONTENTS/OUTLINE

Meckels diverticulum is a true diverticulum which is a remnant of the omphalomesentric duct. The contents of the exhibit are : Embryology of the Meckels diverticulum Multimodality imaging (conventional contrast , ultrasound, CT, MRI, nuclear medicine and angiography) apperances of diverticulum and related complications such as: Diverticulitis Perforation Gastrointestinal bleed Bezoar formation Inversion with intussception Internal hernia, content in inguinal hernia. Malignancy Mimics include Appendicitis, Epiploic appendagitis, Ileitis, Non meckel diverticulitis, lymphadenitis, mesentric panniculitis

GI184-ED-X

Beyond Diverticulitis: Complications and Pitfalls Related to Colonic Diverticular Disease

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Brandon W. Welsh, MD, Kansas City, KS (*Abstract Co-Author*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Vincent M. Mellnick, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (*Presenter*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV

TEACHING POINTS

- Colonic diverticular disease (CDD) is a highly prevalent condition throughout the developed world- In addition to typical uncomplicated acute diverticulitis, a host of less common acute, subacute, and chronic complications can be seen at CT and other imaging modalities- Distinction between colonic diverticular disease and colorectal cancer can be challenging at CT, even with colonography technique

TABLE OF CONTENTS/OUTLINE

Colonic diverticular disease (CDD)- Prevalence and demographics- Typical imaging featuresAcute uncomplicated diverticulitis- Left-sided- Right-sidedComplications of diverticulitis and CDD- Peridiverticular abscess- Peritonitis- Pylephlebitis and hepatic abscess- Fistula formation- Diverticular bleeding- Diverticular stricture and obstruction- Giant sigmoid diverticulum- Impacted diverticulum simulating submucosal massCT- and CTC-related pitfalls- Distinguishing CDD from colorectal cancer- Other mimics of diverticulitis (focal colitis, epiploic appendagitis)- Inadequate distention from diverticulosis at CTC- CDD simulating polyps at CTC (impacted/inverted diverticula, mucosal prolapse)- Unsuspected diverticulitis at CTC

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Vincent M. Mellnick, MD - 2016 Honored Educator

GI185-ED-X

When Gallbladder Met Abdominal Wall: Tensile Gallbladder Fundus Sign in Acute Cholecystitis

All Day Room: GI Community, Learning Center

Participants
Bedro Jin, MD, Santa Barbara, CA (*Abstract Co-Author*) Nothing to Disclose
Turner Fishpaw, MD, Santa Barbara, CA (*Presenter*) Nothing to Disclose
Steven Hartzman, MD, Santa Barbara, CA (*Abstract Co-Author*) Nothing to Disclose
Bernard Chow, MD, Santa Barbara, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Described by Chansik et al (AJR) in 2013, the tensile gallbladder fundus sign is a moderately sensitive and highly specific CT sign in the diagnosis of acute cholecystitis. Our educational exhibit aims to illustrate the meaningful use of the tensile gallbladder fundus sign in clinical practice. We will use multiple pathology proven cases from our institution to help characterize the tensile gallbladder fundus sign in detail. An additional goal is to incorporate this sign into an imaging diagnosis algorithm for acute cholecystitis. In effect, we believe that incorporating this CT finding in the radiologist's repertoire could potentially avoid delay in diagnosis with its associated complications, discomfort from ultrasound examinations and unnecessary radiation exposure from HIDA scans.

TABLE OF CONTENTS/OUTLINE

Introduction Radiologic features of acute cholecystitis Limitations of CT in the acute cholecystitis diagnosis Tensile Gallbladder Fundus sign on CT

a. Definition
b. Usefulness
c. Limitations Incorporation of this CT sign into an algorithm for the diagnosis of acute cholecystitis Conclusion

GI186-ED-X

Revisiting Traumatic Bowel Injury on MDCT: Lessons Learned

All Day Room: GI Community, Learning Center

Participants
Ameya J. Baxi, MBBS, DMRD, San Antonio, TX (*Presenter*) Nothing to Disclose
Abhijit Sunnapwar, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Julia L. Humphrey, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Kedar N. Chintapalli, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Shaile Philips, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Vijayanadh Ojili, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Study specific & non specific MDCT signs of bowel & mesenteric traumaDifferentiate between surgical & non-surgical traumatic lesions

TABLE OF CONTENTS/OUTLINE

Bowel & mesenteric injury is seen in up to 5% of blunt abdominal trauma. Clinical diagnosis of is often unreliable & negative laparotomy rate is up to 40% when clinical assessment is used for treatment. Delay in diagnosis or missed injuries can however increase mortality & morbidity from hollow viscus perforation, hemorrhage, peritonitis, or sepsis.Signs of bowel/mesenteric injury are frequently subtle & require meticulous attention & thorough search in all the images. The significance of each individual sign varies. MDCT is the imaging modality of choice in evaluating blunt trauma to bowel & mesentery.Specific signs of bowel injury include discontinuity of wall, pneumoperitoneum, retropneumoperitoneum, extravasation of oral contrast, & last abnormal bowel wall enhancement, segmental lack of enhancement, or decreased nhancement. Nonspecific signs include bowel wall thickening & free intraperitoneal fluid. MDCT signs of mesenteric injury include extravasation of contrast from mesenteric vessels, abrupt termination, vascular beading & fat stranding.In this exhibit we will discuss MDCT findings of oesophagus, stomach, small and large bowel injury including rectum as well as mesenteric injury.

GI187-ED-X

CT Findings of Drug-induced Gastrointestinal Tract Disorders

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Eliko Tanaka, MD, Yokohama, Japan (*Presenter*) Nothing to Disclose
Nobuyuki Takeyama, MD, Yokohama, Japan (*Abstract Co-Author*) Nothing to Disclose
Akira Furukawa, MD, PhD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
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Syerikjan Tulyeubai, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Linh D. Nguyen, MD, Arakawa-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Drug-induced GI tract disorders are caused by various drugs and lead to variety of symptoms and conditions. Correct diagnosis of the condition for adequate therapy is important, however, differential diagnosis is sometimes difficult. Knowledge of causative drugs and characteristic pathology of each drug-induced GI tract disorder and mechanism of pathogenesis, as well as, characteristic CT findings will help in correct diagnosis. The purposes of this presentation are: To know drugs that may cause drug-induced GI tract disorders To learn clinical and pathological conditions and mechanisms of pathogenesis in each drug-induced GI tract disorder To recognize characteristic CT images and key findings of drug-induced GI tract disorders depending on causative drugs

TABLE OF CONTENTS/OUTLINE

General knowledge of drug-induced GI tract disordersSummary of well documented drugs as causes of drug-induced GI tract disordersDemonstration of drug-induced GI tract disorders depending on each drug including clinical condition, mechanisms of pathogenesis, pathology, and CT images with emphasis on key findings Causative drugs discussed are: Antibiotics, NSAIDS, Chemotherapy agents, Others, including resin, barium, corticosteroids, opioid, α-glucosidase inhibitor, Chinese herbal medicine, PPI, ACE inhibitors, etc Discussion of differential diagnosis

GI188-ED-X

Cross Sectional Imaging of the Gallbladder; Pearls and Pitfalls

All Day Room: GI Community, Learning Center

Participants

Khaled M. Elsayes, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Akram M. Shaaban, MBBCh, Salt Lake City, UT (*Abstract Co-Author*) Nothing to Disclose
Ahmed M. Khalaf, MBBCh, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Ayman H. Gaballah, MD, FRCR, Columbia, MO (*Abstract Co-Author*) Nothing to Disclose
Corey T. Jensen, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Sarah M. Rothan, MD, Pearland, TX (*Abstract Co-Author*) Nothing to Disclose
Ajaykumar C. Morani, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- Describe most commonly encountered pearls pathognomonic for specific gallbladder pathologies.- Illustrate various imaging pitfalls of the gallbladder that can lead to erroneous diagnoses.- Describe relevant technical background. pathophysiology and hemodynamics of these pitfalls.

TABLE OF CONTENTS/OUTLINE

1. Pearls2. Diagnostic pitfalls a. Mistaking benign lesions for malignant lesions b. Mistaking malignant lesions for benign lesions2. Technical pitfalls a. CT, US, MR specific issues that create difficulties in diagnosis b. Technique pitfalls3. Atypical presentations of common benign lesions4. Atypical presentations of common malignant lesions5. Organization according to imaging findings

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Christine O. Menias, MD - 2016 Honored Educator

GI189-ED-X

CT Evaluation of Challenging Cases of Distal Small Bowel Pathology: Pearls, Pitfalls and Imaging Tips for the Differential Diagnosis

All Day Room: GI Community, Learning Center

Participants

Christopher R. Bailey, MD, Baltimore, MD (*Presenter*) Nothing to Disclose
Pamela T. Johnson, MD, Baltimore, MD (*Abstract Co-Author*) Consultant, National Decision Support Company
Elliot K. Fishman, MD, Baltimore, MD (*Abstract Co-Author*) Institutional Grant support, Siemens AG; Institutional Grant support, General Electric Company;

TEACHING POINTS

1. Small bowel pathology can be difficult to detect and when detected forming a specific differential diagnosis is critical.This exhibit will define a series of imaging findings that will help one analyze cases of small bowel disease and separate cases into likely diagnosis be it inflammatory or neoplastic.2.Understand the pitfalls in the analysis of distal small bowel pathology and how a well structured systematic approach including the use of multiplayer and 3D imaging will help one reach the correct diagnosis3. Complications of chemotherapy or bone marrow transplant may be the source of small bowel pathology and must be considered in the differential diagnosis

TABLE OF CONTENTS/OUTLINE

1. Clinical Presentation and clinical history as a guide to scan protocol2. Scan protocols with post processing protocols3. Small Bowel Patterns of Involvement a. bowel wall thickness and enhancement pattern b. length of involvement including extension to cecum c. presence of adjacent extension into fat or enteroenteric fistulae d. mesenteric involvement including adenopathy or fibrofatty proliferation e. involvement of other organs or organ systems f. distinguishing tumor vs inflammatory/ischemia g. defining the various features of select inflammatory processes4. Role of post processing including MPR and 3D MIP/VRT5. final key points and pearls

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Elliot K. Fishman, MD - 2012 Honored Educator
Elliot K. Fishman, MD - 2014 Honored Educator
Elliot K. Fishman, MD - 2016 Honored Educator
Pamela T. Johnson, MD - 2016 Honored Educator

GI190-ED-X

Focal Liver Lesion Assessment with Contrast-enhanced Ultrasound (CEUS) and CEUS LI-RADS (Liver Imaging Reporting and Data System)

All Day Room: GI Community, Learning Center

Awards
Cum Laude

Participants
Alexander M. Vezeridis, MD, PhD, La Jolla, CA (*Presenter*) Nothing to Disclose
Yuko Kono, MD, PhD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
David O. Cosgrove, MBBCh, FRCR, London, United Kingdom (*Abstract Co-Author*) Research Consultant, SuperSonic Imagine Research Consultant, Bracco Group Speakers Bureau, Toshiba Corporation
Christoph F. Dietrich, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Hyun-Jung Jang, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Avinash R. Kambadakone, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Tae Kyoung Kim, MD, PhD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Andrej Lyshchik, MD, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Donald G. Mitchell, MD, Philadelphia, PA (*Abstract Co-Author*) Consultant, CMC Contrast AB
Fabio Piscaglia, Bologna, Italy (*Abstract Co-Author*) Research support, Bracco Group Speaker, Bayer AG Advisory Board, Bayer AG Speaker, Siemens AG
Cynthia S. Santillan, MD, San Diego, CA (*Abstract Co-Author*) Consultant, Robarts Clinical Trials, Inc
Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;
Juergen K. Willmann, MD, Stanford, CA (*Abstract Co-Author*) Research Consultant, Bracco Group; Research Grant, Siemens AG; Research Grant, Bracco Group; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company; Advisory Board, Lantheus Medical Imaging, Inc; Advisory Board, Bracco Group
Stephanie R. Wilson, MD, Calgary, AB (*Abstract Co-Author*) Equipment support, Siemens AG; Equipment support, Koninklijke Philips NV

TEACHING POINTS

1. Learn how CEUS LI-RADS will standardize technique, data collection, interpretation, and reporting of CEUS exams of the liver in patients at risk for hepatocellular carcinoma (HCC).2. Understand CEUS LI-RADS major features, and the importance of washout features to diagnose LI-RADS 5 lesions (definitely HCC).3. Learn CEUS LI-RADS categories and how to classify focal liver observations according to CEUS LI-RADS.

TABLE OF CONTENTS/OUTLINE

1. Introduction on CEUS LI-RADS: background, history2. Indications for, benefits and limitations of, and common referral patterns for CEUS of focal liver lesions3. Brief overview of how a CEUS examination of the liver is performed, and sources for further information and instruction4. Description of CEUS LI-RADS with specific examples of observation categorization according to CEUS imaging findings: a. Major features, arterial phase enhancement and washout features b. Tie-breaking rules and ancillary features c. LI-RADS 1 -- definitely benign, including cysts, classic hemangiomas, or definite focal hepatic fat deposition or sparing d. LI-RADS 2 -- probably benign e. LI-RADS 3 -- intermediate probability for HCC f. LI-RADS 4 -- probably HCC g. LI-RADS 5 -- definitely HCC h. LI-RADS 5V -- definite tumor in vein i. LI-RADS M -- probably malignant, not specific for HCC

GI191-ED-X

Villous Gastrointestinal Tumors: Multimodality Imaging with Pathologic Correlation

All Day Room: GI Community, Learning Center

Awards
Identified for RadioGraphics

Participants
Rashad Johnson, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Ayman H. Gaballah, MD, FRCR, Columbia, MO (*Abstract Co-Author*) Nothing to Disclose
Priya R. Bhosale, MD, Bellaire, TX (*Abstract Co-Author*) Nothing to Disclose
Harmeet Kaur, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Akram M. Shaaban, MBBCh, Salt Lake City, UT (*Abstract Co-Author*) Nothing to Disclose
Khaled M. Elsayes, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

TEACHING POINTS

- Review the epidemiology, etiology, and pathophysiology of gastrointestinal villous tumors- Describe the distribution of the common and uncommon gastrointestinal villous tumors- Discuss the utility of cross sectional imaging modalities in detection, diagnosis and differential diagnosis of these lesions- Illustrate cross sectional imaging features of these lesions with pathological correlation

TABLE OF CONTENTS/OUTLINE

Epidemiology, etiology, pathogenesis, and clinical presentationsCommon and uncommon locationsImaging characteristics with pathologic correlationDifferential diagnosisSummary:According to WHO criteria, villous adenomas comprise 5% of all gastrointestinal adenomas and are associated with more severe degrees of dysplasia. Although benign, they have malignant potential and can be precursors of adenocarcinomas. Polyps are generally sessile structures that appear as velvety or cauliflower like projections and are often asymptomatic but may occasionally ulcerate and bleed; and uncommonly, they may result in obstruction if very large.Villous adenomas occur more frequently in the rectum and rectosigmoid, although they may occur anywhere in the colon. Rarely, villous adenomas can occur in the duodenum and the small bowel, particularly at the ampulla.

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Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Akram M. Shaaban, MBBCh - 2015 Honored Educator
Akram M. Shaaban, MBBCh - 2016 Honored Educator
Priya R. Bhosale, MD - 2012 Honored Educator

GI193-ED-X

Pancreatic Ductal Adenocarcinoma with CT Spectral Imaging: What's New?

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Xiao Zhu Lin, MD, Shanghai, China (*Presenter*) Nothing to Disclose
Huanhuan Xie, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) To illustrate the characteristics of CT spectral imaging of pancreatic ductal adenocarcinoma (PDAC)2) To explore the optimal monochromatic energy level for evaluating PDAC and peri-lesional vessels3) To demonstrate optimal monochromatic imaging with spectral CT in the preoperative staging of PDAC by presenting clinical data and images

TABLE OF CONTENTS/OUTLINE

1) Multi-parametric imaging of PDAC with spectral CT (113 cases)·CT spectral HU curves of PDAC, pancreatic parenchyma and aorta with dynamic enhanced imaging·Normalized CT spectral HU curves of PDAC to pancreatic parenchyma·Iodine/water concentration, Effective anatomic number (Eff-Z), and normalized values of PDAC2) Optimal monochromatic imaging of PDAC with spectral CT·Optimal monochromatic energy level and CNR value of PDAC to pancreatic parenchyma, and of peri-lesional vessels to PDAC3) Preoperative staging of PDAC with spectral CT optimal monochromatic imaging

GI194-ED-X

You Place it, You Own it! What the Interventional Radiologist Needs to Know about the Longitudinal Care of Gastrostomy Tubes

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Stephen R. Lee, MD, Boston, MA (*Presenter*) Nothing to Disclose
Nathan Elie Frenk, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Catherine Grams, NP, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Emily Mertz, PA, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Meredith Preziosi, NP, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Kara Stasko, PA, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Peter R. Mueller, MD, Boston, MA (*Abstract Co-Author*) Consultant, Cook Group Incorporated

TEACHING POINTS

Although much has been published on the technique of percutaneous gastrostomy tube placement and management of periprocedural complications, there is a dearth in the IR literature regarding longitudinal care of patients with gastrostomy tubes. As contemporary IR practices become increasingly "clinical", much of the responsibility in long-term management of gastrostomy catheters has appropriately been shifted back on to many IR practices. This case-based educational exhibit will review the work-up and treatment of common presenting problems encountered in clinic or on rounds after gastrostomy tube placement. Treatment of pericatheter cellulitis and local skin care regimens to address skin breakdown related to pericatheter leakage will be discussed. Common problems associated with gastropexy T-tack anchors and suggestions for preventing them will be discussed in detail. Finally, technical refinements to prevent pain with use and frequent catheter clogging will be discussed.

TABLE OF CONTENTS/OUTLINE

1) Skin infections2) Gastropexy T-tack problems3) Pericatheter leakage4) Pain with use5) Catheter clogging

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Peter R. Mueller, MD - 2012 Honored Educator
Peter R. Mueller, MD - 2013 Honored Educator

GI195-ED-X

Esophageal Mucosal Resection: A New Treatment Option for Advanced Megaesophagus-What Every Radiologists Should Know?

All Day Room: GI Community, Learning Center

Participants

Fernanda M. Costa, MD, Boa Vista, Brazil (*Presenter*) Nothing to Disclose
Larissa S. Cavalcanti, Boa Vista, Brazil (*Abstract Co-Author*) Nothing to Disclose
Rainier L. Reis, Recife, Brazil (*Abstract Co-Author*) Nothing to Disclose
Carla Serpa, Recife, Brazil (*Abstract Co-Author*) Nothing to Disclose
Andrea F. Melo, MD, Recife, Brazil (*Abstract Co-Author*) Nothing to Disclose
Eduardo J. Silva, MD, Recife, Brazil (*Abstract Co-Author*) Nothing to Disclose
Jorge Elias JR, MD, PhD, Ribeirao Preto, Brazil (*Abstract Co-Author*) Nothing to Disclose
Valdair F. Muglia, MD, PhD, Ribeirao Preto, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

* To understand the indications/contraindications, advantage/disadvantage and the surgical anatomy/techniques of Esophageal Mucosal Resection (EMR), which is considered a new treatment option for advanced megaesophagus;* To learn EMR follow-up with diagnostic imaging methods.* To enfasize EMR normal postoperative aspects and mainly its complications (acute and chronic), important on the radiologist practice.

TABLE OF CONTENTS/OUTLINE

1. Advanced megaesophagus: major causes (including Chagas Disease) and its pathophysiology
2.Esophageal mucosal resection
2.1. Indications and Contraindications
2.2. Advantages and Disadvantages
3. Surgical anatomy and techniques
4. Postoperative diagnostic imaging method
4.1. Radiography, Endoscopy, Tomography follow-up
4.2. Normal postoperative aspects
5. Acute complications (hemo-hydropneumothorax, esophagogastric anastomose dehiscence or stenosis, fistula, mediastinal fluid collection)
6. Cronic complications (esophagogastric anastomose isquemia, swallowing/regurgitation disorders, gastric compression, fluid collection between the brought-up stomach and esofagic muscular layer)
7. Conclusion

GI196-ED-X

Don't Call it an Abscess: Clinical and CT/MRI Characteristics of Neoplasms Arising in Chronic Anal Fistulas

All Day Room: GI Community, Learning Center

Participants
Pauley Chea, MD, Burlington, MA (*Presenter*) Nothing to Disclose
Christopher D. Scheirey, MD, Burlington, MA (*Abstract Co-Author*) Nothing to Disclose
Jennifer C. Broder, MD, Burlington, MA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Mucinous or squamous cell carcinoma can arise in chronic anal fistulas in patients with IBD2. Clinical presentation of these lesions is often delayed due to location in the ischioanal fossa. 3. Imaging characteristics can mimic abscess and are susceptible to misinterpretation and delay in diagnosis.4. Understanding CT and MRI features of these challenging lesions can assist in prospective diagnosis.5. Treatment can include chemotherapy, radiation and surgical intervention.

TABLE OF CONTENTS/OUTLINE

1) Pathophysiology/Presentation:Rare.IBD can lead to chronic fistulas, creating environment for neoplasm development.Location and mimicry of abscess can lead to delay in diagnosis.2) Clinical, radiologic and pathologic characteristics: Examples from 7 patients (5 mucinous and 2 squamous carcinomas):CT/MRI imaging characteristics of mucinous and squamous lesions with images:Physical exam characteristics with images.Pathology with images.3) Management Options and Outcomes:Neoadjuvant chemoradiation.Surgical abdominoperineal resection.Adjuvant chemotherapy.Prognosis.

GI197-ED-X

Calcified Liver Masses; Pattern Recognition Approach on Computed Tomography with Pathologic Correlation

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Mohamed I. Elshikh, MBBCh, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
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Akram M. Shaaban, MBBCh, Salt Lake City, UT (*Abstract Co-Author*) Nothing to Disclose
Sanaz Javadi, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Ayman H. Gaballah, MD, FRCR, Columbia, MO (*Abstract Co-Author*) Nothing to Disclose
Khaled M. Elsayes, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

TEACHING POINTS

Discuss the spectrum of common and uncommon liver masses that can demonstrate calcificationDescribe typical and atypical imaging features of these masses with pathologic correlationIllustrate a pattern recognition approach to help reach a specific diagnosis.

TABLE OF CONTENTS/OUTLINE

- Pathophysiology and etiology- Typical and atypical imaging features of calcific liver pathologies: inflammatory (e.g. granulomatous infection and Echinococcal disease), traumatic (e.g. calcified organizing hematoma), vascular calcification, benign and malignant neoplasms (e.g. biliary cystadenoma/cystadenocarcinoma, fibrolamellar carcinoma and cholangiocarcinoma), and metastatic (e.g. mucinous adenocarcinoma, osteosarcoma and chondrosarcoma)- Current management- Differential diagnostic approachSummaryCalcifications of the liver are frequently encountered at CT. Entities such as chronic granulomatous infection typically is the source. However, there are certain patterns of calcifications that manifest with liver masses. The purpose of this exhibit is therefore to illustrate the key imaging features and patterns of liver calcifications with an emphasis on CT. In addition, this exhibit will explain the implications of these various imaging findings on patient management.

Honored Educators

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Khaled M. Elsayes, MD - 2014 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Akram M. Shaaban, MBBCh - 2015 Honored Educator
Akram M. Shaaban, MBBCh - 2016 Honored Educator

GI198-ED-X

When Stool Becomes a Tool: Characterizing Bowel Contents as a Key to Differential Diagnosis

All Day Room: GI Community, Learning Center

Participants
Renata S. Assis, MD, Niteroi, Brazil (*Abstract Co-Author*) Nothing to Disclose
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Fernanda T. de Andrade, MD, FRCR, Rio de janeiro, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

A wide range of luminal contents may be detected in the gastrointestinal tract on CT and MRI exams, with important diagnostic implications.For instance, when dealing with bowel distension, the small bowel feces sign may help to locate the obstruction site. Moreover, many conditions may present with typical luminal contents, like blood products in bowel hemorrhage, calculus in gallstone ileus and fat in intussusceptions.Also, it is crucial to understand the effects of ingested substances, such as contrast media, certain fruits and iron reposition, on the signal characteristics of bowel contents.

TABLE OF CONTENTS/OUTLINE

1) Introduction: why characterize the bowel contents?2) CT and MRI appearances of intraluminal substances including blood, calcium, mucin, fat, feces, fluid, air, iron, contrast media and certain juices/fruits.3) Review the features of intestinal contents in bowel obstruction: air-fluid level small bowel feces sign fecaloma mesenteric fat lipoma gallstone foreign body bezoar4) Intraluminal material in other conditions, such as foreign objects in bowel perforation and appendicolith in appendicitis.5) Table organized in a didactic fashion, dividing luminal contents into pathological and non-pathological, categorizing them by each material and main associated conditions.

GI199-ED-X

Defining the Characteristics of Lipomas on CT Colonography

All Day Room: GI Community, Learning Center

Participants

Judy Yee, MD, Clayton, CA (*Presenter*) Research Grant, EchoPixel, Inc
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Stefanie Weinstein, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
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Benjamin M. Yeh, MD, San Francisco, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Author with royalties, Oxford University Press; Shareholder, Nextrast, Inc;
Priyanka Jha, MBBS, Sacramento, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Colonic lipomas are benign fatty tumors that are most commonly found incidentally. The majority of colonic lipomas are reported to be asymptomatic and typically located in the right colon. These lesions have been found more frequently in females than in males and during the fifth and sixth decades of life. Diagnosis of these tumors can be accurately and easily made using the 2D views on CT colonography. The purpose of this study is to define the current characteristics of colonic lipomas using CT colonography including: 1) patient demographics 2) imaging features and 3) segmental distribution.

TABLE OF CONTENTS/OUTLINE

This exhibit presents current features of colonic lipomas using CT colonography and will compare these findings with previously reported characteristics using other colonic tests. The incidence of lipomas of the colon in a large (>1000) patient cohort will be presented. Patient demographics, including symptomatology, gender, and age will be used to emphasize teaching points. Imaging features, including morphology (sessile, pedunculated, flat) and the mean and range of attenuation values (Hounsfield Units) will be presented. The size (mean and range) of lipomas and segmental distribution will be reported. Additionally, specific for CT colonography the usefulness of coating or adherence of tagging agents of colonic lipomas will be discussed.

GI200-ED-X

Secondary Signs of Small Iso-Attenuating Pancreatic Adenocarcinoma

All Day Room: GI Community, Learning Center

Participants

Megumi Matsuda, MD, Toon, Japan (*Presenter*) Nothing to Disclose
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Hitoshi Miki, MD, PhD, Matsuyama, Japan (*Abstract Co-Author*) Nothing to Disclose
Teruhito Mochizuki, MD, Toon, Japan (*Abstract Co-Author*) Nothing to Disclose
Yousuke Mizuno, Toon, Ehime Prefecture, Japan (*Abstract Co-Author*) Nothing to Disclose
Sohei Kitazawa, Toon, Ehime Prefecture, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Pancreatic adenocarcinoma is highly malignant tumor and its prognosis remains very poor in spite of advancement of CT and MRI. Early detection and curable resection is an only way to save patients from this disease. When small pancreatic adenocarcinomas show iso-attenuating, secondary signs are very important for detection of the tumor. In this exhibit we demonstrate small iso-attenuating pancreatic adenocarcinomas showing secondary signs. We also compare the images of iso-attenuating pancreatic adenocarcinomas with their PET/CT findings and pathological findings. We believe this knowledge would lead to early detection of the tumor in routine work up of abdominal CT which is not performed by dynamic CT protocol for pancreatic imaging.Teaching Points of this exhibit are:1. To learn secondary signs which indicate pancreatic adenocarcinoma.2. To learn pathological characteristics of iso-attenuating pancreatic adenocarcinoma.

TABLE OF CONTENTS/OUTLINE

1.Secondary signs of iso-attenuating pancreatic adenocarcinoma Ductal dilatation and abrupt cut off sign Local atrophic change Unbalanced Proportion Amorphous change in fatty infiltration Presence of cyst2. Comparison with PET/CT findings3. Comparison with pathological findings

GI201-ED-X

Acute Mesenteric Ischemia on MR Imaging: Pearls and Pitfalls

All Day Room: GI Community, Learning Center

Participants

Mohamad El Hawari, MD, Wichita, KS (*Presenter*) Nothing to Disclose
Akash C. Joshi, MD, Wichita, KS (*Abstract Co-Author*) Nothing to Disclose
Kamran Ali, MD, Wichita, KS (*Abstract Co-Author*) Nothing to Disclose
Kelsey S. Bourm, MD, Wichita, KS (*Abstract Co-Author*) Nothing to Disclose
Patrick Craig, DO, Wichita, KS (*Abstract Co-Author*) Nothing to Disclose
Samuel Ornelas, MD, Wichita, KS (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Acute mesenteric ischemia is a life threatening emergency with high mortality. Prompt diagnosis is crucial. Multidetector Computed Tomography (MDCT) is the main modality used to diagnose acute mesenteric ischemia.Familiarity with MR appearances of acute mesenteric ischemia is important as the diagnosis may be unsuspected with MR abdomen obtained for unrelated reasons. MRI would be the preferred modality in pregnancy and in patients with severe contrast allergy. In this exhibit, we illustrate the spectrum of imaging findings of acute mesenteric ischemia and identify key MR sequences for optimal visualization of specific findings. TEACHING POINTS:- Discuss the indications and role of MRI/MRA in evaluating acute mesenteric ischemia.
- Depict the imaging manifestations of acute mesenteric ischemia on MRI/MRA
- Identify potential pitfalls and how to avoid them

TABLE OF CONTENTS/OUTLINE

Introduction. Clinical features and pathophysiology of acute mesenteric ischemia. MR imaging features of acute mesenteric ischemia. Potential pitfalls and protocol optimization.
Conclusion

GI202-ED-X

Complex Abdominal Defects: Avoiding a Hot Mesh

All Day Room: GI Community, Learning Center

Participants
Marc Michael D. Lim, MD, Valhalla, NY (*Presenter*) Nothing to Disclose
Anthony G. Gilet, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Edward Esses, MD, Valhalla, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- Ventral hernias, enterocutaneous fistulas, and other ventral abdominal defects are feared complications of many surgical procedures and have a high rate of recurrence.- Size, extent, recurrence, and types of previous repairs are radiographic findings that can effect subsequent surgical planning for complex abdominal defects.

TABLE OF CONTENTS/OUTLINE

Introduction Etiology of complex abdominal defects Patient risk factors Epidemiology Surgical management: Hernias Types of mesh Biologic Synthetic Rationale behind use Comparative analysis Types of repair Mesh vs Tissue Open Laparoscopic Surgical management: Enterocutaneous fistulas Imaging Preoperative evaluation Postoperative complications Evaluation of recurrence Summary

GI203-ED-X

CT of Small Bowel Obstruction: An Update

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Edouard J. Herin, MD, Creteil, France (*Presenter*) Nothing to Disclose
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Stephane Silvera, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
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Marc Zins, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- To review the pathophysiology of the two types of small bowel obstruction (SBO) (simple vs closed loop)- To know how to differentiate these two types on CT, and what differences it makes on patient treatment and outcome- To review CT findings predicting success or failure of medical treatment versus surgery- To learn which CT technique (including spectral CT) should be used for assessment of ischemia associated with SBO- To know the clinical value of the small-bowel feces sign (SBFS)- To learn recent insights in assessment and management of SBO from the literature

TABLE OF CONTENTS/OUTLINE

- Pathophysiology of SBO- Treatment options and prognosis- CT findings predicting treatment outcome- Is ischemia present and which are the most specific CT signs? Improving detection of ischemia with adequate CT technique- SBFS: How to use it?- Sample cases- Future directions and summary

GI204-ED-X

Uncommon Evolution and Complications of Common Benign Liver Lesions

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Federica Vernuccio, MD, Palermo, Italy (*Presenter*) Nothing to Disclose
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Wasim Allaham, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Giuseppe Brancatelli, MD, Palermo, Italy (*Abstract Co-Author*) Speaker, Bayer AG
Valerie Vilgrain, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To describe unusual evolution of common benign liver lesions (BLL) To describe possible complications of BLL To discuss the clinical implications

TABLE OF CONTENTS/OUTLINE

Hemangioma Unusual evolution Size change Calcification Complications Spontaneous rupture Major thrombosis Kasabach-Merritt Syndrome Volvulus of pedunculated type Extrinsic compression Hepatic cyst Unusual evolution Size change Granuloma formation Complications Hemorrhage Infection Spontaneous rupture Extrinsic compression Focal nodular hyperplasia Unusual evolution Size change Fibrous regression Complications Vascular compression Hepatocellular adenomas Unusual evolution Size change Content/aspect changes Changes in vascularization Complications Rupture Hemorrhage Malignancy Unusual evolution or complications of BLLs are more and more encountered due to the increasing number of CT and MRI performed. In some cases, changes in lesion structure lead to diagnostic challenge; the comparison with previous imaging is often useful. This exhibit reviews the most common complications and unusual evolution of BLL and gives some diagnostic clues.

GI205-ED-X

Small Bowel Crohn's Disease at the Present Time: Is MR Enterography as Good as Barium Studies on the Diagnosis and Management?

All Day Room: GI Community, Learning Center

Participants

Maria Esther Gomez San Martin, MD, Valladolid, Spain (*Presenter*) Nothing to Disclose
Nuria Andres Garcia, MD, Valladolid, Spain (*Abstract Co-Author*) Nothing to Disclose
Rebeca Siguenza Gonzalez, Valladolid, Spain (*Abstract Co-Author*) Nothing to Disclose
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Maria Pina Pallin, MD, Valladolid, Spain (*Abstract Co-Author*) Nothing to Disclose
Isabel Jimenez Cuenca, MD, Valladolid, Spain (*Abstract Co-Author*) Nothing to Disclose
Maria Antonia Udaondo Cascante, Valladolid, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- Describe the radiological signs of Crohn´s disease, both during activity and signs of chronicity and its potential complications, using two imaging tests such as barium studies and MR enterography.
- Recognize MR enterography as radiological test of choice in the study of the acute phase and follow-up of the Crohn´s disease.

TABLE OF CONTENTS/OUTLINE

Through this study we will describe the radiological findings in Crohn´s disease, both signs of activity and chronicity, and we will stress upon the current importance of MR enterography as it is is becoming in exploring "frontline" to study patients with Crohn disease.Barium study of the small bowel is the classic method of radiological diagnosis and monitoring of Crohn's disease. It will still be used for a long time, so it is important to know which are its implementation protocols and image findings.However, new techniques such as MR enterography are getting imposed, especially in monitoring, allowing assess the presence of active disease. This is important in order to modify treatment guidelines that present a big economic cost, with the advantage of reducing the radiation dose delivered to the patient, who is subsidiary of frequent controls owing to the typical disease evolution.

GI206-ED-X

MR Imaging of Non-Gynecologic Pelvic Lesions

All Day Room: GI Community, Learning Center

Participants
Kyeong Ah Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Yang Shin Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jong Mee Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Woong Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Chang Hee Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Cheol Min Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. There is a wide spectrum of diseases that arise in the female pelvic cavity, however many pelvic masses are misinterpreted as a gynecologic origin.2. Non-gynecologic pelvic lesions encompass various conditions from benign lesions to highly aggressive malignant lesions. They include diseases (benign and malignant tumor, inflammatory and infectious disease, etc.) of various origins, such as gastrointestinal tract, peritoneum, and retroperitoneum.3. MR imaging can provide valuable information in differential diagnosis of not only gynecologic lesions, but also non-gynecologic lesions encountered in female pelvis.

TABLE OF CONTENTS/OUTLINE

1. GASTROINTESTINAL TRACT: Tumors arising from GI tract may mimic the appearance of ovarian or uterine masses. Such tumors include colorectal cancer, gastrointestinal tumor or lymphoma of small bowel, and appendiceal mucocele.2. PERITONEUM: Benign or malignant disease involving the peritoneum may also mimic the appearance of reproductive organ diseases. These peritoneal lesions include peritoneal serous papillary carcinoma, and tuberculous peritonitis.3. RETROPERITONEUM: Variety of retroperitoneal mass also occurs in the female pelvis and can simulate gynecologic disease. These include cystic lymphangioma, parasitic leiomyoma, and neurogenic tumor.

GI207-ED-X

Pancreatic Metastatic Lesions from Renal Cell Carcinomas (RCC): CT and MR Patterns

All Day Room: GI Community, Learning Center

Participants

Gianpiero Cardone, MD, Milano, Italy (*Presenter*) Nothing to Disclose
Maurizio Papa, MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Paola Mangili, PhD, Milano, Italy (*Abstract Co-Author*) Nothing to Disclose
Fraco Gaboardi, MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Giuseppe Balconi, Ornago, Italy (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) To illustrate the most frequent CT and MR patterns of metastatic pancreatic lesions from RCC. 2) To evaluate the most effective CT and MR imaging examination techniques in the diagnosis of metastatic pancreatic lesions from RCC.

TABLE OF CONTENTS/OUTLINE

1) Epidemiology2) CT and MR imaging techniquesThe most effective CT technique was multiphasic acquisition. The most effective MR techniques were TSE T2w and dynamic ce-FS-GRE T1w sequences evaluated before and after digital subtraction procedure.3) CT and MR patterns of metastatic pancreatic lesions from RCCa) size b) morphologyc) densitometry (CT) and signal intensity (MR) d) contrast enhancement patterns e) DWI (MR)The most frequent CT patterns were hypodensity on pre-contrast images and intense contrast enhancement, being hyperdense compared with normal surrounding pancreatic parenchyma. The most frequent MR patterns were high signal intensity on T2w images, restricted diffusion and hypervascularization on ce- images. The most effective CT technique was multiphasic acquisition. The most effective MR techniques were TSE T2w and dynamic ce-FS-GRE T1w sequences evaluated before and after digital subtraction procedure.

GI208-ED-X

Pitfalls and Pearls in the CT Diagnosis of Pancreatic Cancer: Lessons Learned from a Weekly Multidisciplinary Conference to Improve Diagnostic Accuracy

All Day Room: GI Community, Learning Center

Participants

Elliot K. Fishman, MD, Baltimore, MD (*Presenter*) Institutional Grant support, Siemens AG; Institutional Grant support, General Electric Company;
Pamela T. Johnson, MD, Baltimore, MD (*Abstract Co-Author*) Consultant, National Decision Support Company
Karen M. Horton, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

This exhibit presents valuable educational lessions learned from participation in a pancreatic cancer multidisciplinary conference staffed by oncologists, surgeons, radiation oncologists, and pathologists. Detection of pancreatic cancer is often delayed because of specific errors in diagnosis. MDCT protocol is a critical determinate in the accurate diagnosis of pancreatic cancer, especially for early diagnosis. Reviewing earlier CT scans is valuable in developing a knowledge base for sources of errors. Understand subtle CT findingsto optimize reader accuracy

TABLE OF CONTENTS/OUTLINE

Importance ofpancreatic cancer multidisciplinary conference Role of the radiologist Common sources of error in the CT diagnosis of pancreatic cancer errors in protocol design single venous phase scan limits detection of PNET (pancreatic neuroendocrine tumors) and metastases slow contrast injection rates reduces vascular lesion conspicuity low resolution multiplanar reconstructions or no MPRs intepretative errors dismissing pancreatic duct dilation due to isodense pancreatic cancer missing subtle enhancement abnormalities with small tumors incorrect diagnosis of pancreatic cancer in autoimmune pancreatitis mistaking peripancreaticadenopathy from GI PNETas a pancreatic mass duodenal GIST mimicking pancreatic cancer

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Elliot K. Fishman, MD - 2012 Honored Educator
Elliot K. Fishman, MD - 2014 Honored Educator
Elliot K. Fishman, MD - 2016 Honored Educator
Pamela T. Johnson, MD - 2016 Honored Educator

GI209-ED-X

MRI Characteristics of Pancreatic Tumors and Imitators

All Day Room: GI Community, Learning Center

Participants

Nikhar Kinger, MD, Atlanta, GA (*Presenter*) Nothing to Disclose
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Pardeep K. Mittal, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To identify pancreatic tumors and their characteristics2. To demonstrate imitators of pancreatic tumors3. To compare pancreatic tumors and their imitators

TABLE OF CONTENTS/OUTLINE

Pancreatic cancer is a leading cause of mortality from cancer as it is often discovered late in its clinical course. The pancreas has been associated with many cystic and solid pathologies such as pancreatic adenocarcinoma, acinar type pancreatic cancer, neuroendocrine tumors, and serous or mucinous cystic neoplasms. Imitators of pancreatic cancer include, but are not limited to, lymphoma, autoimmune pancreatitis, paraduodenal pancreatitis, metastatic disease from the kidneys and colon. We identify pancreatic tumors and their characteristics. We describe imitators of pancreatic tumors and their characteristics. We compare their imaging characteristics.

Honored Educators

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Courtney A. Coursey Moreno, MD - 2016 Honored Educator
Pardeep K. Mittal, MD - 2016 Honored Educator
Frank H. Miller, MD - 2012 Honored Educator
Frank H. Miller, MD - 2014 Honored Educator

GI210-ED-X

The Role of MRI Diffusion Weighted Imaging in Peritoneal Carcinomatosis Evaluation: Where Are We Now?

All Day Room: GI Community, Learning Center

Participants

Javier V. de la Calle Lorenzo, Santander, Spain (*Presenter*) Nothing to Disclose
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Hector Vidal Trueba, Santander, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To illustraste the features of diffusion weighted imaging (DWI) and conventional MRI sequences in peritoneal carcinomatosis To determine its utility in the asessment of preoperative peritoneal cancer index (PCI) To be aware of the potential DWI pitfalls

TABLE OF CONTENTS/OUTLINE

Peritoneal carcinomatosis implies a poor survival rate in patients suffering from ovarian, colonic, appendicular or gastric neoplasms. Cytoreductive surgical procedure has improved outcome over the last years but its succes relies on an accurate preoperative PCI. MDCT is not sensitive enough in peritoneal lesions < 5 mm, therefore further techniques are needed. DWI with ADC maps and contrast-enhanced sequences combined improve the detection of malignant lesions. Sequence protocol Hotspots for peritoneal implants MRI findings Morphologic classification: Solid Cystic Mixed Patterns of presentation Micronodular Nodular Plaque-like Omental cake Mass-like Teca aspect Ascites Pitfalls of DWI

GI211-ED-X

MRI Characteristics of Pancreatic Cystic Lesions and Management Based on Pathological Classification

All Day Room: GI Community, Learning Center

Participants

Pardeep K. Mittal, MD, Atlanta, GA (*Presenter*) Nothing to Disclose
Camila L. Vendrami, Santo Andre, Brazil (*Abstract Co-Author*) Nothing to Disclose
Jay Patel, MD, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose
Courtney A. Coursey Moreno, MD, Suwanee, GA (*Abstract Co-Author*) Nothing to Disclose
Caroline Kato, DO, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
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Peter A. Harri, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Frank H. Miller, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Siemens AG

TEACHING POINTS

-Discuss pathological classification of pancreatic cysts according to line of origin and MRI characteristics -Describe MR imaging features that help differentiate pancreatic cystic lesions -Role of endoscopic ultrasound in differentiating benign v/s malignant cystic lesions will also be discussed

TABLE OF CONTENTS/OUTLINE

Image based characterization of pancreatic cystic lesions is necessary for appropriate management, as some lesions require surgical intervention or follow-up, whereas others require no action. Differential diagnosis based on pathological classification, patient profile and pertinent imaging patterns such as location, calcification, internal septations or mural nodularity and communication with duct will be discussed Discuss MRI features of various pancreatic cystic Serous cyst adenoma Mucinous cystic pancreatic tumor (adenoma and carcinoma) IPMN Adenocarcinoma Solid pseudopapillary neoplasm Cystic neuroendocrine Lesions mimicking primary pancreatic cystic masses Pseudocyst Lymphoepithelial cyst Squamoid cyst Paraduodenal pancreatitisMRI allows clear depiction of the internal features of pancreatic cysts such as septa and other cyst contents as well as the pancreatic ductal system, therefore more specific diagnosis can be achieved required for management

Honored Educators

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Courtney A. Coursey Moreno, MD - 2016 Honored Educator
Frank H. Miller, MD - 2012 Honored Educator
Frank H. Miller, MD - 2014 Honored Educator

GI212-ED-X

Gallbladder Cancer on MRI-What Surgeon's Expect to See in the Report

All Day Room: GI Community, Learning Center

Participants

Hsiang-Jer Tseng, MA, MD, Atlanta, GA (*Presenter*) Nothing to Disclose
Nikhar Kinger, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
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Frank H. Miller, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Siemens AG
Jay Patel, MD, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose
Pardeep K. Mittal, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To demonstrate findings of gallbladder cancer on MRI2. To define classification and staging of gallbladder cancer on MRI3. To highlight important findings for diagnosis and surgical management

TABLE OF CONTENTS/OUTLINE

Gallbladder cancer is a rare but deadly malignancy that is often difficult to diagnose early. MRI, an excellent modality for evaluation of soft tissues, plays an important role in identifying gallbladder pathology and management. We demonstrate examples of gallbladder cancer and also discuss primary gallbladder cancer staging according to the AJCC TNM system. We also discuss mimics of gallbladder cancer including metastatic disease, lymphoma, xanthogranulomatous cholecystitis, and tumefactive sludge. We highlight important findings for diagnosis and surgical management.

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Frank H. Miller, MD - 2012 Honored Educator
Frank H. Miller, MD - 2014 Honored Educator

GI213-ED-X

An Entity of Many Faces: The Typical and Atypical Appearances of Pancreatic Serous Cystadenomas

All Day Room: GI Community, Learning Center

Participants

Taemee Pak, Carle Place, NY (*Presenter*) Nothing to Disclose
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Douglas S. Katz, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Victoria Khalef, MD, New Hyde Park, NY (*Abstract Co-Author*) Nothing to Disclose
Barak Friedman, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Ramit Lamba, MD, Sacramento, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Review the epidemiology, natural history, pathologic findings, and medical management of pancreatic serous cystadenomas (SCA).2. Delineate the typical and atypical imaging findings of pancreatic SCAs on CT and MRI, with emphasis on potential misdiagnosis.3. Consider the role of ancillary imaging, especially endoscopic ultrasound (EUS), in making a correct diagnosis.4. Examine radiologic mimics and morphologic overlaps that may lead the radiologist to an incorrect diagnosis of pancreatic SCA, including other cystic pancreatic neoplasms and pancreatic adenocarcinomas.5. Review characteristic imaging findings of SCA that may aid the radiologist in making the correct diagnosis, or suggest additional imaging to better evaluate.

TABLE OF CONTENTS/OUTLINE

1. Epidemiology and natural history of pancreatic SCA2. Pathologic findings3. Management4. Classic imaging findings of SCA Microcysts Honeycomb appearance Calcified central scar (CT) T2 dark central scar (MR) Lobular shape5. Less common imaging findings of SCA Unilocular cyst Microcysts Oligocystic Upstream pancreatic ductal dilatation6. Role of ancillary imaging7. Case based review of mimics/differential diagnoses Mucinous cystic neoplasms Intraductal papillary mucinous neoplasm8. Conclusions

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Douglas S. Katz, MD - 2013 Honored Educator
Douglas S. Katz, MD - 2015 Honored Educator
Ramit Lamba, MD - 2014 Honored Educator

GI214-ED-X

Colon-cidentals: Detection, Characterization and Management of Colon Incidentalomas

All Day Room: GI Community, Learning Center

Participants
Christopher D. Sanders, MD, Fairfield, CA (*Presenter*) Nothing to Disclose
Jared D. Kirkland, MD, Fairfield, CA (*Abstract Co-Author*) Nothing to Disclose
Dell P. Dunn, MD, Newton, MA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

-CT is the work horse of diagnostic medicine with identification of incidental abnormalities reported in up to 24% of CT scans.
-Numerous ACR "White Papers" now exist offering recommendations to help radiologist interpret the clinical relevance of such "incidentalomas"; however, no such guidelines currently exist for incidental colonic masses.
-As radiology transitions from volume-based to value-based practice, it is important to know:
 -When incidentalomas can be left alone
 -When further workup or intervention is necessary
 -The optimal next step in management
-Lifetime incidence of colorectal cancer (CRC) is approximately 4-5%
-Screening programs are effective in early detection of CRC and reducing the morbidity and mortality
-However, a large portion of the population doesn't receive screening and is at risk for incidentally discovered CRC
 -Screening rate is ~57-78% based on 2010-2012 data, leaving 22-43% of patients >50yo unscreened and at risk to present with an incidental CRC.
 -10-14% of CRC occurs in patients <50yo, below the recommended age to begin screening

TABLE OF CONTENTS/OUTLINE

Adenocarcinoma
-Colon
-Rectal
GIST
Carcinoid
Metastasis
Desmoid
Adenoma
Appendiceal Mucocele
Leiomyoma
Hemangioma
Lipoma
Crohn's disease
Vascular malformation
Duplication Cyst
Giant Sigmoid Diverticulum
Retrorectal Hamartoma
Lymphoma
Lynch Syndrome

GI215-ED-X

Added Value of MRI in the Staging of Pseudomyxoma Peritonei

All Day Room: GI Community, Learning Center

Participants

Anthony Dohan, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Michel Abihanna, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
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Vinciane Place, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Clarisse Eveno, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Olivier Glehen, Pierre Benite, France (*Abstract Co-Author*) Nothing to Disclose
Marc Pocard, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Philippe A. Soyer, MD, PhD, Paris, France (*Abstract Co-Author*) Consultant, Guerbet SA;
Pascal Rousset, Pierre Benite Cedex, France (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The goals of this exhibit are: To review the specific MR imaging features of pseudomyxoma peritonei (PMP). To illustrate how specific sequences allow to better depict tumor spreading compared to computed tomography (CT). To explain what the surgeon needs to know before deciding cytoreductive surgery with hyperthermic intraperitoneal chemotherapy (HIPEC) To highlight the added value of the new functional imaging techniques

TABLE OF CONTENTS/OUTLINE

PMP: histopathological features and classification. Overview of MR imaging features of PMP with illustrative cases and intraoperative correlation obtained during cytoreductive surgery with HIPEC. Sample cases of PMP with various degrees of organ involvement. Added value of diffusion-weighted MR sequences by comparison with other imaging modalities. New functional imaging techniques: mucinous deposits volumetry and 3D texture analysis.

GI217-ED-X

It's My Belly Button: Cross-sectional Imaging Spectrum of Diseases of the Umbilicus and Remnants of the Umbilical Cord Revisited

All Day Room: GI Community, Learning Center

Awards

Certificate of Merit

Participants

Robert J. Jackson, MD, San Antonio, TX (*Presenter*) Nothing to Disclose
Carlos S. Restrepo, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Venkata S. Katabathina, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Discuss embryology & anatomy of the umbilicus and remnants of the umbilical cord.
Review common and rare diseases of the umbilicus, urachal, and omphalomesenteric duct remnants.
Describe cross-sectional imaging findings of these diseases and the role of imaging in the diagnosis, treatment, follow-up & surveillance.

TABLE OF CONTENTS/OUTLINE

Introduction
Embryology and anatomy of umbilicus with special emphasis on umbilical cord remnants
Umbilicus: Omphalitis, abscess, hematoma, endometriosis, and neoplasms (Sister Joseph nodule)
Umbilical ring: Omphalocele, gastroschisis, umbilical and Spigelian hernia
Urachus: Patent Urachus, cysts, sinus, diverticulum & adenocarcinoma; abnormalities of extraperitoneal perivesical space
Omphalomesenteric duct: Meckel diverticulum
Recanalization of umbilical vein
Conclusion

Honored Educators

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Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

GI218-ED-X

Intestinal Diverticula: Pathogenesis and Radiographic Findings

All Day Room: GI Community, Learning Center

Participants

Nanae Tsuchiya, Okinawa, Japan (*Presenter*) Nothing to Disclose
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Tsuneo Yamashiro, MD, Nishihara, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation
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Masahiro Okada, MD, Nishihara-Cho, Japan (*Abstract Co-Author*) Nothing to Disclose
Sadayuki Murayama, MD, PhD, Nishihara-Cho, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation

TEACHING POINTS

1. To know the definition, pathogenesis and differential diagnosis in diverticulum 2. To review the radiographic findings in diverticulum, including new technologies of CT colonography and gastric 3D-CT 3. To know the important complications and inform to emergency room doctors by submitting actual CT images

TABLE OF CONTENTS/OUTLINE

1. Definition of Diverticulum- true or false diverticulum- traction or pulsion diverticulum2. Technologies of intestinal diverticulum- CT colonography- Gastric 3D-CT3. Various Diverticulum - Pathogenesis
- Image finding
- Complications
- Differential diagnosis(A) Esophageal diverticulum
  - Zenker’s diverticulum
  - Killian-Jamieson diverticulum
  - Mid-Esophageal Diverticulum (traction or pulsion type)
  - Epiphrenic diverticulum(B) Gastric diverticulum(C) Small bowel diverticulum
  - Duodenal diverticulum
  - Jejunoileal diverticulum
  - Meckel's diverticulum(D) Colonic diverticulum
  - Colonic diverticulum
  - Appendicular diverticulum

GI219-ED-X

Complications of Laparoscopic Cholecystectomy, Including Bile Duct Injury

All Day Room: GI Community, Learning Center

Participants

Nikhar Kinger, MD, Atlanta, GA (*Presenter*) Nothing to Disclose
Courtney A. Coursey Moreno, MD, Suwanee, GA (*Abstract Co-Author*) Nothing to Disclose
Kelly L. Cox, DO, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Sadhna Nandwana, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Pardeep K. Mittal, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To identify complications of laparoscopic cholecystectomy2. To define classification of bile duct injuries3. To demonstrate the utility of MRI in diagnosis and classification of bile duct injuries

TABLE OF CONTENTS/OUTLINE

Laparoscopic cholecystectomy is an innovative method of surgery that has demonstrated improved morbidity and mortality when compared to other methods of gallbladder surgery. However, complications remain a possibility of all surgeries. Bile duct injuries are a serious consequence of surgery, particularly laparoscopic cholecystectomy. Bile duct injury can result in immediate complications such as jaundice, biliary peritonitis, and cholangitis as a result of bile leak, bile duct transection, or bile duct ligation. Long term issues of bile duct injury also include recurrent cholangitis and secondary biliary cirrhosis. MRI is an excellent modality for evaluation of soft tissues. The Bismuth system for describing bile duct injuries is widely used. We demonstrate examples of injuries related to laparoscopic cholecystectomy and evaluate gallbladder injuries with current classification methods. We demonstrate the role of hepatobiliary agents in classification of bile duct injuries.

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Pardeep K. Mittal, MD - 2016 Honored Educator

GI220-ED-X

Bariatric Surgery: Complications on Imaging

All Day Room: GI Community, Learning Center

Participants

Nikhar Kinger, MD, Atlanta, GA (*Presenter*) Nothing to Disclose
Courtney A. Coursey Moreno, MD, Suwanee, GA (*Abstract Co-Author*) Nothing to Disclose
Jay Patel, MD, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose
Pardeep K. Mittal, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To identify types of bariatric surgery2. To identify the role of imaging in preoperative and postoperative bariatric surgery evaluation3. To demonstrate the complications of bariatric surgery on imaging

TABLE OF CONTENTS/OUTLINE

An increase in obesity and its associated comorbidities is a phenomenon that has been described in many countries around the world. Many public health initiatives attempt to counteract the individual cost of obesity. One of these many methods include bariatric surgery. Bariatric surgery has many different forms such as Roux-en-Y gastric bypass and sleeve gastrectomy. We demonstrate examples of bariatric surgery and identify the role of imaging in preoperative and postoperative evaluation. We demonstrate the imaging characteristics of potential complications from bariatric surgery.

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GI221-ED-X

Gastric Cancer Recurrence at MDCT: 'Getting to Know the Enemy'

All Day Room: GI Community, Learning Center

Participants

Felipe A. Sanchez, MD, Santiago, Chile (*Presenter*) Nothing to Disclose
Carolina A. Weitz, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Jose Gutierrez Chacoff, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Jorge Ortiz Vega, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Freddy A. Jalil, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Cristian Varela, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Ignacio Maldonado, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

After viewing this exhibit, the learner will be able to: Recall the postsurgical anatomy and expected findings after oncologic gastric surgery. Recognize the appearance of main recurrence patterns, such as locoregional involvement, hepatic metastases, peritoneal seeding and distant metastases. Recognize the early signs that are highly suggestive of neoplastic recurrence.

TABLE OF CONTENTS/OUTLINE

1.- Epidemiology of gastric cancer2.- Curative surgical procedures: postsurgical usual findings Indications Oncologic surgery techniques, with schematic representation Normal postsurgical findings at MDCT (case based)3.- Patterns of recurrence Incidence Types of recurrence and its patterns. Frequency of each pattern of recurrence in literature and in our local database. Clinical implications4.- Representative imaging findings of recurrence at MDCT Sutile key findings that suggest tumor recurrence Locoregional involvement (including surgical seeding) Hepatic metastases Peritoneal seeding Distant metastases Diagnostic pitfalls 5.- Schematic evaluation approach6.- Summary and recommendations

GI222-ED-X

Not Such a Pain in the Butt: MR Imaging of Rectal Cancer what the Surgeon Needs to Know

All Day Room: GI Community, Learning Center

Participants

Vanessa Lewis, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Frank H. Miller, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Siemens AG
Paul Nikolaidis, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Harmeet Kaur, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Scott Strong, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Carolina Parada Villavicencio, MD, Chicago , IL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. MRI plays a key role in the preoperative staging of rectal cancer, including evaluation of nodal disease, involvement of the mesorectal fascia, and invasion of the pelvic side wall or local orgams.2. MRI is the best modality for evaluating pelvic anatomy for the surgeon, including the anal sphincter complex and peritoneal reflection.3. Radiologists play a role in evaluating post-treatment complications.4. Structured reporting may help with surgical planning.

TABLE OF CONTENTS/OUTLINE

Pelvic anatomy, including the anal sphincter complex and peritoneal reflection. Importance of high resolution small FOV imaging in orthogonal planes for diagnosis. Role of MRI in TNM staging. DIagnostic dilemmas, such as T2 vs. early T3 disease. Evaluating key areas to guide surgical management, including iliac chain nodal metastases, peritoneal reflection, and anal sphincter. Post-treatment complications, including recurrence and fistulas. Structured reporting geared toward the surgeon.

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Frank H. Miller, MD - 2014 Honored Educator

GI223-ED-X

The Abnormal Stomach-Gastric Twists and Turns

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Satheesh Krishna, MD, Ottawa, ON (*Presenter*) Nothing to Disclose
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Raman Verma, MD, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose
Ania Z. Kielar, MD, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose
Adnan M. Sheikh, MD, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Review the imaging landmarks of normal stomach 2. Discuss the varied abnormalities in gastric orientation and salient imaging features which help identify each of them. 3. Discuss the imaging features of complications resulting from gastric 'twists and turns' 4. To present a "take home" systematic imaging approach to an abnormally oriented stomach to arrive at the correct diagnosis to ensure timely management.

TABLE OF CONTENTS/OUTLINE

1. Revisiting normal anatomic landmarks on CT 2. CT protocol considerations 3. Dextrogastria with embryological considerations. 4. Diaphragmatic hernias- types, evolution of from intraabdominal to completely intrathoracic stomach 5. 'Organoaxial' intrathoracic positioning of the "upside down" stomach. 6. Complications of organoaxial positioning -'floppy fundus' and gastric ischemia. 7. Complications of chronic hernia with ischemia, strictures and perforation. 8. Differentiation of organoaxial and mesenteroaxial volvulus. 9. Differentiation of primary and secondary mesenteroaxial volvulus 10. Gastric intussusception secondary to masses. 11. Retrograde jejunogastric intussusception in patients with partial gastrectomy. 12. Gastric herniation secondary to diaphragmatic rupture. 13. Pseudo-malrotation secondary to gastric distension 14. Finally, a "Take Home" systematic imaging approach to an abnormally oriented stomach will be presented.

GI224-ED-X

From Inguinal to Spermatic Cord Lipoma; Pearls, Pitfalls and Mimics of Pelvic Hernias

All Day Room: GI Community, Learning Center

Awards
Identified for RadioGraphics

Participants
Miguel C. Cabarrus, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
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Benjamin M. Yeh, MD, San Francisco, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Author with royalties, Oxford University Press; Shareholder, Nextrast, Inc;

TEACHING POINTS

The purpose of this exhibit is: To review the relevant anatomy and important anatomic landmarks in the abdominal wall and pelvis. Provide illustrative examples of common and uncommon abdominopelvic hernias that may be encountered in clinical practice. Discuss how to identify and differentiate hernia types through the use of anatomic landmarks. Identify mimics and pitfalls in the diagnosis of abdominopelvic hernias.

TABLE OF CONTENTS/OUTLINE

Review relevant CT anatomy and anatomic landmarks of the abdominal wall and pelvis Inguinal canal and contents Vasculature Muscles Ligaments Fascial layersCase based review of hernia types Groin Inguinal (direct, indirect) Femoral Ventral Umbilical Paraumbilical Incisional/parastomal Spigelian Pelvic Sciatic Ischiorectal Obturator LumbarReview of imaging findings related to treatment and complications Bowel obstruction and strangulation Postoperative appearance of hernia repairHernia mimics and pitfalls Spermatic cord lipoma Canal of nuck cyst Abdominal wall tumors Hematoma Undescended testis Varicocele

GI225-ED-X

Scope out the Periphery of the Focal Hepatic Lesions: What Do They Tell Us?

All Day Room: GI Community, Learning Center

Participants
Tae Un Kim, MD, Yangsan, Korea, Republic Of (*Presenter*) Nothing to Disclose
Nam Kyung Lee, MD, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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Jeong Heo, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To learn about imaging findings of various focal hepatic lesions with focus on the periphery of lesions for arriving at the diagnosis.
To understand the corresponding histopathology of different disease entities with special emphasis on the periphery of the lesions.
To discuss the imaging characteristics for differentiating features between benign and malignant hepatic lesions..

TABLE OF CONTENTS/OUTLINE

Introduction Terms of periphery features: lesional vs. perilesional**Imaging features with focus on the periphery of the focal hepatic lesions** 1. Infectious Abscess (double target sign) 2. Inflammatory Inflammatory hepatic pseudotumor: target sign - IgG4-related Inflammatory pseudotumor 3. Benign neoplasm Hemangioma: interrupted nodular enhancement Adenoma: Atoll sign Focal nodular hyperplasia: spoke-wheel pattern 4. Malignant neoplasm HCC : capsular enhancement Cholangiocarcinoma: target sign Metastasis: ring enhancement Others: hemangioendothelioma, lymphoma**Clues for the differential diagnosis between benign and malignant hepatic lesions****Summary**

GI226-ED-X

Not Common but not Forgotten: Non-malignant Esophageal Diseases on CT

All Day Room: GI Community, Learning Center

Participants
Brett W. Cerniglia, MD, MPH, Philadelphia, PA (*Presenter*) Nothing to Disclose
Hongju Son, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The esophagus is involved by a wide range of pathologic processes that can be detected, defined, and staged with CT in conjunction with other imaging modalities or endoscopy. While either primary malignancy or metastasis from the adjacent organs is much more common, benign diseases/conditions can also be detected on CT. We review benign neoplasms, inflammatory/infectious diseases, trauma and additional miscellaneous conditions. It is important to compare and collaborate with other imaging modalities and/or endoscopic findings in order to formulate accurate diagnoses. Familiarity with radiographic features of these conditions is essential to guide appropriate patient management.

TABLE OF CONTENTS/OUTLINE

1. Benign tumors: Leiomyoma, squamous papilloma, duplication cyst, fibrovascular polyp2. Inflammatory or infectious diseases: Esophagitis, scleroderma3. Trauma: Perforation, fistula, hiatal hernia, intramural esophageal dissection4. Miscellaneous conditions: Achalasia, varices, transient intraluminal diverticulum

GI227-ED-X

Diseases of the Peribiliary Gland

All Day Room: GI Community, Learning Center

Awards
Magna Cum Laude

Participants
Takashi Matsubara, Kanazawa, Japan (*Presenter*) Nothing to Disclose
Kazuto Kozaka, MD, Kanazawa, Japan (*Abstract Co-Author*) Nothing to Disclose
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Toshifumi Gabata, MD, PhD, Kanazawa, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Recently embryological and anatomic studies have shown that stem cells that are capable of differentiating into hepatocytes, cholangiocytes, and pancreatic cells are distributed along the biliary tree, particularly in the peribiliary glands. In addition, previous studies showed that exocrine acini were intermingled with peribiliary glands expressed pancreatic enzymes. Thus the biliary tract could be regarded as an incomplete pancreas. There are various diseases such as inflammation, neoplasms and congenital anomaly originate from the peribiliary glands.The purpose of this exhibit is to:1. Illustrate an anatomy of biliary tree including peribiliary glands.2. Illustrate various diseases or pathological conditions related to peribiliary glands.

TABLE OF CONTENTS/OUTLINE

Biliary Tract is an Incomplete Pancreas and Peribiliary Glands have Biliary Tree Stem Cells
Diseases of the Peribiliary Gland
Inflammation -Peribiliary Cysts and IgG4-Sclerosing Cholangitis
Neoplasms -Cholangiocellular Carcinoma and Intraductal Papillary Neoplasms
Congenital Anomaly -Autosomal Dominant Polycystic Kidney Disease

GI228-ED-X

Evaluating the Fatty Liver (Stetosis) in Spectral CT-A Future Prospect of the Quantification of Intrahepatic Fat Density

All Day Room: GI Community, Learning Center

Participants

Tomohiro Arai, RT, Tokyo, Japan (*Presenter*) Nothing to Disclose
Tsuyoshi Tajima, MD, PhD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Masaki Misawa, Tsukuba Ibaraki, Japan (*Abstract Co-Author*) Nothing to Disclose
Masafumi Shinozaki, RT, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Kayo Sakamoto, RT, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshinobu Yajima, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Masanori Sato, Ota, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Because the conventional CT image is reconstructed of the relative CT values that have no unit to be measured, it cannot reflect the composition of materials on images. On the other hand, the spectral CT is possible to acquire images constructed of units of physical density of materials, such as fat densities within the hepatic cells of human body.This educational exhibit shows the advantages of spectral CT in quantification of the fatty liver. In this section, we will introduce the application of the fat-weighted images and the density analysis using spectral CT.

TABLE OF CONTENTS/OUTLINE

1. To show the results of phantom study to evaluate the accuracy using the spectral CT.2. To describe the measurement accuracy and the information amount of spectral CT in comparison with the conventional CT in comparison with the reference standard, the pathological quantification of fat using liver biopsy.3. To exhibit the future prospect of less-invasive imaging evaluation of fatty liver using the spectral CT.

GI229-ED-X

Avoiding Pitfalls in the Interpretation of Gadoxetic Acid-enhanced MR Imaging

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Marco Dioguardi Burgio, MD, Paris, France (*Presenter*) Nothing to Disclose
Luisa Paulatto, Geneva, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Maxime Ronot, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Sylvain Terraz, MD, Geneva, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Valerie Vilgrain, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Giuseppe Brancatelli, MD, Palermo, Italy (*Abstract Co-Author*) Speaker, Bayer AG

TEACHING POINTS

To review pharmacokinetic properties of gadoxetic acid (GA) To describe situations in which use of GA may lead to incorrect diagnosis To emphasize those diagnostic clues that may help reach proper diagnoses

TABLE OF CONTENTS/OUTLINE

Pharmacokinetics of GA (vs. extracellular contrast agents) Possible pitfalls in different clinical scenarios Nodules in cirrhotic patients Overdiagnosis of HCC Hemangioma Focal confluent fibrosis Cholangiocarcinoma Atypical HCC Lack of capsule visualization Iso/hypertensity on HBP Extrahepatic cancers staging Overdiagnosis of metastases Cholangiocarcinoma Hemangioma Fat deposition Atypical mets Target appearance Fortuitous discovery FNH vs. adenoma Hemangioma Unusual situations (splenosis) GA is widely used in three main clinical situations: characterization of small nodules in cirrhotic patients, staging of extrahepatic cancers, and characterization of fortuitously discovered focal liver lesions. In all cases, the use of GA may lead to over- or misdiagnosis because of atypical presentations, or misidentification of mimickers. Cautious analysis of imaging features and clinical context helps reaching a proper diagnosis in most cases.

GI230-ED-X

Stomach Pseudolesions Due to External Compression that Mimic Gastric Subepithelial Tumor on Upper GI Endoscopy: Correlation with EUS and CT Findings

All Day Room: GI Community, Learning Center

Participants

Joon Chul Ra, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Eun Sun Lee, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jong Beum Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyun Jeong Park, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung Bin Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Byung Ihn Choi, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Compression of stomach from external adjacent structures(e.g. liver, pancreas, spleen, normal splenic artery or aneurysm, crus of diaphragm) can mimic gastric subepithelial tumor on upper GI endoscopy.2. Endoscopic ultrasound and CT can be helpful for differentiation between external compression and true lesions.

TABLE OF CONTENTS/OUTLINE

1. Gastric subepithelial tumors(SETs)- Definition- Common cause- Etiology2. Diagnosis of gastric SETs- Upper GI endoscopy- Endoscopic ultrasonogrphy(EUS)- Computed tomography(CT) 3. Mimickers of gastric SETs: External compression from adjacent structures.- Pancreas- Liver(or hepatic cysts)- Spleen- Normal splenic artery or splenic artery aneurysm- Crus of diaphragm

GI231-ED-X

Accidental Findings in Abdominal CT: How to Detect and Quantify Cholesterol Stones in Gallbladder with Non-enhanced Dual-Energy Spectral CT

All Day Room: GI Community, Learning Center

Participants

Chuangbo Yang, MMed, Xianyang City, China (*Presenter*) Nothing to Disclose
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Taiping He, Xianyang, China (*Abstract Co-Author*) Nothing to Disclose
Yong Yu, Xianyang City, China (*Abstract Co-Author*) Nothing to Disclose
Haifeng Duan, Xianyang City, China (*Abstract Co-Author*) Nothing to Disclose
Yongjun Jia, MMed, Xianyang City, China (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) To illustrate the limitations of detecting cholesterol stones in conventional CT imaging2) To illustrate the advantages of virtual monochromatic images with extended energy range and fat-based material decomposition images in dual-energy Spectral CT3) To demonstrate strategies to maximize the detection of cholesterol stones

TABLE OF CONTENTS/OUTLINE

1) Limitations of conventional CT·CT number affected by averaging and beam hardening·Limited tube voltage range·Cholesterol stones in gallbladder have similar CT number as bile in 80-140kVp2) Advantages of Spectral CT imaging·Spectral CT generates both monochromatic image sets from 40-140keV and fat-based material decomposition images·Monochromatic images at 40keV and 140keV increase the CT number differences between bile and cholesterol stones for better separation·Cholesterol stones with fat as major component appear bright in Fat-based MD images3) Strategies to maximize the detection of cholesterol stones·Use Fat-based MD images to locate cholesterol stones in gallbladder, and quantify fat concentration in the stone for positive identification and differentiation·Combine monochromatic images at 40keV and 140keV for overall image analysis

GI233-ED-X

Imaging the J-pouch (Ileal Pouch-Anal Anastomosis or IPAA): Surgical Variations, Natural History and Common Complications

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
Joshua D. Reber, MD, Rochester , MN (*Presenter*) Nothing to Disclose
Amy L. Lightner, Rochester, IA (*Abstract Co-Author*) Nothing to Disclose
Shannon P. Sheedy, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
David Bruining, MD, Rochester, MN (*Abstract Co-Author*) Research Grant, Given Imaging Ltd Consultant, Bracco Group
Stephen W. Trenkner, MD, Edina, MN (*Abstract Co-Author*) Nothing to Disclose
John M. Barlow, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Mellena D. Bridges, MD, Jacksonville, FL (*Abstract Co-Author*) Nothing to Disclose
Joel G. Fletcher, MD, Rochester, MN (*Abstract Co-Author*) Grant, Siemens AG; ;

TEACHING POINTS

Surgical formation of an ileal pouch-anal anastomosis (IPAA or "J-Pouch") following colectomy is commonly utilized in medically refractory ulcerative colitis and FAP. Typical outcomes following IPAA are excellent, but complications can substantially reduce patient quality of life and functionality. Fluoroscopy, CT, and MRI are often employed for evaluation of these conditions. Structural complications include anastomotic leak, stricture, retained rectum with inflammation or dysplasia, pouch prolapse, and chronic postoperative fistulas or sinus tracts. De novo or recurrent Crohn's disease can result in fistulizing disease to the pouch, pouchitis, or pre-pouch ileal disease. Radiologist familiarity with postoperative complications may hasten accurate diagnosis and inform proper treatment.

TABLE OF CONTENTS/OUTLINE

J pouch surgical variations Natural history of J pouch Pouchitis vs. Crohn's Features suggeseting pouchitis vs. Crohn's 4. Diarrhea Causes – compliance, overflow, sphincters 5. Structural Complications Leak –pouch-anal anastomosis and blind end Stricture at IPAA Retained rectum Prolapse Post-operative fistulas 6. Recurrent Crohn's Pre-pouch ileum or pouch Fistulizing Crohn's disease of the pouch Perianal and ano-vaginal fistulas 7. Other complications Ischemia Malignancy

Honored Educators

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Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

GI234-ED-X

Hepatocarcinogenesis, MRI, and LI-RADS-It's Not Always HCC!

All Day Room: GI Community, Learning Center

Participants

Cynthia S. Santillan, MD, San Diego, CA (*Presenter*) Consultant, Robarts Clinical Trials, Inc
Isabel G. Newton, MD, PhD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Adrija Mamidipalli, MBBS, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
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Thomas A. Hope, MD, San Francisco, CA (*Abstract Co-Author*) Research Grant, Consultant, GE Healtcare
Elhamy R. Heba, MBBCh, MD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Mark Valasek, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
An Tang, MD, Montreal, QC (*Abstract Co-Author*) Advisory Board, Imagia Cybernetics Inc
Eduardo A. Costa, MD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;

TEACHING POINTS

The purpose of this exhibit is1)To familiarize radiologists with the possible pathways leading to malignancy in patients with cirrhosis or chronic hepatitis B virus infection 2)To explain the differences between cirrhotic/regenerative nodules, low grade dysplastic nodules, high grade dysplastic nodules, early hepatocellular carcinoma (HCC), and progressed HCC 3)To explain the association between cirrhosis and non-hepatocellular tumors such as cholangiocarcinoma (CCA) and hepatocholangiocarcinoma (HCA) tumors 4)To demonstrate some of the LI-RADS imaging features associated with these entities with an explanation of the underlying pathophysiology

TABLE OF CONTENTS/OUTLINE

1)Background: Spectrum of hepatocellular nodules in cirrhosis, Concept of clonal expansion leading from nonmalignant nodules to progressed HCC (Histologic features associated with progressed HCC such as expansive growth & vascular invasion), and Concept of stem cells leading to HCC, CCA, or HCA tumors 2)Discussion of imaging features & associated pathophysiology:Major LI-RADS features (Arterial phase hyperenhancement, Capsule appearance, Threshold growth) & Ancillary features (Hepatobiliary & transitional phase hypointensity, Mild-moderate T2 hyperintensity, Restricted diffusion, Corona enhancement, Intralesional fat, Lesional iron sparing, Mosaic architecture) 3)Summary

GI235-ED-X

Shear Wave Elastography: The Painless Liver 'Biopsy'

All Day Room: GI Community, Learning Center

Participants
Pauley Chea, MD, Burlington, MA (*Presenter*) Nothing to Disclose
Shalin M. Soni, MD, Burlington, MA (*Abstract Co-Author*) Nothing to Disclose
Karen L. Reuter, MD, Wellesley Hls, MA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- Chronic liver disease (CLD) may lead to hepatocyte injury, fibrotic regeneration, and cirrhosis- The current gold standard for monitoring the progression of CLD is the non-focal liver biopsy. - Shear wave elastography is a non-invasive means of supplementing and possibly replacing liver biopsy in the staging of liver fibrosis and the diagnosis of cirrhosis.- Shear wave elastography exploits a natural physical property of advancing CLD: As fibrosis progresses, liver tissue hardens. Quantified values of liver stiffness are obtained in kilopascals (kPA), a unit of pressure measurement which can then converted to a METAVIR F stage, traditionally obtained histologically.

TABLE OF CONTENTS/OUTLINE

-Introduction to Chronic Liver Disease (Etiology,Pathophysiology) -"Gold Standard" Histopathologic Staging & Pitfalls.- Use of non-invasive techniques in staging fibrosis (Fibrotest,Fibroscan,Elastography).- Introduction to shear wave elastography (Basic Physics).- Case examples demonstrating current use (Question of fibrosis, Cirrhosis) .- Pitfalls of elastography including confounding factors.- Clinical implications. (HCV prescription coverage. Treatment response monitoring.)-Conclusion and Future Directions.

GI236-ED-X

Cyst or Missed? Differentiating Challenging Cystic Lesions of the Liver

All Day Room: GI Community, Learning Center

Participants
Yachao Zhang, MD, Valhalla, NY (*Presenter*) Nothing to Disclose
Zeah Venitelli, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Perry S. Gerard, MD, Valhalla, NY (*Abstract Co-Author*) Nothing to Disclose
Anthony G. Gilet, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Cystic hepatic lesions cross the spectrum of pathophysiology, from the benign to the highly malignant; the indolent to the urgent; the congenital to the acquired. The challenge arises in that many of these conditions exhibit substantial overlap in clinical and imaging characteristics.We will demonstrate imaging examples with pathologic correlate of challenging cystic hepatic lesions, many of which were misdiagnosed initially on a clinical or imaging basis. We will highlight important imaging pearls that will help differentiate 'look alike' entities. We will point out several potential pitfalls that can help avoid errors of interpretation.

TABLE OF CONTENTS/OUTLINE

Benign cysts: Simple hepatic cysts, von-meyenberg complexes, polycystic liver diseaseInfectious and acquired cysts: pyogenic cysts, echinoccocal cysts, amebic cysts, intrahepatic pancreatic pseudocystNeoplasm: Hepatic intraductal oncocytic papillary carcinoma, biliary cystadenoma/cystadenocarcinoma, cystic metastases from ovarian and pancreatic primariesPearls and Pitfalls: Cystic metastasis mimicking benign cysts; peri-biliary cysts mimicking intrahepatic biliary ductal dilatation; Caroli's disease mimicking cholangiocarcinoma; recurrent pyogenic cholangitis mimicking cholangiocarcinoma.Differentiating bilomas from other hepatic fluid collections,

GI237-ED-X

Contribution of Radiology for the Diagnosis of Gastroesophageal Reflux Disease (GERD)

All Day Room: GI Community, Learning Center

Participants

Alberto I. Carbo, MD, Shreveport, LA (*Presenter*) Nothing to Disclose
Aya Al Asfari, MD, Shreveport, LA (*Abstract Co-Author*) Nothing to Disclose
Thomas R. Gates, MD, Shreveport, LA (*Abstract Co-Author*) Nothing to Disclose
Dean D. Maglinte, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:To review the pathophysiology of GERDTo explain the correlation between the pathologic changes produced by reflux and radiologic imagesTo describe the radiologic technique used for the diagnosis of GERD including the radiologic contrasts, use of premedication, patient positions To illustrate the imaging findings associated with GERD like hiatal hernia, mucosal abnormalities, feline esophagus, thickened folds, inflammatory esophagogastric polyps, ulcerations, scarring and strictures, dysmotilities of the cricopharyngeus and esophagus, Barrett's esophagusTo explain the differential diagnosis of radiologic findingsTo discuss the pros and cons of the option: Radiology versus Endoscopy on a patient with symptoms of reflux

TABLE OF CONTENTS/OUTLINE

Pathophysiology of GERDRadiologic techniqueReview of imaging findings Sample cases and mimicsRadiology versus Endoscopy

Honored Educators

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Alberto I. Carbo, MD - 2015 Honored Educator

GI238-ED-X

Multi-modality Imaging Features of HCC Post-RFA Therapy

All Day Room: GI Community, Learning Center

Participants
Bijan Bijan, MD, Sacramento, CA (*Presenter*) Nothing to Disclose
Ellen Cheang, MD, Sacramento, CA (*Abstract Co-Author*) Nothing to Disclose
Jonah S. Hirschbein, MD, Sacramento, CA (*Abstract Co-Author*) Nothing to Disclose
Justin S. Lee, MD, Sacramento, CA (*Abstract Co-Author*) Nothing to Disclose
Giselle M. Melendres, MD, Davis, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Compare and contrast radiofrequency ablation (RFA), microwave ablation, and cryoablation as treatment options for hepatocellular carcinoma (HCC).2. Review the appropriate post-ablation imaging follow up and expected findings with an emphasis on MRI.3. Illustrate the appearance of post-ablation disease recurrence.4. Discuss the potential pitfalls of post-ablation imaging follow up.

TABLE OF CONTENTS/OUTLINE

1. The Application of Percutaneous Ablation to HCC.Radiofrequency ablation, microwave ablation, and cryoablation will be reviewed with an emphasis on the advantages and disadvantages of each technique in the setting of HCC.2. Post-Ablation ImagingAppropriate post-ablation imaging follow up will be discussed and expected findings will be presented with examples from our own institution. Examples will include ultrasound, CT, MR, and PET followup. Cases of disease recurrence will be presented as well.3. DWI and PET Correlation.The role and utility of these techniques will be explored.4. Post-Ablation Imaging Pitfalls.Potential pitfalls of post-ablation imaging will be illustrated with an emphasis on steps that can be taken to help ensure accurate interpretation of these studies.

GI239-ED-X

A Life Threatening Outcome: Colonic Complications in Acute Pancreatitis

All Day Room: GI Community, Learning Center

Participants

Javier V. de la Calle Lorenzo, Santander, Spain (*Presenter*) Nothing to Disclose
Amaya Iturralde Garriz, santander, Spain (*Abstract Co-Author*) Nothing to Disclose
Raul Pellon Daben, Santander, Spain (*Abstract Co-Author*) Nothing to Disclose
Francisco Gonzalez Sanchez, Santander, Spain (*Abstract Co-Author*) Nothing to Disclose
Victor Fernandez Lobo, Santander, Spain (*Abstract Co-Author*) Nothing to Disclose
Sara Sanchez Bernal, MD, Santander, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- To remember that although colonic complications in acute pancreatitis are not frequent, they ensure high severity- To remark the importance of identifying these types of complications (especially colon necrosis) in the controls performed using as example our hospital cases.- To emphasize the important role we have as radiologists in the final patient evolution.

TABLE OF CONTENTS/OUTLINE

1. Introduction: types of complications in acute pancreatitis 1.1 Gastrointestinal complications 1.2 Vascular complications 1.3 Inflammatory complications2. Types of gastrointestinal complications 2.1 Minor complications (Ogilvie, mechanical obstruction..) 2.2 Major complications (Necrosis, perforation, fistula, stenosis, necrotizing colitis)3. Series of cases about major complications and its radiological features on CT4. Conclusion: CT is useful for early detection of colonic necrosis that despite being an infrequent complication it causes high mortality index in this patients.

GI240-ED-X

Pancreatic Neuroendocrine Tumors: Interplay between CT and Treatment

All Day Room: GI Community, Learning Center

Participants

Kyung Jin Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hyoung Jung Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kyung Won Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sang Hyun Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Dong Wook Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:1. To know the 2010 WHO classification and NCCN guideline for pancreatic neuroendocrine tumors. 2. To differentiate high grade pancreatic neuroendocrine tumor from low grade tumor on dynamic CT. 3. To know the complications of molecular targeted agent in patients with pancreatic neuroendocrine tumors. .

TABLE OF CONTENTS/OUTLINE

A. Introduction: various clinical and imaging features of pancreatic neuroendocrine tumors. B. 2010 WHO classification of pancreatic neuroendocrine tumors. C. 2015 NCCN guidelines for pancreatic neuroendocrine tumors. D. CT information that might be obtained before surgery: beyond the TNM staging. 1. Differentiation of grade 3 pancreatic neuroendocrine carcinoma from grade 1/2 pancreatic neuroendocrine tumors. 2. Candidates for oncological surgery versus candidates for conservative surgery in patients with pancreatic neuroendocrine tumors. 3. Assessment of the prognosis in patients with pancreatic neuroendocrine tumors, based on dynamic CT. E. Tumor response and complications of molecular targeted agent (Sunitinib and Everolimus)

GI241-ED-X

Anterior Extraperitoneal Space: Comprehensive Anatomical Overview and Evaluation of Pathologies Using CT and MRI

All Day Room: GI Community, Learning Center

Participants

Frank K. Chen, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Arvin Saremi, BS, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
petros Mirilas, MD,PhD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Farhood Saremi, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:Review the relevant anatomy of the structures participating in formation of the anterior extraperitoneal space
Review characteristic imaging findings of common and uncommon pathologies involving this region

TABLE OF CONTENTS/OUTLINE

Normal embryology and anatomy of the anterior extraperitoneal spaceDevelopmentTransversalis fascia
Umbilical prevesical fascia
Umbilicovesical fascia
Fascia around the round ligamentImaging characteristics with cadaveric correlationAbdominal above the umbilicus
Retropubic or prevesical space of Retzius
Prevesical, perivesical, and paravesical spaces
The retroinguinal space of Bogros
Connections to Subperitoneal pelvic space, presacral space and retoperitoneumRelationship to the vessels, median and medial umbilical ligaments
Anatomical variations
Abnormalities of the anterior extraperitoneal spaceInfection and abscess
Post trauma changes
MalignanciesRelevance for extraperitoneal laparoscopic surgery
Relevant considerations for percutaneous interventions

Honored Educators

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Farhood Saremi, MD - 2015 Honored Educator

GI242-ED-X

Fecal Incontinence: Findings at MRI Defecography

All Day Room: GI Community, Learning Center

Participants
Adrian A. Dawkins, MD, Lexington, KY (*Presenter*) Nothing to Disclose
Nanditha George, MBBS, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose
Rashmi T. Nair, MD, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose
Andres R. Ayoob, MD, Lexington, KY (*Abstract Co-Author*) Grant, Koninklijke Philips NV
Halemane S. Ganesh, MD, lexington, KY (*Abstract Co-Author*) Nothing to Disclose
Scott D. Stevens, MD, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose
James T. Lee, MD, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The reviewer of this exhibit will1) be familiarized with MR defecography as a technique for evaluating abnormal defecation.2) gain insight into how MR defecography is performed at our institution.2) be familiarized with the spectrum of abnormalities seen in fecal incontinence and management implications.

TABLE OF CONTENTS/OUTLINE

MR Defecography: Indications and contraindicationsMR Defecography: TechniqueMR Defecography: Spectrum of findings in fecal incontinence

GI243-ED-X

Pancreatography: Radiologists Should Know Endoscopic Retrograde Pancreatography (ERP) as well as Magnetic Resonance Cholangiopancreatography (MRCP)

All Day Room: GI Community, Learning Center

Participants

Shinichi Ota, MD,PhD, Otsu, Japan (*Presenter*) Nothing to Disclose
Akitoshi Inoue, MD, Shiga, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuki Tomozawa, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Shobu Watanabe, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Norihisa Nitta, MD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Kiyoshi Murata, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Akira Furukawa, MD, PhD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To be familiar with ERP, although radiologists are so familiar with MRCP. To understand the advantages / disadvantages and usefulness / limitation of MRCP and ERP.

TABLE OF CONTENTS/OUTLINE

Overview of ERP and MRCP Merits and demerits of ERP and MRCP Indication and role of pancreatography in the diagnosis of pancreatic disease Normal pancreatography on ERP and MRCP Cases in which MRCP contributes well to the diagnosis Cases in which ERP plays a key role for the diagnosis Cases in which pancreatography misleads the diagnosis Cases with complication caused by ERP Summary

GI244-ED-X

Radiologic Manifestations at Abdominal Imaging and Approach to Diagnosis of Amyloidosis as a Systemic Disease

All Day Room: GI Community, Learning Center

Participants

Suk Kim, MD, Pusan, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ga Jin Han, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Nam Kyung Lee, MD, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Tae Un Kim, MD, Yangsan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Amyloidosis is defined as an extracellular deposition of protein fibrils with a β-sheet fibrillar structures and characteristic properties after staining with Congo Red stain and classified several subgroup according to pathology and underlying disease. However, imaging findings at abdomen CT have been relatively nonspecific and unknown associated with various types and clinical settings. Therefore, we present here all about abdominal involvement of amyloidosis focused on various underlying disease or plasma cell disorder with 73 amyloidosis patients at our institution during the past 5 years.

TABLE OF CONTENTS/OUTLINE

1. Clinical characteristics of amyloidosis(1) Frequency(2) Pathology(3) Classification2. Diagnostic approach of amyloidosis(1) Imaging findings of amyloidosis at abdomen CT (2) Correlation with endoscopic, laboratory, and pathologic findings(3) Various concomitant systemic disease and imaging findings(4) Post-treatment changes and prognosis3. Mimickers of amyloidosis and differential diagnosis4. Importance of abdominal involvement in diagnosing amyloidosis in various clinical setting

GI245-ED-X

Unintended Consequences: A Pictorial Review to Identifying Surgical and Post-endoscopy Biliary Intervention Complications

All Day Room: GI Community, Learning Center

Awards
Cum Laude

Participants
Joseph C. DeMarco, DO, Valhalla, NY (*Presenter*) Nothing to Disclose
Kimberly Scherer, DO, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose
Tzyy Shyang Chao, MD, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose
Sean K. Calhoun, DO, Long Valley, NJ (*Abstract Co-Author*) Nothing to Disclose
Thaddeus M. Yablonsky, MD, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose
Scott Sosin, DO, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Surgery and ERCP have become mainstays of treatment for both benign and malignant pancreaticobiliary disease. At the end of this Educational Exhibit, the reader should: Be able to identify on imaging the various complications following surgical or endoscopic biliary intervention. Be able to discuss management options including interventional radiology solutions for each complication.

TABLE OF CONTENTS/OUTLINE

1. Stent Complications: Unstable/unsuitable stent positioning Lumen occlusion Stent migration Tumor overgrowth of the stent Pancreatitis Bile leak Hemorrhage Cholangitis Cholecystitis Pseudoaneurysm2. Interventional solutions: Percutaneous transhepatic cholecystostomy Percutaneous stent placement/restenting Stent retrieval Embolization i.Coils ii.N-butyl cyanoacrylate iii.Gelfoam

GI246-ED-X

FDG PET/MR in Hepatobiliary Malignancies: Is there an Indication?

All Day Room: GI Community, Learning Center

Participants
Karin A. Herrmann, MD, PhD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Uliyana Yankevich, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
John B. Ammori, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Christopher Siegel, MD, PhD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Rong Rong, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Negin Rassouli, MD, Cleveland, OH (*Abstract Co-Author*) Institutional Grant support, Koninklijke Philips NV
Raj M. Paspulati, MD, Cleveland, OH (*Presenter*) Nothing to Disclose

TEACHING POINTS

To illustrate and discuss the diagnostic potential of combined FDG PET/MR in the workup and follow up of primary and secondary hepatic malignancies and address the benefits and limitations of this technique

TABLE OF CONTENTS/OUTLINE

Review the current established role of MRI and FDG PET in staging hepatocellular carcinoma (HCC) including various PET tracers Demonstrate examples of incremental diagnostic value of combined FDG PET/MR in selected cases increasing the diagnostic confidence of metastatic HCC Review the current applications of MRI and FDG PET in diagnosis and staging of cholangio-cellular carcinoma with focus on the intrahepatic type and illustrate added value of combined FDG PET/MRI in nodal and distal staging Demonstrate the benefit of combined PET/MR in the preoperative workup of gallbladder neoplasms Review the role of MRI in the follow up of secondary hepatic neoplasms and demonstrate the added value of combined PET/MR in assessing response to treatment. Highlight the pitfalls and limitations of FDG PET/MR in the evaluation of malignant liver lesions

GI247-ED-X

Unveiling the Mysteries of Congenital, Benign and Malignant Splenic Pathologies, Utilizing US, CT and MRI

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Krystal C. Buchanan, MD, New Haven, CT (*Presenter*) Nothing to Disclose
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Mahan Mathur, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Margarita V. Revzin, MD, Wilton, CT (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The goal of this study is to familiarize radiologists with applications of ultrasound in evaluation of congenital, benign and malignant splenic pathology. This will serve to enhance pattern recognition and help radiologists create a focused, useful differential diagnosis for various splenic conditions.

TABLE OF CONTENTS/OUTLINE

A. A description of splenic anatomy and peritoneal ligaments.
B. A review of ultrasound protocol for splenic evaluation, emphasizing optimization of parameters to improve splenic parenchymal assessment.
C. A review of sonographic features of splenic pathologies in 5 categories: 1. Congenital abnormalities (accessory spleen, asplenia, polysplenia, true cysts aka epidermoid, wandering spleen), 2. Infectious/Inflammatory pathology (bacterial abscess, hydatid cyst, mononucleosis/CMV, sarcoidosis, granulomatous disease), 3. Benign neoplasms (hemangioma, hamartoma, lymphangioma, hemangiomatosis, lymphangiomatosis, littoral cell angioma), 4. Malignant neoplasms (lymphoma, angiosarcoma, metastases by direct local invasion and hematogenous spread), 5. Other (extramedullary erythropoiesis)
D. A discussion of imaging features characteristic of certain splenic pathologies, to help in narrowing differential diagnoses.
E. Management of the presented splenic conditions will be reviewed.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Leslie M. Scoutt, MD - 2014 Honored Educator

GI248-ED-X

Decoding the Spleen Code: Vascular Splenic Pathologies on Cross-sectional Imaging

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
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Margarita V. Revzin, MD, Wilton, CT (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The goal of this study is to familiarize radiologists with applications of ultrasound in the evaluation of splenic vascular pathologies. This will serve to enhance the ability of radiologists to look for particular vascular compromises when dealing with a specific clinical situation.

TABLE OF CONTENTS/OUTLINE

(1) Brief review of splenic vascular anatomy. **(2)** Ultrasound assessment of splenic vasculature, emphasizing utilization of different approaches and modes, as well as optimization of parameters. **(3)** Sonographic features of vascular pathologies in two major categories: **(A) Traumatic;** splenic laceration, fracture, subcapsular and intraparenchymal hematoma, ruptured splenic hematoma, splenic infarct, splenosis. **(B) Nontraumatic:** (a) Congenital (splenic artery aneurysm, AVM/AVF) (b) Infectious/inflammatory (splenic artery pseudoaneurysm, splenic vein occlusion, intraparenchymal hemorrhage and infarct in CMV infection and mononucleosis, splenic emboli from sepsis, peliosis (c) Splenic pathology related to portal hypertension including splenorenal shunt, patent and partially thrombosed short gastric varices, Gamna Gandy bodies (d) Hematologic disease including sickle cell related vascular abnormalities, autosplenosis, regenerating splenic nodules in the setting of a nonfunctioning spleen. **(4)** A review of the management of presented splenic vascular pathologies.

GI249-ED-X

Arterial Hyperenhancement and Washout in Cirrhosis-Pitfalls in Application of these Imaging Features

All Day Room: GI Community, Learning Center

Participants
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Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;

TEACHING POINTS

Purpose of exhibit is 1.To familiarize radiologists with LI-RADS definitions for arterial hyperenhancement & washout appearance using imaging examples & schematics 2.To emphasize that in patients with cirrhosis, arterial hyperenhancement & washout can be associated with not only hepatocellular carcinoma (HCC) but also non-HCC malignancies such as intrahepatic cholangiocarcinoma & metastatic disease 3.To demonstrate differences in arterial hyperenhancement & washout patterns that help in the differential diagnosis of HCC & non-HCC malignancies 4.To present pitfalls in the assessment of these features, such as the appearance with hepatobiliary contrast agents & post-treatment changes

TABLE OF CONTENTS/OUTLINE

A.Background:1.Importance of distinguishing HCC from other hepatic malignancies in patients with cirrhosis 2.LI-RADS definitions for arterial hyperenhancement & washout appearance 3.Different temporal & spatial patterns of these features that aid in the differential diagnosis of HCC & non-HCC malignancies 4.Pathophysiological basis for these patternsB.Quiz: Radiologists will be presented with imaging examples of hepatic lesions demonstrating arterial hyperenhancement & washout appearance & will be asked to select the most likely diagnosis (HCC or non-HCC malignancy) after assessing enhancement patterns

GI250-ED-X

Reporting Pancreatic Ductal Adenocarcinoma: How to Highlight the Critical Findings

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Fernanda G. Velloni, MD, Sao Paulo, Brazil (*Presenter*) Travel support, Bracco Group
Sabrina O. Bernal, MD, Rio de Janeiro, Brazil (*Abstract Co-Author*) Nothing to Disclose
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Gustavo Pinto, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Rogerio Z. Pinetti, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Roberto Blasbalg, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- To review the epidemiology, diagnostic approach and staging of pancreatic ductal adenocarcinoma (PDA).- To review the radiological staging and its impact on the choice of therapeutic option and subsequent prognosis.- To expose the main differences between structured and conventional reporting patterns.- To emphasize that the adoption of a standardized template for radiology reporting using universally accepted terminology improves the decision-making process for the management of patients with PDA.

TABLE OF CONTENTS/OUTLINE

Pancreatic ductal adenocarcinoma (PDA):A. Epidemiology B.Diagnosis C.StagingD.Staging x Treatment x PrognosisE. Conventional x Structured ReportsF. Using structured report of multiphasic computed tomography (CT) or magnetic resonance imaging (MRI) for staging pancreatic ductal adenocarcinoma (PDA) in practice.

GI251-ED-X

CT Evaluation of Patients Presenting with Acute Abdominal Pain and Diarrhea

All Day Room: GI Community, Learning Center

Participants

Eugene Y. Kim, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
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Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Sanjeev Bhalla, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

This exhibit will: Familiarize the radiologist with the CT appearance of a broad spectrum of clinical entities that present with abdominal pain and diarrhea Illustrate the specific imaging features to aid the radiologist in narrowing the differential diagnoses Review the pathophysiology and relevant management for each entity, when applicable

TABLE OF CONTENTS/OUTLINE

In patients with abdominal pain and diarrhea, infection should be one of the first considerations. However, there is a wide spectrum of causes that can cause similar presenting signs and symptoms in the right clinical setting.In addition reviewing a host of infectious etiologies, this exhibit will systematically review the spectrum of other underlying processes that result in abdominal pain and diarrhea, including inflammatory conditions, ischemic bowel, neutropenic enterocolitis, graft-versus-host disease, autoimmune disorders, chemotherapy related enterocolitis, and radiation related enterocolitis. Each condition will be presented with an emphasis on CT findings with multimodal imaging correlates. Brief pathophysiology and relevant treatment will be discussed for each entity, to aid the radiologist in effectively directing management.

Honored Educators

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Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Sanjeev Bhalla, MD - 2014 Honored Educator
Sanjeev Bhalla, MD - 2016 Honored Educator

GI252-ED-X

Retroperitoneal Masses: Spectrum of Imaging Findings

All Day Room: GI Community, Learning Center

Participants
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Hanan Sherif, MD, Doha, Qatar (*Abstract Co-Author*) Nothing to Disclose
Ahmed-Emad Mahfouz, MD, Doha, Qatar (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To review retroperitoneal radiological anatomy.2. To spot features associated with aggressive retroperitoneal masses.3. To analyze imaging features of different diseases affecting the retro-peritoneum.4. To correlate radiological features associated with retro-peritoneal diseases with their histopathological diagnosis.

TABLE OF CONTENTS/OUTLINE

1. Radiological anatomy of retro-peritoneum.2. Imaging features of retro-peritoneal diseases with histopathological diagnosis correlation:a. Retro-peritoneal Fibrosis.b. Retro-peritoneal Lipomatosis.c. Retro-peritoneal Leiomyosarcoma.d. Retro-peritoneal Schwannoma.e. Retro-peritoneal Lymphoma.f. Retro-peritoneal Neuroblastoma.g. Retro-peritoneal Ganglioneuromah. Retro-peritoneal Lymphangiomai. Retro-peritoneal Desmoplastic Round Blue Cell Tumourj. Retro-peritoneal Hematoma

GI253-ED-X

Read between the Images-Hepatic and Renal Manifestations of Systemic Disease and Generalized Conditions: Beyond the Usual

All Day Room: GI Community, Learning Center

Participants

Rikiya Yamashita, MD, Kyoto, Japan (*Presenter*) Nothing to Disclose
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Kaori Togashi, MD, PhD, Kyoto, Japan (*Abstract Co-Author*) Research Grant, Bayer AG Research Grant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd Research Grant, FUJIFILM Holdings Corporation Research Grant, Nihon Medi-Physics Co, Ltd Research Grant, Shimadzu Corporation Research Grant, Toshiba Corporation Research Grant, Covidien AG

TEACHING POINTS

Hepatic and renal manifestations are frequent in patients with systemic diseases and conditions, but it is often challenging to achieve a unifying diagnosis. Knowledge of a variety of imaging appearances of rare systemic diseases and conditions can help interpreting radiologists play a pivotal role in timely diagnosis and appropriate treatment selection. The purpose of this exhibit is: 1. To describe typical hepatic and renal manifestations of rare systemic diseases and conditions. 2. To present the role of imaging in the diagnosis and evaluation of underlying systemic diseases and conditions. 3. To expose radiologists to a series of challenging cases in order to help improve the radiologist's diagnostic performance when facing such cases.

TABLE OF CONTENTS/OUTLINE

We present a series of challenging cases in a quiz format. Imaging findings and associated clinical implications will be highlighted with emphasis on key differentiating features in the discussion of each case.

GI254-ED-X

Utility of Spectral Analysis of Hepatic Ultrasound in Detecting Cardiac Pathology

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Hugo Rodriguez Requena, MD, San Sebastian De Los Reyes, Spain (*Presenter*) Nothing to Disclose
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Isabel Salmeron Beliz, MD, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose
Isidro Cogollos Agruna, MD, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

-To review technical issues and parameters of colour and spectral Doppler to optimize the examination-To describe the normal features of both hepatic and portal veins, and then summarize those pathologic findings that may rise a suspicion for heart conditions

TABLE OF CONTENTS/OUTLINE

Brief anatomical and physiology reminder of both hepatic and portal veinsTechnical considerations for an appropriate Doppler evaluation of the liverNormal and abnormal Doppler waveforms in different heart conditionsSample cases Limitations and summary CONCLUSION:The major teaching point of this exhibit are:-Doppler ultrasound is a simple but cost-effective tool that provides great amount of information if performed by a trained radiologist-A careful spectral analysis of hepatic and portal veins will reflect documented cardicac conditions. It also can help in detecting unknown heart morbidities, and therefore in preventing subsequent complications

GI255-ED-X

Pre-transplantation Radiologic Assessment in Recipients with Hepatocellular Carcinoma

All Day Room: GI Community, Learning Center

Participants
Kyoung Won Kim, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jihyun An, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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So Yeon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Gi Won Song, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung Gyu Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To present a comprehensive and illustrative review about radiologic pre-transplantation assessment of hepatocellular carcinoma in recipient candidates waiting for liver transplantation.2. To discuss about radiologic assessment of hepatocellular carcinoma after bridging and downstaging treatments while waiting for liver transplantation.3. To illustrate radiologic features (beyond tumor staging) that may be related with prognosis after liver transplantation.

TABLE OF CONTENTS/OUTLINE

1. Increasing tendency of liver transplantation for recipients with hepatocellular carcinoma2. Hepatocellular carcinoma forecast chart and metroticket model to estimate survival after liver transplantation3. Comparison of Milan, UCSF, and several local criteria of large liver transplant centers4. Different issues in cadaveric and living donor liver transplantations5. Pre-transplantation radiologic staging for hepatocellular carcinoma-How accurate?6. Bridging and downstaging treatments while waiting for liver transplantation7. Clinical practice guidelines-current recommendations for bridging and downstaging treatments before liver transplantation8. Radiologic features (beyond tumor staging) that may be related with prognosis after liver transplantation9. Summary

GI257-ED-X

MR Defecography in Obstructive Defecation Syndrome: Imaging Findings and Impact on Surgical Management

All Day Room: GI Community, Learning Center

Awards
Magna Cum Laude

Participants
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Brijbhushan Aggarwal, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Describe the procedure, sequences and interpretation of obstructive defecation syndrome Illutrate the imaging findings in obstructive defecation syndrome Impact on surgical management

TABLE OF CONTENTS/OUTLINE

MR defecography procedure and sequences Pelvic floor anatomy on MRI with description of the pubo-coccygeal , 'H' and 'M' lines and the anorectal angle Describing and grading the various pathologies like rectocoele, rectal prolapse, rectal intussusception,spastic perineum syndrome,enterocoeles and descending perineum The impact of the imaging findings on the management and surgical procedures like STARR and POPSTARR.

GI258-ED-X

Imaging of Unusual Rectal Neoplasms? From Benign to Malignant

All Day Room: GI Community, Learning Center

Participants
Hongliang Sun, MD, Beijing, China (*Presenter*) Nothing to Disclose
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Wu Wang, MD, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To describe and illustrate unusual neoplasms that can affect the rectum in addition to adenocarcinoma with CT and MRI.To introduce critical clinical features, key radiologic findings of various unusual benign and malignant rectal neoplasms correlated with pathologic findings.

TABLE OF CONTENTS/OUTLINE

Epidemiology of various neoplasmsClinical featuresHistology of various neoplasmsReview of imaging findings CT, Conventional MRI – Diffusion weighted imaging, DCESample casesBenign lesionsa. Rectal duplication cyst (Figure.1)b. Rectal angiolipoma (Figure 2)c. Villous adenomad. Gastrointestinal stromaltumor (GIST) (Figure 3) Malignant lesionsa. Anal cancerb. Primary Lymphoma (Figure 4)c. Neuroendocrine tumor (NET) (Figure 5)

GI259-ED-X

Early Detection of Intrahepatic Cholangiocarcinoma

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
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TEACHING POINTS

Early diagnosis for intrahepatic cholangiocarcinoma (ICC) is important because the curative treatment option of cholangiocarcinoma is surgical resection. But the results of surgery are still not satisfied. To improve patients' survival ratio, early detection is mandatory. To know precursor or preinvasive lesion of ICC such as biliary intraepithelial neoplasm (BilIN), intraductal papillary neoplasm of bile duct (IPNB), and mucinous neoplasm (MCN) of the liver and high risk group such as primary sclerosing cholangitis, hepatolithiasis, congenital biliary disease is essential to make early diagnosis of ICC. In addition, small sized mass forming ICC usually shows atypical enhancement and it sometimes misdiagnosed as hepatocellular carcinoma, resulting in inappropriate therapy.The purpose of this exhibit is to: Illustrate the anatomical classification of biliary tract. Illustrate high risk group of ICC and early lesions of bile duct cancer such as BilIN, IPNB and small mass forming ICC. Discuss differential diagnosis

TABLE OF CONTENTS/OUTLINE

Anatomical classification of biliary tract and gross classification and growth manner of ICC High risk group of ICC Early lesion of ICC Small mass forming ICC (small duct/bile ductular cancer) Differential diagnosis

GI260-ED-X

'It's Not a Tumor'-Pancreatic Pitfalls and Cancer Mimics

All Day Room: GI Community, Learning Center

Participants
D A. Paratore, DO, Cleveland, OH (*Presenter*) Nothing to Disclose
Namita S. Gandhi, MD, Cleveland, OH (*Abstract Co-Author*) Research support, Siemens AG
Myra K. Feldman, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Teaching Points-There are several mimics and imaging pitfalls one must consider when evaluating for pancreatic adenocarcinoma.- Dedicated pancreatic imaging protocols are essential for accurate lesion detection and characterization of pancreatic lesions. - Structured radiologic reports ensure that the information required to accurately stage and manage pancreatic cancer is presented in a clear and reproducible manner.

TABLE OF CONTENTS/OUTLINE

Review of pancreatic cancer imaging algorithm and imaging protocols (CT, MRI, EUS, PET). Sample cases of mimics/pitfalls/atypical presentations Focal fat, AIP, Lymphoma, Xanthogranulomatous disease, hypovascular NET, SPT

GI261-ED-X

MR Elastography: Its Added Value over Conventional MR Imaging of the Liver

All Day Room: GI Community, Learning Center

Participants

Argha Chatterjee, MBBS, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
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Sudhakar K. Venkatesh, MD, FRCR, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Frank H. Miller, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Siemens AG

TEACHING POINTS

Discuss the value of MR elastography in the diagnosis of hepatic fibrosis and cirrhosis compared to conventional imaging. Discuss the strengths and limitations of MR elastography and compare it with other MR and ultrasonography based techniques for fibrosis evaluation. Demonstrate uncommon causes of elevated stiffness values.

TABLE OF CONTENTS/OUTLINE

MR elastography is a novel technique that should be used more frequently in clinical practice. In this exhibit the role of MR elastography in the diagnosis of hepatic fibrosis will be discussed. Technique Review of literature including prior meta-analysis Role of MRE for hepatic fibrosis Comparison with anatomic features and other techniques Role of MRE when assessing liver masses Gradient echo and spin echo techniques Limitations of MRE Uncommon causes of elevated hepatic stiffness mimicking fibrosis Future applications

Honored Educators

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Frank H. Miller, MD - 2012 Honored Educator
Frank H. Miller, MD - 2014 Honored Educator

GI262-ED-X

Colorectal Laterally Spreading Tumor: CT Colonography Findings and Pitfalls

All Day Room: GI Community, Learning Center

Participants

Narumi Taguchi, Kumamoto, Japan (*Presenter*) Nothing to Disclose
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Yasuyuki Yamashita, MD, Kumamoto, Japan (*Abstract Co-Author*) Consultant, DAIICHI SANKYO Group

TEACHING POINTS

1. Laterally spreading tumor (LST) is the flat lesion well known among the endoscopists worldwide, and it is clearly defined as a lesion of ≥10 mm in diameter with a low vertical axis extending laterally along the interior luminal wall.2. The LST is thought to be one of the important precursor lesion of colorectal cancer and, therefore, clinically important to detect in earlier stage.3. LST on CT colonography (CTC) is generally less conspicuous than polypoid lesion of a similar size but may still detectable with appropriate technique and awareness.

TABLE OF CONTENTS/OUTLINE

1. What is LST? -Background and definition of LST -Subclassification2. Clinical significance of LST -Prevalence and malignant potential3. Diagnostic imaging in detection of LST -Endoscopy -Barium enema -CTC: comparison of 2D and 3D views for evaluation of LST4. Comparing CTC features with pathological findings5. Diagnostic pitfalls in CTC detection of LST -False positive and false negative -Limitations of CTC assessment6. Future perspective of LST assessment

GI263-ED-X

State-in-Art of Monochromatic CT in the Evaluation of Gastric Cancer

All Day Room: GI Community, Learning Center

Participants
Lei Tang, MD, Beijing, China (*Presenter*) Nothing to Disclose
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Ying-Shi Sun, MD, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Ying-Shi Sun, MD, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Jia-Fu Ji, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To introduce the limitations of conventional polychromatic CT in the evaluation of gastric cancer.2. To illustrate the new methods provided by monochromatic CT in the resolution improvement and quantitative evaluation of gastric cancer.3. To highlight the specific utilizations of monochromatic CT on gastric cancer.

TABLE OF CONTENTS/OUTLINE

1. Limitations of polychromatic CT:(1) soft tissue resolution restricts the detection and staging.(2) unfixed shape of the hollow viscera influences the response evaluation.2. Potentials provided by monochromatic CT:(1) monochromatic images can yield improved CNR without increasing the noise.(2) spectral curves to discriminate the components of the tumors.(3) iodine concentrations (IC) can be used to evaluate the tissue components quantitatively.3. Specific utilizations:(1) 50 keV images to highlight the blood vessels, and bright-line sign to help T staging (Fig 1).(2) 70 keV images to highlight the soft tissue differences, for the favor of exact staging (Fig 2).(3) Spectral curves combined with IC to evaluate the fat space infiltration (Fig 3)(4) Spectral curves combined with IC to discriminate the components of cancers (Fig 4)(5) IC to predict the response of gastric cancer to neoadjuvant chemotherapy (Fig 5).

GI264-ED-X

Current Role of CT Colonography in Preoperative Evaluation for Patients with Colorectal Cancer

All Day Room: GI Community, Learning Center

Participants

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Kenichiro Hirata, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Sadahiro Yamamura, Kumamoto-Shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Tadatoshi Tsuchigame, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasuyuki Yamashita, MD, Kumamoto, Japan (*Abstract Co-Author*) Consultant, DAIICHI SANKYO Group

TEACHING POINTS

1. CTC offers a comprehensive preoperative evaluation in patients with colorectal cancer, including a definition of the tumor location, presence or absence of synchronous lesions, evaluation of vascular system, and fairly accurate TNM staging.2. The 3D fusion images of the mesenteric arteriogram and venogram with CTC images clearly revealed individual vascular anatomies around the lesion and could play an important role in safely facilitating the surgical procedure as the preoperative 3D mapping.

TABLE OF CONTENTS/OUTLINE

1. Current status for CTC2. Preoperative evaluation by CTC - Tumor localization - TNM staging - Synchronous lesions - Evaluation of vascular systems3. Preoperative CTC acquisition techniques - Scanning protocols - Preoperative 3D mapping4. Radiation dose reduction techniques for preoperative CTC - Iterative reconstruction algorithms - Low tube voltage techniques5. Future perspective of the preoperative CTC

GI265-ED-X

An Imaging Atlas of Gallbladder and Bile Ducts Pathology with Contrast Enhanced Ultrasound

All Day Room: GI Community, Learning Center

Participants

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Sofia Tsolaki, Athens, Greece (*Abstract Co-Author*) Nothing to Disclose
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Ploutarhos A Piperopoulos, MD, PhD, Athens, Greece (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To explain the use of Contrast Enhanced Ultrasound (CEUS) in imaging gallbladder and bile ducts pathology. To review indications, imaging findings, limitation and pitfalls. To study the way in which CEUS increases the diagnostic value of baseline, unenhanced US.

TABLE OF CONTENTS/OUTLINE

Basic knowledge of US contrast agents is refreshed. Pathology in the gallbladder and bile ducts with indication for CEUS is outlined. Various indications for CEUS of the gallbladder include elucidating normal variants, differentiating dense biliary sludge from masses, assessment of cholecystitis, abscess and wall rupture. CEUS of the biliary tree is useful for distinguishing sludge from intraluminal masses, as well as detecting and characterising cholangiocarcinoma. All pathological entities are explained with imaging findings on CEUS, correlated with CT or MR when these were performed. CEUS findings are compared to those of baseline, unenhanced US to assess the increase in US diagnostic value post contrast injection.

GI266-ED-X

DWI of Focal Splenic Lesions

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
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Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- To analyze the different appearances on DWI and ADC maps of normal spleen- To review the presentation of tumor and non tumor splenic focal masses on DWI- To enhance the role of DWI in the differential diagnosis and management of focal splenic lesions

TABLE OF CONTENTS/OUTLINE

The use of DWI in the spleen has been limited, as in normal conditions, this organ shows restriction of water motion. This exhibit reviews the characteristic on DWI of the most common splenic tumor and non tumor focal lesions, focusing on clinical features, pathology and MRI features with sample cases. The complementary role of DWI to MRI is enhanced, as in general infectious and malignant lesions show a higher grade of restriction on DWI than benign entities.Outline1. Introduction2. DWI optimization for spleen3. Appearance on DWI of normal spleen4. Benign lesions: infection, cysts, vascular conditions, vascular tumors (hemangioma, lymphangioma, others), hamartoma, storage diseases, sarcoidosis, Gamna-Gandy bodies, inflammatory pseudotumor, extramedullary hematopoiesis5. Malignant tumors: metastasis, lymphoma, leukemia, sarcomas6. Conclusions

Honored Educators

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Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

GI267-ED-X

CT-Colonography (CTC) in the Diagnosis of Rectal Pathology: Spectrum of Findings, Endoscopic Correlation and Management Algorithm

All Day Room: GI Community, Learning Center

Participants

Susana A. Otero Muinelo, MD, A Coruna, Spain (*Presenter*) Nothing to Disclose
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Enrique Flores, MD, Santiago De Compostela, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the semiology of the different rectal lesions presented at CT-Colonography (CTC). To propose an algorithm for further handling of the lesions.

TABLE OF CONTENTS/OUTLINE

Colorectal carcinoma is a significant cause of death and early detection and treatment are critical. CTC is a noninvasive procedure recently implemented as a screening technique for colorectal cancer when Optical Colonoscopy (OC) is contraindicated or incomplete.Rectal area can be especially challenging at CTC due to several factors related to anatomic conditions, intestinal preparation and the technique itself which may obscure the pathology and difficult the diagnosis. The rectum is the single most common location of missed cancers at CTC.Although the most important pathology in this area is cancer, in most cases we will find unsuspected and benign entities: varices, polyps, papillae, hemorrhoids, inflammatory diseases, extramucosal lesions, postsurgical changes or artifacts.In order to avoid misdiagnosis we must pay attention to technical requirements, be familiar to the spectrum of rectal pathology and its features in CTC, perform a careful 3D flying-through and 2D assessment, and be concerned of the subsequent management each patient will undergo, always correlating our findings with OC when performed, pathologic examination results and clinical evolution.

GI268-ED-X

A Radiologist's Ready Reckoner for Imaging Assessment of Pancreatic Tumors

All Day Room: GI Community, Learning Center

Participants
Ashish Verma, MBBS, MD, Varanasi, India (*Presenter*) Nothing to Disclose
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Ram C. Shukla, MD, MBBS, Varansi, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

A systematic algorithm for an evidence based imaging evaluation of pancreatic tumors relies primarily on a pancreatic protocol CT/MR scan and targets those specific questions which a surgeon usually poses while planning a management protocol. Defining the three aspects in every lesion may simplify reporting of pancreatic tumor in everyday clinical practice.Is the lesion in pancreas?
What is the lesion?
What all the surgeon wants?

TABLE OF CONTENTS/OUTLINE

Each of the three aspects extrapolates to a specific problem encountered while management of a pancreatic lesion.Is the lesion in pancreas? – Lesion localization. To make sure we are not mistaking another periampullary malignancy.
What is the lesion? – Lesion characterization. To decide whether surgery, surgery with chemoradiation or watchful observation should be chosen as the approach.What all the surgeon wants? – Lesion resectability. To assess the resectability criteria as per NCCN guidelines.

GI270-ED-X

Secondary Sclerosing Cholangitis: Uncommon Causes for a Familiar Disease

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Amr S. Elnayal, MD, Montreal, QC (*Presenter*) Nothing to Disclose
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Caroline Reinhold, MD, MSc, Montreal, QC (*Abstract Co-Author*) Consultant, GlaxoSmithKline plc

TEACHING POINTS

The purpose of this exhibit is:1. To review the imaging characteristics of potential diseases leading to sclerosing cholangitis and the complications of each disease entity.2. To clarify the differentiating imaging features between primary and secondary sclerosing cholangitis.3. To detect the early signs of cholangiocarcinoma and its different imaging presentations.

TABLE OF CONTENTS/OUTLINE

1. Causes of secondary sclerosing cholangitis: pathophysiology and imaging features of each disease with emphasis upon the MRI and MRCP findings.
2. Characteristic imaging findings that may help in the differential diagnosis between various types of secondary sclerosing cholangitis and primary sclerosing cholangitis (PSC).
3. The use of MRI for early detection of cholangiocarcinoma in patients with sclerosing cholangitis and the impact on the future management including potential liver transplantation.

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Caroline Reinhold, MD, MSc - 2013 Honored Educator
Caroline Reinhold, MD, MSc - 2014 Honored Educator

GI271-ED-X

The Gamut of Cystic Liver Lesions: A Pictorial Review

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Elise E. Saddleton, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Paul Nikolaidis, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Helena Gabriel, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to review:Review a wide spectrum of cystic liver lesions, including infectious, inflammatory, congenital and neoplastic.Characteristic imaging appearance of cystic lesions of the liver.When is follow-up imaging warranted?Which lesions have malignant potential?

TABLE OF CONTENTS/OUTLINE

Imaging appearance of benign cystic liver lesions.Imaging appearance of malignant cystic liver lesions.Differential considerations for single versus multiple cystic liver lesions.Characteristics that warrant follow-up for particular cystic lesions.Controversial case examples.

GI272-ED-X

Pulp Fiction and Facts-Differentiating Splenic Lesions

All Day Room: GI Community, Learning Center

Participants
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Angela Tong, MD, MS, Valhalla, NY (*Abstract Co-Author*) Nothing to Disclose
Perry S. Gerard, MD, Valhalla, NY (*Abstract Co-Author*) Nothing to Disclose
Anthony G. Gilet, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Embryology of the spleen and how it relates to congenital splenic lesions.
2. Imaging pearls of benign and malignant lesions of the spleen with pathologic correlation.
3. How to avoid common imaging pitfalls of the spleen.

TABLE OF CONTENTS/OUTLINE

In this educational presentation, we will present illustration of the embryology and anatomy of the spleen. We will also review the CT and MRI imaging characteristics of the following common and unusual splenic lesions. We will demonstrate key imaging findings in the following cases: Congenital and anatomic variants:

- Polyspenia and asplenia syndromes, including situs abnormalities
- Wandering spleen and splenic torsion

Focal splenic lesions:

- Hemangioma
- Hamartoma
- Pseudocyst
- Lymphangioma
- Splenic infarcts and abscesses
- Splenic lymphoma
- Splenic metastasis
- Angiosarcoma
- Sclerosing angiomatoid nodular transformation (SANT)Systemic diseases:
- Sarcoidosis
- Amyloidosis
- Gaucher's diseaseChallenging cases and pitfalls:
- Intrapancreatic and intrapulmonary splenules mimicking neoplasm
- Infarcted splenules
- Difficult traumas: Pseudoaneurysms, lacerations without free fluid
- Isolated splenic vein thrombosis and left gastric varices as only imaging findings of occult pancreatic malignancy

GI273-ED-X

Swallowable Gastric Balloons: Overview of Normal Post Procedural Imaging and Complications

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

John Braun, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose
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George Eid, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Gino Sartori, BS, Jeannette, PA (*Abstract Co-Author*) Nothing to Disclose
Mark Welnick, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Teaching Points:1. Discuss indication and reasoning behind swallowable gastric balloons with an overview of how the procedure is performed. 2. Review normal post procedural findings of gastric balloon placement.3. Discuss complications of swallowable gastric balloons and review associated radiographic findings.

TABLE OF CONTENTS/OUTLINE

Table of Contents:1. Overview of Gastric Balloonsa. Clinical reasoning and managementb. Indication for placement2. Procedure Overview3. Post Procedural Assessmenta. Normal follow up imagingb. Complications

Honored Educators

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Matthew S. Hartman, MD - 2016 Honored Educator

GI274-ED-X

Living in a Bad Neighborhood-Unusual Local Complications of Acute Pancreatitis: What the Radiologist Usually Doesn't Expect

All Day Room: GI Community, Learning Center

Participants

Ignacio Maldonado, MD, Santiago, Chile (*Presenter*) Nothing to Disclose
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Daniel I. Lazo, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
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Cristian Varela, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Jorge Ortiz Vega, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Local complications of acute pancreatitis can be categorized in fluid collections, gastrointestinal and biliary complications, solid organ involvement and vascular injuries. Gastrointestinal and biliary complications affect mainly the stomach, duodenum and transverse colon. In these cases, sinus tracts, fistulas and strictures may develop. When solid organs are affected, the liver, spleen and kidneys are frequently compromised. Vascular complications generally occur months or years after the episode, and include hemorrhage, arteriovenous fistula (AVF), portomesenteric vein thrombosis, ischemia and infarction. Massive hemorrhages are uncommon and associated with high mortality rate, mostly due to the rupture of pseudoaneurysms of the splenic artery. AVF are rare complications. In such cases angiographic images show hypervascular with arteria-venous shunts. Portomesenteric vein thrombosis is relatively rare. The splenic vein is involved more frequently. Secondary portal hypertension may develop.

TABLE OF CONTENTS/OUTLINE

General concepts of acute pancreatitis.
New Atlanta classification, fluid collections.
Other local complications of acute pancreatitis.
Pictorial essay of unusual local complications of acute pancreatitis Gastrointestinal and biliary complications. Solid organ involvement. Vascular complications.Teaching points.

GI275-ED-X

'Now You See Me, Now You Don't!'-Mobile Abdominal Masses: A Review

All Day Room: GI Community, Learning Center

Participants
Vitor Hugo Fialho Lopes, MBChB, London, United Kingdom (*Presenter*) Nothing to Disclose
Kumar Subramanian, Luton, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Rachana Shukla, Abergavenny, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- Certain abdominal masses can be highly mobile, especially those arising from or attached to the mesentery/intraperitoneal bowel loops
- This has to be taken into consideration when reporting interval cross-sectional imaging; rather than representing a new pathology, such known lesions may have solely moved in position
- Utmost importance needs to be given when performing interventional or therapeutic procedures of such masses (namely planning radiotherapy or targeted biopsies)

TABLE OF CONTENTS/OUTLINE

The present exhibit will display cases in which patients underwent CT examination of the abdomen and pelvis at our institution for a variety of reasons, and abdominal or mesenteric masses were identified. These masses were noted to be in a different position on subsequent CT scans. Such mobile masses we identified in our practice include:- Gastrointestinal Stromal Tumour (with a peduncle)
- Small bowel lymphoma
- Metastatic melanoma Images on interval imaging showing the different positions these masses assumed will be displayed. In the relevant cases, the implications in patient management of having a mobile abdominal mass will be explored. Other intra-abdominal lesions (both intra and extraluminal) known to display mobility will be described and reviewed.

GI276-ED-X

CT and MRI of Neoplastic Solid Pancreatic Lesions: Key Findings to Preoperative Assessment

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Mariana De Freitas Portela, Rio De Janeiro, Brazil (*Presenter*) Nothing to Disclose
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Ingrid C. de Holanda, Rio de Janeiro, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To describe the key findings of neoplastic solid pancreatic lesions on CT and MRI during staging in order to improve decision-making process and optimize treatment.Discuss the contribution of PET-CT on neoplastic solid pancreatic lesions.

TABLE OF CONTENTS/OUTLINE

1) Describe the key CT and MRI findings used to access ressecability to be mentioned to stage neoplastic solid pancreatic lesion
2) Discuss the contribution of PET-CT on neoplastic solid pancreatic lesion
3) Discuss and illustrate differential diagnoses
4) Discuss potential pitfalls

GI277-ED-X

Ascites: CT and US Correlation-What Every Radiologist Should Know

All Day Room: GI Community, Learning Center

Participants

Yuri C. Neves, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
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Andrea C. Gomes, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Maria Cristina Chammas, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Discuss the importance of peritoneal anatomy and flow pathways in assessing disease spread through peritoneal spaces;2. Review the main causes of ascites and understand its physiopathological mechanisms;3, Describe the most important findings of ascites on ultrasonography (US) and computed tomography (CT);4. Point out what is important to search on US and CT, including ancillary features with diagnostic value;5. Recognize the advantages and limitations of each imaging modality in depicting ascites.

TABLE OF CONTENTS/OUTLINE

Background Definition of ascites Main causes of ascites Physiopathological mechanisms of fluid accumulation Available imaging modalitiesAnatomic Considerations Peritoneal cavity anatomy (folds - ligaments and mesenteries - and peritoneal spaces/compartments) Flow pathways of peritoneal free fluid and its importance to the pathologic processes.Findings Most important findings (transudative versus exsudative) Additional findings that may help elucidate the correct diagnosis. Comparison between US and CT - advantages and limitations

GI279-ED-X

Future Gold Standard of Imaging in Acute Pancreatitis

All Day Room: GI Community, Learning Center

Participants
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Ana Alvarez, Santiago de Compostela, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

-To establish the severity and scoring of acute pancreatitis on imaging: -To differentiate between Interstitial Edematous pancreatitis and necrotizing pancreatitis-To identify the etiology-To evalutate their complications collections, pseudocyst, abscess, pseudoanervysm-To discuss the role of new imaging techniques: Dual energy CT, Diffusion, IVIM, secretin-enhanced MRCP-To know the interventional therapeutic options

TABLE OF CONTENTS/OUTLINE

1. Index severity2. Etiology: 2.1.Biliary Litiasis 2.2.functional pathology 2.3.Anatomic variants2.4.Tumors 2.5.Drugs 2.6. Others3. Complications3.1.collections3.2.pseudocysts3.3.Abscess: 3.4. Disruption of wirsung:4.Imaging modalities4.1.US4.2 CT4.3.Dual energy CT4.4. MR4.4.1.Diffusion4.4.2. PErfusion4.5 MRCP4.6. Secretin-Enhanced MRCP5.Therapeutic options

GI280-ED-X

Imaging Evaluation of Pancreatic and Peripancreatic Cystic Lesions: Pseudocysts, Tumors, Mimickers, and Beyond

All Day Room: GI Community, Learning Center

Participants

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Mark B. Johnson, MD, MS, Winooski, VT (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to:1. Identify pancreatic and peripancreatic lesions, as well as several common mimickers based on their morphology, size, and characteristic imaging features.2. Summarize current follow-up recommendations for discussed lesions.

TABLE OF CONTENTS/OUTLINE

Inflammatory Pseudocyst Hemorrhagic pseudocyst Infected pseudocyst/peripancreatic collectionNeoplastic Serous cystadenoma Mucinous cystic neoplasm Solid pseudopapillary neoplasm Intraductal papillary mucinous neoplasm (IPMN) Mucinous adenocarcinoma arising from IMPN Pancreatic Adenocarcinoma Pancreatic neuroendocrine tumor (NET)Syndromes Causing Multiple True Pancreatic Cysts Von Hippel-Lindau Cystic fibrosis Autosomal dominant polycystic kidney diseasePotential Mimickers Fluid in lesser sac Biliary cystadenoma True cyst Dilated pancreatic duct Duodenal diverticulum Trauma Post surgical changes

GI281-ED-X

Barium Enema: A Review of the Colon Demonstrating Normal-Pathologic and Postoperative Findings

All Day Room: GI Community, Learning Center

Awards
Identified for RadioGraphics

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Michelle M. McNamara, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Rupan Sanyal, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Jessica G. Zarzour, MD, Birmingham, AL (*Presenter*) Nothing to Disclose

TEACHING POINTS

Technique and review of a normal barium enemaCommon pathologic conditions with cross sectional correlatesPostoperative imaging appearances with associated complications

TABLE OF CONTENTS/OUTLINE

Review the technique of a routine double contrast barium enema and water-soluble enemas including the preparation, materials (barium, water soluble contrast agents and selection of enema tube tips), instillation of barium and air, fluoroscopic spot images, and overhead radiographsReview common indications for the double contrast barium enemaReview the common pathologic conditions visualized by the double contrast barium enema, the differential diagnoses, and the cross sectional correlates including hemorrhoids, diverticula, polyps, adenocarcinoma, volvulus, intussusception, inflammatory bowel disease, hernias, and external compression.Review the post-operative imaging appearance of commonly performed colonic surgeries including abdominoperineal resection, anterior resection, protocolectomy with ileal J pouch-anal anastomosis, Hartmann procedure, and primary anastomosis with diverting loop ileostomy as well as associated complications.

GI282-ED-X

Role of MRI in Local Staging of Recurrent Rectal Cancer; Correlation with Surgical Outcome

All Day Room: GI Community, Learning Center

Participants

Ruben Waardhuizen van, MD, Rotterdam, Netherlands (*Presenter*) Nothing to Disclose
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Francois Willemssen, MD, Hoogstraten, Belgium (*Abstract Co-Author*) Nothing to Disclose
Marianne De Vries, MD, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Sebastiaan v. Koeverden, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Describe dilemma's on imaging of local recurrent rectal cancer(LRRC) Present our experiences/recommendations from the literature for diagnosis of LRRC on MRI,using Diffusion Weighted Imaging(DWI),Dynamic contrast enhanced(DCE) images as tools to increase sensitivity/specificity Demonstrate the added value of post-processing image evaluation of DCE series for diagnosis of LRRC Identify findings on MRI of LRRC which are decisive for surgical outcome/patient prognosis Describe current treatment options

TABLE OF CONTENTS/OUTLINE

Introduction Imaging challenges for diagnosis/local staging of LRRC Evaluation of our patients cohort(n=51).Describe/illustrate the added value of DWI/DCE to improve sensitivy/specificity for diagnosis of LRRC Describe/illustrate key-findings on MRI wich are decisive for surgical resection margins Treament options for LRRC Conclusions/recommendations ReferencesEarly detection of LRRC may lead to improved chance of radical surgery.MRI is currently the preferred modality for pre-surgical workup. Postoperative/postradiation scarring and inflammation however make it hard to detect recurrent tumor. This exhibit will be based on an evaluation of our patient cohort/recommendations from the current literature. We present our experiences/analysis of patients with LRRC who had MRI,surgery,histopathology assessment for LRRC

GI283-ED-X

Liver Transplant: Imaging of Postoperative Course

All Day Room: GI Community, Learning Center

Participants
Nerea Hormaza, MD, Bilbao, Spain (*Presenter*) Nothing to Disclose
Ana Rosa Gil Martin, Bilbao, Spain (*Abstract Co-Author*) Nothing to Disclose
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Ander Garcia Etxebarria, Barakaldo, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- To identify normal imaging findings after liver transplant, and thus avoid possible misdiagnosis. - To describe the wide spectrum of complications and their imaging features. - To discuss the adequacy of each imaging modality and emphasize the role of imaging not only in diagnosis, but also in follow-up and in therapeutic process.

TABLE OF CONTENTS/OUTLINE

Liver transplantation has become the principal treatment for end-stage liver disease. In recent years, operative technique and immunosuppressive agents have been improved. However, postoperative complications are not uncommon and they may limit the success of transplantation. Complications include vascular and biliary disorders, fluid collections, infection, graft versus host disease, post-transplantation lymphoproliferative disorders and disease recurrence among others. Early diagnosis is crucial to minimize morbi-mortality and to improve outcomes. Radiologists play a pivotal role in this process. They should select the most adequate imaging modality and recognize pathological conditions. In this exhibit, we show normal postoperative findings and imaging features of possible complications in multiple imaging modalities. We also present an imaging follow-up algorithm and therapeutic applications of radiology.

GI284-ED-X

Normal and Abnormal Opening of the Upper Esophageal Sphincter during the Swallowing: Radiologic Classification and Therapeutic Consequences

All Day Room: GI Community, Learning Center

Participants

Alberto I. Carbo, MD, Shreveport, LA (*Presenter*) Nothing to Disclose
Stacie Odom, Shreveport, LA (*Abstract Co-Author*) Nothing to Disclose
Dean D. Maglinte, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To describe the anatomy and mechanisms of the normal opening and closing of the Upper Esophageal Sphincter (UES)
To explain the causes, pathophysiology and mechanisms of abnormal function of the UES
To describe the Videofluroscopy technique of swallowTo review the radiologic findings and describe a radiologic classification of the UES dysmotilities including diminished opening due to UES decreased elasticity or non-relaxation of sphincter, reduced opening due to diminished contraction of the pharyngeal walls, delayed opening due to late UES relaxation or tardy elevation of hyolaryngeal complex (HLC), and early closing due to premature UES contraction or early return of HLC.
To discuss the consequences of the radiologic classification on patient treatment

TABLE OF CONTENTS/OUTLINE

Anatomy of the UES. Opening and closing muscles
Physiology and neurologic control of UES function
Causes and mechanisms of UES dysmotilities
Videofluoroscopic technique
Radiologic findings and classification of UES dysmotilities
Therapeutic consequences
Sample cases of each category documented by rapid digital sequences

Honored Educators

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Alberto I. Carbo, MD - 2015 Honored Educator

GI285-ED-X

Perfusional Disorders of the Liver: What Every Radiologist Should Know

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
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TEACHING POINTS

TEACHING POINTS: The purpose of this exhibit is:To detail and discuss the most important liver perfusional disorders, highlighting its main imaging features found in clinical practice.

TABLE OF CONTENTS/OUTLINE

TABLE OF CONTENS / OUTLINES Many different pathologies: traumatic, inflammatory, neoplastic, hematologic and compressive are able to affect liver perfusion, taking to specific imaging patterns. The spectrum of perfusional liver diseases comprises disturbances of the great hepatic vessels and other clinical conditions like fistulas and bleeding tumors. Without timely and precise diagnosis, there is an important raise in morbidity and mortality rates. Introduction explaining the normal blood supply of the liver and how it is affected in different vascular disorders; A pictorial essay with computed tomography (CT) and magnetic resonance imaging (MRI) of different cases of perfusional hepatic disorders assessed in our institution, including portal vein thrombosis, hepatic artery pseudoaneurysm, Budd-Chiari Syndrome, Sinusoidal Obstruction Syndrome, peliosis hepatis and others. Summary and conclusions. Bibliographical references.

GI287-ED-X

Primary Sclerosing Cholangitis: What You Should Know

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Juan C. Spina Jr, MD, Capital Federal, Argentina (*Presenter*) Nothing to Disclose
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Eduardo Mullen, Bs As, Argentina (*Abstract Co-Author*) Nothing to Disclose
Martin De Santibanez, Caba, Argentina (*Abstract Co-Author*) Nothing to Disclose
Jesica L. Savluk, MD, Capital Federal, Argentina (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:1- To illustrate the evolution of primary sclerosing cholangitis from diagnosis to transplantation
2- To describe the most frequent complications.

TABLE OF CONTENTS/OUTLINE

Introduction: Diagnosis and evolutionDescription of typical imaging findingsDominant strictures vs cholangiocarcinoma.Complications: cholangitis / biliary sepsisIndications for liver transplantationPost transplant evaluation: recurrence in liver graft and other complications.Example cases using MDCT and MRI with histologic correlation

GI288-ED-X

Beyond Pancreatic Adenocarcinoma: Atypical Pancreatic Masses

All Day Room: GI Community, Learning Center

Participants

Mariano Volpacchio, MD, Buenos Aires, Argentina (*Presenter*) Nothing to Disclose
German Espil, MD, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Diego M. Haberman, MD, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Victor Llanquipacha, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Mario G. Santamarina, MD, Valparaiso, Chile (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Pancreatic adenocarcinoma is a common tumor with a very poor prognosis. Although its typical imaging appearance has been extensively described a variety of both benign and malignant tumors as well as nonneoplastic lesions may involve the pancreas and pose a diagnostic challenge on imaging studies. The purpose of this exhibit is: To review unusual pancreatic masses clinical, pathologic and imaging features with a case-based approach To provide diagnostic clues useful to assist in proper diagnosis and management

TABLE OF CONTENTS/OUTLINE

Introduction Pancreatic ductal adenocarcinoma imaging features Atypical and unusual pancreatic masses: Epithelial (exocrine, endocrine), mesenchymal, hematologic, secondary tumors Inflammatory conditions: Focal chronic pancreatitis, autoimmune pancreatitis, groove pancreatitis, esinophilia Pseudotumors Imaging-based algorithm approach to diagnosis

Honored Educators

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Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

GI289-ED-X

10 Diagnosis you Need to Know about Pancreas

All Day Room: GI Community, Learning Center

Participants
Tassia R. Yamanari, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Publio C. Viana, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Natally d. Horvat, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Valter R. Dos Santos Junior, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Thais C. Lima, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Ana Isabella De Oliveira, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Claudia D. Leite, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Research Grant, General Electric Company
Giovanni G. Cerri, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Marcos R. Menezes, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Pancreatic lesions are often detected at imaging as an expected finding in patients with clinically suspected pancreatic disease or as an incidental imaging finding in an asymptomatic patient. The spectrum of pancreatic lesions is broad and they can be classified as neoplastic, such as solid or cystic, and nonneoplastic lesions, such as acute, chronic, autoimmune, or focal pancreatitis. A detailed knowledge of the radiologic features of 10 most important pancreatic conditions with a good understanding of the clinical background is essential for correct diagnosis.

TABLE OF CONTENTS/OUTLINE

Introduction with the broad classification of pancreatic conditions as neoplastic and nonneoplastic lesions. Review of the spectrum the 10 important conditions of the pancreas with special attention to key cross-sectional imaging features and clinical management such as adenocarcinoma, neuroendocrine tumors, intraductal papillary mucinous neoplasm, serous and mucinous cystic neoplasms, Frantz tumor, metastasis, acute, chronic and focal pancreatitis. Illustration of uncommon lesions that must be known such as osteoclast giant cell tumor, lymphoma and groove pancreatitis.

GI290-ED-X

Abdominal Manifestations of Acute Graft-versus-Host Disease: What Radiologists Need to Know

All Day Room: GI Community, Learning Center

Participants
Tassia R. Yamanari, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
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Natally d. Horvat, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Davi d. Romao, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Valter R. Dos Santos Junior, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Claudia D. Leite, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Research Grant, General Electric Company
Marcos R. Menezes, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Giovanni G. Cerri, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To explain the basic principles and indications of hematopoietic steam cells transplantation (HSCT). To review the pathophysiology of Graft-versus-host disease (GVHD). To recognize the abdominal imaging findings of acute GVHD. To describe the differential diagnosis of the imaging findings in the early post transplantation setting.

TABLE OF CONTENTS/OUTLINE

Introduction with overview of pathophysiology of GvHD. Most common abdominal imaging features and clinical manifestations of acute GvHD: intestinal and extra-intestinal disease. Differential diagnosis: mucositis, typhlitis, infectious enterocolitis (pseudomembranous colitis, CMV and other virus, fungi) and thrombotic microangiopathy.

GI291-ED-X

Imaging of Pancreatic Transplant: Review of Common Surgical Techniques, Normal Imaging Findings and Complications

All Day Room: GI Community, Learning Center

Participants

Rahul B. Gujrathi, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Anne Roy, MD, Westmount, QC (*Abstract Co-Author*) Nothing to Disclose
Vipul Bist, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Amr S. Elnayal, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Morooj Al Subhi, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review common surgical techniques for pancreatic transplant. Normal imaging findings and complications in in pancreas transplant.

TABLE OF CONTENTS/OUTLINE

Pancreatic transplant is established treatment for patients with diabetes and renal failure. Over the years there have been changes in the surgical technique and immunosuppressive regimens which has improved the rate of graft survival. It is critical to know normal imaging appearance of the transplant pancreas for evaluation of postoperative complications.While imaging for a transplant pancreas it is vital to be aware of prevalent surgical techniques like systemic venous anastomosis - bladder drainage and portal-venous anastomosis - enteric drainage. It’s rewarding to be aware of normal imaging characteristics on ultrasound, CT scan and MRI in emergency situations, especially ultrasound, as it is the most commonly asked for diagnostic imaging modality for assessment of transplant in postoperative period. And while imaging one should be aware of common complications related to transplant pancreas. Complications include vascular thrombosis, vascular stenosis, rejection, pancreatitis and rarely post-transplant lymphoproliferative disorder.

GI292-ED-X

The Crying Pancreas: When to Suspect and How to Report Pancreatic Fistulas

All Day Room: GI Community, Learning Center

Participants

Tiago O. Morita, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Natally d. Horvat, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Fernanda L. Mazzucato, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Cinthia D. Ortega, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Manoel S. Rocha, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the main causes and the clinical importance of pancreatic fistulaTo overview imaging findings of pancreatic fistula at MDCT and MRI in patients with chronic and acute pancreatitis, neoplasm, upper abdominal surgery and trauma with a series of illustrated teaching cases from our institutionTo discuss the relevance of different imaging modalities and the role of the radiologist in the diagnosis and management of pancreatic fistula

TABLE OF CONTENTS/OUTLINE

Normal pancreatic anatomy and postoperative anatomyEpidemiology and diagnosis of pancreatic fistulaImaging findings of pancreatic fistula at MDCT and MRI in various clinical settings. When to suspect? How to report?Follow-up studies after treatment through surgical drainage, percutaneous drainage or clinical management, and outcomesRelevance of different imaging modalities in the diagnosis and treatment of pancreatic fistulaRole of the radiologist in the multidisciplinary teamSummary and take-home messages

GI293-ED-X

Pictorial Review of Vascular Involvement in Borderline and Locally Advanced Pancreatic Ductal Adenocarcinomas and Complex Vascular Reconstructions used in Aggressive Surgical Treatments

All Day Room: GI Community, Learning Center

Participants

Donald L. Ly, MD, BEng, Toronto, ON (*Presenter*) Nothing to Disclose
Seng Thipphavong, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Boraiah Sreeharsha, FRCPC, Liverpool, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Review borderline resectability criteria for pancreatic ductal adenocarcionmas.2. Show examples of surgically treated borderline resectable and locally advanced pancreatic ductal adenocarcinomas.3. Highlight the imaging appearances and potential complications of complex arterial and venous reconstructions used in treatment for these pancreatic malignancies.

TABLE OF CONTENTS/OUTLINE

Pancreatic ductal adenocarcinomas in borderline to minimally advanced stages can be treated with aggressive surgical approaches in specialist centres. For abdominal radiologists, it is essential to properly identify and appropriately stage these tumours. Further, it is important to be well versed with the various advanced vascular reconstructions used in surgical treatment.We will shows various examples of resected borderline resectable and locally advanced pancreatic adenocarcinomas, highlight the crucial vascular involvement for reporting, describe various types of advanced vascular reconstructions and review their standard imaging appearances. We will also describe common vascular complications to emphasize the importance of early imaging surveillance in the postoperative period.

GI294-ED-X

In and Out: Internal Hernias in the Acute Setting

All Day Room: GI Community, Learning Center

Participants
Dennis P. Gilroy, DO, Rochester, NY (*Presenter*) Nothing to Disclose
Kevin C. He, MD, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Shweta Bhatt, MD, MBBS, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:1. To review normal and abnormal peritoneal apertures and their associated internal hernias.2. To practice identifying ED cases of complications.

TABLE OF CONTENTS/OUTLINE

1. Review of the different types of internal hernias:- Foramen of Winslow.- Transmesenteric.- Paraduodenal (right and left).- Pericecal.- Intersigmoid.2. ED cases of acute presentations. Discussion of potential complications. Examples include:- Closed loop obstruction.- Transmural necrosis.- Others.

GI295-ED-X

Cholangiocarcinoma Diagnosis and Staging: Update for Practicing Radiologist

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Najmeh Rohani, MD, Darby, PA (*Presenter*) Nothing to Disclose
Oleg Teytelboym, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Risk factors for biliary tract malignanciesSpectrum of clinical presentation of patients with cholangiocarcinomaChallenges in establishing tissue diagnosisRadiological features of cholangiocarcinoma on various imaging modalities including US, CT, MRI and FDG PET/CTMorphological classification of cholangiocarcinomaResectability criteriaDifferential diagnosis of cholangiocarcinoma

TABLE OF CONTENTS/OUTLINE

Epidemiology, pathogenesis and clinical features of cholangiocarcinomaMorphologic spectrum of cholangiocarcinoma based on pathology and radiological findingsDifferential diagnoses in malignant biliary obstructionIllustration of different imaging modalities in diagnosis of cholangiocarcinomaReview diagnostic yields of various biopsy techniques.Radiological staging and preoperative assessment of patients with cholangiocarcinomaResectability evaluation in hilar cholangiocarcinomaTreatment and palliation options for cholangiocarcinomaTNM staging of cholangiocarcinoma

GI296-ED-X

Uncommon Colorectal Tumors beyond Adenocarcinoma

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Angela H. Caiado, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Gisele Warmbrand, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Luciana P. Chamie, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Carlos A. Matsumoto, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Gustavo S. Meirelles, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Partner, DICOM Grid; Stockholder, Fleury SA; Advisory Board, Boehringer Ingelheim GmbH; Advisor, F. Hoffmann-La Roche Ltd
Rogerio Caldana, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Dario A. Tiferes, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To know the epidemiological aspects and clinical behavior of uncommon neoplasms of the colon and rectum.To illustrate using a case-based approach, the typical imaging characteristics of rare colorectal tumors and their differential diagnosis.To discuss the role of radiological and nuclear imaging techniques in diagnosis, evaluation of spread and response to therapy.

TABLE OF CONTENTS/OUTLINE

A. Introduction: The majority of colorectal neoplasms are adenomas and adenocarcinomas, nevertheless the incidence of rare tumours has increased in the last decades.B. Clinical and epidemiological aspects, as well as, the imaging findings of the uncommon colorretal tumors such as hemangiomas, neuroendocrine tumors, gastrointestinal stromal tumor (GIST), leiomyomas and sarcomas, lymphomas, melanomas, metastases and squamous cell carcinomas will be discussed and illustrated.C. Discussion of the radiological and nuclear imaging techniques role including CT, MRI, tumorspecific radiolabeled somatostatin receptor analogs and PET CT in diagnosis, evaluation of spread and response to therapy.D. SummaryE. Conclusion: Precocious diagnosis and the development of more efficient treatment remains the key to improve quality of life and survival for this relatively rare but progressively increasing group of colon and rectum tumors.

GI297-ED-X

Transjugular Intrahepatic Portosystemic Shunt (TIPS)-What Radiologists Should Know

All Day Room: GI Community, Learning Center

Participants

Erina M. Nagaya, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Fabio T. Jojima, MD, BEng, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Vitor C. Zanetta, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Barbara D. Nunes, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Osmar C. Saito, MD,PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Maria Cristina Chammas, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Sandra M. Tochetto, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to:- Review the imaging evaluation in the pre- and post-operative of TIPS;- Discuss the imaging criteria for diagnosis of device dysfunction;- Show examples of earlier and later complications of TIPS.

TABLE OF CONTENTS/OUTLINE

- Describe the procedure technique and the current indications for TIPS.- Review the imaging evaluation, particularly ultrasound and computed tomography, before and after TIPS. The assessment of the portal vein and its main branches, the splenic and mesenteric vein, the hepatic veins, the inferior vena cava, the collateral vessels (paraumbilical, left gastric, splenorenal shunt) and ascites will be discussed.- Describe the expected adaptations in the portal hemodynamic after the implantation of TIPS.- Discuss the imaging criteria for the diagnosis of device dysfunction.- Cases of device stenosis (on portal anastomosis, hepatic vein anastomosis, related to device fold or device retraction) will be reviewed. Examples of device, portal vein and inferior vena cava occlusion resulting in device dysfunction will be discussed.

GI299-ED-X

An A in Anus Anatomy and Abnormalities: Resident's Guide to Understanding Imaging of the Anus

All Day Room: GI Community, Learning Center

Participants
Stephanie Channual, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Steven S. Raman, MD, Santa Monica, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

While the imaging of the anus may appear straightforward, most residents are not comfortable in the imaging interpretation of the anal pathology until late in their training. MR imaging is also rapidly emerging as a powerful tool for pre-surgical planning of the anal region. Therefore, it is important for residents to be familiar with anal anatomy and pathology early on in their career.At the end of the exhibit, the reader will:1. Understand the anatomy of the normal anal sphincter. 2. Learn about the various anal pathology that exists and its appearances on fluoroscopy, US, CT, PET-CT, and MRI. 3. Be familiar with the optimal MRI protocols and post-processing techniques in imaging the anus.

TABLE OF CONTENTS/OUTLINE

Descriptions on the anatomy of the anal canal.
Pictorial review of various anal pathology: Congenital (anorectal malformations), Traumatic, Iatrogenic, Inflammatory (ulcerative colitis, Crohn’s disease), Infectious (perianal abscess, pilonidal sinus disease), and Neoplastic processes (primary cancer, lymphoma, metastases).
MR imaging protocols and post-processing technique recommendations.

GI301-ED-X

Clinical and MR Indices of Inflammatory Bowel Disease Activity

All Day Room: GI Community, Learning Center

Participants
Cynthia S. Santillan, MD, San Diego, CA (*Presenter*) Consultant, Robarts Clinical Trials, Inc
Jordi Rimola, MD, Barcelona, Spain (*Abstract Co-Author*) Consultant, Robarts Clinical Trials
Barrett G. Levesque, MD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
David Bruining, MD, Rochester, MN (*Abstract Co-Author*) Research Grant, Given Imaging Ltd Consultant, Bracco Group
William J. Sandborn, MD, Rochester, MN (*Abstract Co-Author*) Research support, Johnson & Johnson Consultant, Johnson & Johnson Research support, Abbott Laboratories Consultant, Abbott Laboratories Research support, UCB SA Consultant, UCB SA Consultant, Elan Corporation, plc

TEACHING POINTS

The purpose of this exhibit is1) To familiarize radiologists with clinical indices of Crohn’s disease used by gastroenterologists, such as the Harvey Bradshaw Index, Crohn’s Disease Activity Index, Crohn’s Disease Endoscopic Index of Severity, and Simple Endoscopic Score for Crohn’s Disease.2) To describe, compare, and contrast indices for Crohn’s disease activity that use MR enterography findings, such as the Magnetic Resonance Index of Activity (MaRIA), Sailer index for anastomotic recurrence, Crohn's Disease MRI Index (CDMRI), and Clermont score. 3) To discuss concept of cumulative damage as assessed with Lemann index.

TABLE OF CONTENTS/OUTLINE

1)Background and significance of Crohn’s disease2)Describe the need for reproducible indices of Crohn’s disease activity: Reliably distinguish active from inactive disease, Guide therapy decisions, & Importance in research3)Review clinical indices of Crohn’s disease: Symptom based vs Endoscopy based4)Review imaging based indices of Crohn’s disease using MR enterography: Describe indices & Provide examples of the relevant features and measurements5)Future directions and summary

GI302-ED-X

Pulp Fiction: Imaging Characteristics and Pathologic Correlates of Splenic Lesions

All Day Room: GI Community, Learning Center

Participants

Dipan Danda, MD, Hamden, CT (*Presenter*) Nothing to Disclose
Mike Spektor, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Mahan Mathur, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Margarita V. Revzin, MD, Wilton, CT (*Abstract Co-Author*) Nothing to Disclose
Patricia Balcacer, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Jonathan D. Kirsch, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the normal appearance of the spleen on CT and MRI Provide an overview of normal variants, vascular and inflammatory disorders of the spleen. Differentiate between benign and malignant splenic lesions with pathologic correlation. Be able to form a differential diagnosis of splenic lesions

TABLE OF CONTENTS/OUTLINE

Introduction Normal Imaging Appearance of the Spleen Normal Splenic Variants Benign Splenic Lesions Splenic Cysts Hydatid Cysts Abscesses Gamna-Gandy bodies Splenic Infarcts Hemangioma Hamartoma Lymphangioma Sclerosing angiomatoid nodular transformation of the splee Littoral cell angioma Malignant Splenic Lesions Lymphoma Angiosarcoma Metasatases Conclusion

GI303-ED-X

Pancreatic Neuroendocrine Tumors: Spectrum of Imaging Findings with Emphasis in Atypical Presentations and Differential Diagnosis

All Day Room: GI Community, Learning Center

Participants

Juan C. Spina Jr, MD, Capital Federal, Argentina (*Presenter*) Nothing to Disclose
Stephanie Gross, MD, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Jimena ossana, Bs As, Argentina (*Abstract Co-Author*) Nothing to Disclose
Oscar Mazza, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Eduardo Mullen, Bs As, Argentina (*Abstract Co-Author*) Nothing to Disclose
Julio R. Coronil, MD, La Plata, Argentina (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:1- To illustrate the spectrum of presentation of pancreatic neuroendocrine tumors with atypical imaging findings
2- To describe tips for the correct differential diagnosis with other lesions.

TABLE OF CONTENTS/OUTLINE

Introduction and clinical presentation (functional / non fuctional, sporadic or associated with different syndromes)Description of typical imaging findingsDescription of atypical presentation and mimics.Imaging findings for differential diagnosisExample cases using MDCT and MRI with histologic correlation

GI304-ED-X

Flat and Serrated Colorectal Lesions at CT Colonography: Appearance, Relevance, Pitfalls

All Day Room: GI Community, Learning Center

Awards
Cum Laude
Identified for RadioGraphics

Participants
Ashley R. Cahoon, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
David H. Kim, MD, Middleton, WI (*Abstract Co-Author*) Consultant, Viatronix, Inc; Co-founder, VirtuoCTC, LLC; Medical Advisory Board, Digital ArtForms, Inc; Stockholder, Cellectar Biosciences, Inc
Meghan G. Lubner, MD, Madison, WI (*Presenter*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV

TEACHING POINTS

Flat colorectal lesions are shallow, plaque-like lesions less than 3 mm in height. Flat lesions/masses include a spectrum of histologic entities including adenomas and serrated neoplasms.Serrated neoplasms of the colon and rectum represent a subgroup of flat lesions that have the potential to transform into colorectal cancer, distinct from the traditional adenoma-carcinoma pathway.Serrated neoplasms include sessile serrated polyps (SSP), traditional serrated adenomas (TSA) and hyperplastic polyps (HP).Target serrated neoplasms for removal are large (>1cm), flat, and proximal in location.Carpet lesions are flat laterally spreading masses >3 cm that tend to occur in older patients in rectal or cecal locations.Oral contrast often coats the surface of flat colorectal neoplasms at CT colonography, which can aid in detection and diagnostic confidence.

TABLE OF CONTENTS/OUTLINE

Definition/general characteristics of flat polypsSpectrum of flat polyps/masses Adenomas Serrated lesionsSerrated neoplasms Incidence, epidemiology, clinical significance Alternative cancer pathway Imaging characteristics and optimizing detection Management Case examples with optical colonoscopy correlationCarpet lesionsOptimal CTC preparation for detection of flat lesions Surface coatingMimics/pitfallsSummary

Honored Educators

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Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
Perry J. Pickhardt, MD - 2014 Honored Educator

GI305-ED-X

What a Tangled Web We Weave: MRE of Crohn's Disease and Its Complications

All Day Room: GI Community, Learning Center

Participants

Anup J. Alexander, MD, Elmhurst, IL (*Abstract Co-Author*) Nothing to Disclose
Edwina Chang, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Aytekin Oto, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV
Melvy S. Mathew, MD, Chicago, IL (*Presenter*) Nothing to Disclose

TEACHING POINTS

1. To review the typical MR enterography protocol and the utility of each of the respective imaging sequences. 2. To discuss a reading algorithm that may be followed when presented with an MR enterography exam as evaluation and detection of all of the pertinent findings can be challenging.3. To illustrate MR enterography findings of different types of Crohn’s disease (active inflammation, fibrostenotic and stricturing) and its complications.

TABLE OF CONTENTS/OUTLINE

Typical MR enterography protocol. Pathophysiology of Crohn’s disease including patterns of involvement.How and when MRE is superior to CT enterography.Characteristic imaging findings related to Crohn’s disease, with emphasis on advanced disease states and associated complications. Active Inflammation. Intramural bowel wall abscess formation. Fistulae formation (e.g., coloenteric, colocolonic, fistulae to vagina or bladder). Intraabdominopelvic abscess formation. Identification of perianal fistulae and abscesses on MRE. Fibrostenotic disease resulting in bowel obstruction.How radiological findings play a pivotal role in subsequent therapy and intervention.

Honored Educators

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Aytekin Oto, MD - 2013 Honored Educator

GI306-ED-X

Twists and Turns: Developmental Anomalies of the Pancreas

All Day Room: GI Community, Learning Center

Participants
Anup J. Alexander, MD, Elmhurst, IL (*Abstract Co-Author*) Nothing to Disclose
Edwina Chang, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Aytekin Oto, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV
Melvy S. Mathew, MD, Chicago, IL (*Presenter*) Nothing to Disclose

TEACHING POINTS

1. To review the normal embryologic development of the pancreas and discuss instances where the expected steps in pancreatic development go awry, resulting in anomalous appearances and conditions.2. To describe the benefits of secretin-enhanced MRCP, including assessment of pancreatic ductal anatomy and exocrine function and detection of complications related to chronic pancreatitis.3. To discuss the clinical relevance of recognizing congenital pancreatic anomalies, e.g., being aware of the corresponding higher propensity of affected patients to develop pancreatitis, also taking care to check for other congenital abnormalities on imaging exams.

TABLE OF CONTENTS/OUTLINE

Normal Embryologic Development of Pancreas.Abnormal Embryologic Development of Pancreas, giving rise to: Parenchymal Agenesis and Hypoplasia. (Potential Mimics: Uneven Fatty Atrophy, Cystitis Fibrosis-Related Fatty Replacement, Sequelae of Prior Pancreatitis resulting in Severe Parenchymal Necrosis, Post-Operative Appearance) Pancreas Divisum. Ansa Pancreatica. Annular Pancreas. Ectopic Pancreatic Tissue.Normal and Abnormal Pancreatic Parenchyma, Ductal Anatomy and Function on Imaging.Clinically Relevant Associations.

Honored Educators

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Aytekin Oto, MD - 2013 Honored Educator

GI307-ED-X

Studding, Seeding and Caking: Peritoneal Carcinomatosis on MRI

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Melvy S. Mathew, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Anup J. Alexander, MD, Elmhurst, IL (*Abstract Co-Author*) Nothing to Disclose
Edwina Chang, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Aytekin Oto, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV

TEACHING POINTS

1. To gain an awareness of the myriad of ways in which peritoneal carcinomatosis may manifest on MRI. 2. To review which imaging sequences are the most useful in the detection and assessment of extent of peritoneal carcinomatosis.3. To discuss the MR findings of peritoneal carcinomatosis with pathological correlation.

TABLE OF CONTENTS/OUTLINE

Pathophysiology of peritoneal carcinomatosis.Most common primary malignancies giving rise to forms of carcinomatosis discussed.Various manifestations of carcinomatosis on imaging with emphasis on MRI appearances: Large masses involving the greater omentum, or "caking." Subtle and overt mesenteric soft tissue nodularity, including plaque-like or stellate patterns or bulky masslesions. Sister Mary Joseph nodule, abdominal wall involvement. Diffuse or focal irregular peritoneal thickening and enhancement. Subcapsular implants. Diaphragmatic involvement. Seeding or serosal implants along small and large bowel; bowel obstruction or stenosis secondary to tumoral encasement.

Honored Educators

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Aytekin Oto, MD - 2013 Honored Educator

GI308-ED-X

Recent Development of Dual-energy Electronic Cleansing in Fecal-tagging CT Colonography

All Day Room: GI Community, Learning Center

Participants
Wenli Cai, PhD, Boston, MA (*Presenter*) Nothing to Disclose
Michael E. Zalis, MD, Boston, MA (*Abstract Co-Author*) Co-founder, QPID Health Inc Chief Medical Officer, QPID Health Inc Stockholder, QPID Health Inc

TEACHING POINTS

Electronic cleansing (EC) is an image post-processing technique for removal of tagged fecal materials in fecal tagging CTC (ftCTC) for virtual fly-through of the colon. In this exhibit, we present an overview about the recent developments of EC technology applied on dual-energy CT colonography (DE-CTC), so called dual-energy EC (DE-CE).The teaching points of this exhibits are:1. DE-CTC acquired by different DE-CT scanners and different imaging protocols may unveil various imaging artifacts and pitfalls. 2. Conventional EC technologies tends to generate severe EC artifacts when applying to non-cathartic ftCTC. 3. Recent technical development on DE-EC demonstrated a substantial progress on obviating cleansing artifacts in non-cathartic ftCTC.

TABLE OF CONTENTS/OUTLINE

1. Introduction of the imaging artifacts in DE-CTC caused by DE-CT scanner and imaging protocols.2. Review of existing EC solutions to conventional single-energy ftCTC and the major EC artifacts and pitfalls casued. 3. Introduction of DE-CT physics for material differentiation and its impacts on DE-EC.4. Overview of recent technical development of DE-EC methods such as using material decomposition model, and effective atomic number, etc.5. Comparisons of EC quality between DE-EC and conventional EC.6. Future trend of DE-EC development in non-cathartic DE-CTC.

GI309-ED-X

Kidney-Pancreas Transplant: What Every Radiologist Should Know About it?

All Day Room: GI Community, Learning Center

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TEACHING POINTS

The purpose of this exhibit is: * To understand the indications/contraindications, advantage/disadvantage and the surgical anatomy/techniques of Kidney-Pancreas Transplant (KPT), which is considered an effective treatment for patients with longstanding Diabetes Mellitus, associated with diabetic nephropathy. * To learn KPT follow-up with diagnostic imaging methods.* To enfasize KPT normal postoperative aspects and mainly its complications (acute and cronic), important on the radiologist practice.

TABLE OF CONTENTS/OUTLINE

1. Kidney-Pancreas Transplant (KPT): 1.1. Definition1.2. Indications and Contraindications 1.3. Advantages and Disadvantages2. Surgical anatomy and techniques 3. Postoperative diagnostic imaging methods4.1. Ultrasonography, Tomography, Resonance, Angiography follow-up4.2. Normal postoperative aspects 5. Vascular complications (arterial and venous thrombosis)5. Pancreatic allograft complications (pancreatitis, Infection with abscess formation, pseudoaneurysm, fistula, anastomose alterations).6. Conclusion

GI311-ED-X

Terminal Ileitis, It's Not Always Crohn's Disease

All Day Room: GI Community, Learning Center

Participants
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Aytekin Oto, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV
Melvy S. Mathew, MD, Chicago, IL (*Presenter*) Nothing to Disclose

TEACHING POINTS

1. To gain awareness of the common and not-so-common entities that have a predilection for the terminal ileum.2. To review the clinical and imaging findings of various etiologies that can involve the terminal ileum with an emphasis on their differentiating characteristics.

TABLE OF CONTENTS/OUTLINE

Anatomy of Terminal Ileum.Entities Involving the Terminal Ileum, including: Crohn’s Disease. Backwash Ileitis and Ulcerative Colitis. Infection. Lymphoid Hyperplasia. Lymphoma. Carcinoid Tumor. Metastatic Disease. NSAID-associated. Radiation Enteritis. Secondary Involvement (Appendicitis, Cecal or Appendiceal Neoplasm, Cecal Diverticulitis, Typhlitis)Differentiating Characteristics on Imaging.

Honored Educators

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Aytekin Oto, MD - 2013 Honored Educator

GI312-ED-X

Large Bowel Obstruction: Not a Small Problem

All Day Room: GI Community, Learning Center

Participants
Victor F. Sai, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Katrina R. Beckett, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Learn about the often tricky to diagnose causes of large bowel obstruction Review many missed cases of large bowel obstruction

TABLE OF CONTENTS/OUTLINE

Quiz Format with many tricky cases of large bowel obstruction to allow the learner to see many cases of large bowel obstruction and try to diagnose the etiology. Multiple CT cine clips with surgical and pathological correlation to be shown.

GI313-ED-X

Vascular Lesions with Gastrointestinal Implications: An Overview of Imaging Features

All Day Room: GI Community, Learning Center

Participants
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TEACHING POINTS

In abdominal vascular imaging we can find lesions of large an medium-sized vessels that traduces a gastrointestinal abnormality such as perfusion disorders, parenchymal lesions and also wall bowel abnormalities that´s why it is important to know vascular anatomy and congenital abnormalities in order to recognize alterations on gastrointestinal system.Angiography, CT, US and MRI are useful to demonstrate the vascular lesion and we can use more than one diagnostic method in order to evaluate organs affected and try to improve its perfusion.There are some features of each organ with vascular lesion that we can evaluate with imaging methods and it is important to recognize them because if there is not an evident vascular lesion at least we can suspect it

TABLE OF CONTENTS/OUTLINE

To review normal abdominal vascularity and congenital anomaliesTo show vascular lesions and its specific gastrointestinal repercussionTo describe each feature for an specific vascular lesion and its gastrointestinal repercussionTo demonstrate imaging findings at gastrointestinal system for vascular lesions

GI314-ED-X

Detection and Inspection of Liver Infections and Collections: The Relevance and Role of Imaging in the Management of Hepatic Infections and Abscesses

All Day Room: GI Community, Learning Center

Participants

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TEACHING POINTS

With biliary tract manipulation and liver transplantation becoming more commonplace, the importance of imaging hepatic infections has increased. These infections can range from phlegmon to organized abscesses and are potentially lethal. Prompt and accurate diagnosis is key in guiding proper treatment in these cases. While a majority of hepatic infections are pyogenic, fungal, parasitic and amebic etiologies may be encountered as well. Proper treatment plans include antibiotic therapy, percutaneous drainage and surgery with an overall shift to minimally invasive therapy observed, which will vary based on the causative organism and extent of disease. Imaging diagnosis is often critical in evaluation of hepatic infections and a sophisticated and specific diagnosis will often be crucial in guiding patient management. We will provide comprehensive review of management of different types of liver abscess with relevant imaging examples. We will highlight important imaging pearls that will help aid in treatment planning.

TABLE OF CONTENTS/OUTLINE

-Introduction-Imaging pearls of hepatic infections (I. Specificity II.Differentiating from other etiologies including malignancy)-Specific imaging patterns of pyogenic, fungal, parasitic and amebic abscesses with examples-Discussion of up-to-date disease specific treatment options

GI315-ED-X

All about Classification Systems for the Severity of Acute Pancreatitis: from Past to Future

All Day Room: GI Community, Learning Center

Participants
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TEACHING POINTS

1. To review evolution of clinical and radiological classification systems for severity of acute pancreatitis.2. To discuss the role of severity classifications for triage patients and guide management.

TABLE OF CONTENTS/OUTLINE

1. History of severity classification systems of acute pancreatitis.2. Clinical severity classification systems: Atlanta, Determinant based, and Revised Atlanta classification.3. Radiological severity classification systems: CT severity index (CTSI) and modified CT severity index (MCTSI)4. Comparative evaluation of radiological and clinical severity classifications.- CTSI versus MCTSI.- Clinical versus Radiological classification system.5. Management of patients with acute pancreatitis based on severity classification systems. - Based on Revised Atlanta classification. - Interventional treatment: Percutaneous versus Endoscopic approaches.

GI316-ED-X

MRI with Liver-specific Contrast Agent for Diagnosis of Hepatocellular Adenoma (HCA) and Focal Nodular Hyperplasia (FNH); Typical and Atypical (or uncertain) Cases

All Day Room: GI Community, Learning Center

Participants

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Gabriel P. Krestin, MD, PhD, Rotterdam, Netherlands (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Bayer AG; Research Grant, Siemens AG; Consultant, Bracco Group; Scientific Advisor, Zebra Medical Vision Ltd; Advisory Board, Quantib BV
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TEACHING POINTS

➢ Describe the appropriate use of hepatobiliary contrast agents in liver imaging, including recommendations for a state-of-the-art MRI liver imaging protocol for routine clinical use.➢ Describe and illustrate typical imaging features of HCA and FNH for confident diagnosis.➢ Demonstrate cases with imaging features which make diagnosis challenging.➢ Present a step-wise approach for proper diagnosis in atypical (or uncertain) cases. ➢ Describe current clinical insights in management of HCA and FNH.

TABLE OF CONTENTS/OUTLINE

1) Introduction: Hepatic adenoma (including subclassification) and FNH2) Hepatobiliary MRI contrast agents3) Typical imaging features of HCA and FNH with liver-specific MRI contrast.4) Challenging cases with atypical findings on MRI. 5) Clinical management of HCA and FNH.6) Conclusions and recommendations7) References

GI317-ED-X

Applied Peritoneal Anatomy Using CT Peritoneography: A Pictorial Review

All Day Room: GI Community, Learning Center

Participants

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TEACHING POINTS

To present a simplified version of the complex applied anatomy of the peritoneum, its reflections as well as attachments by CT peritoneography. To provide an understanding of the pathway of spread and localization of intra- and extra-peritoneal diseases.

TABLE OF CONTENTS/OUTLINE

Define peritoneum, mesentery, omentum and peritoneal ligaments.Normal findings and applied anatomy.Mesentery: Small bowel mesentery Transverse mesocolon Sigmoid mesocolon**Omentum:** The lesser omentum: The gastrohepatic and hepatoduodenal ligament. The greater omentum: The gastrocolic, gastrosplenic and gastrophrenic ligament.**Peritoneal spaces/compartments:** The lesser peritoneal sac: contains 3 recesses - Superior, splenic and inferior recess. The greater peritoneal sac: The supramesocolic compartment: it includes - Right and left subphrenic, right and left perihepatic, right and left subhepatic and perisplenic spaces. The inframesocolic compartment: it includes - Right and left paracolic gutter and abdominal central space. Pelvic cavity: Rectovesical space (Male) and rectouterine space/ pouch of Douglas (Female).**Peritoneal cavity communications with other spaces**: the pathways of spread and localization of intra- and extra-peritoneal diseases. The abdominal wall The retroperitoneum The pleural cavity The mediastinum

GI318-ED-X

CT and MRI Features of Autoimmune Pancreatitis: An Update

All Day Room: GI Community, Learning Center

Participants
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TEACHING POINTS

Autoimmune pancreatitis (AIP) is a form of chronic pancreatitis characterized by high responsiveness to corticosteroid administration, with a histologic background of lymphoplasmacytic sclerosing pancreatitis for type 1 and idiopathic duct-centric pancreatitis for type 2.Multimodality non-invasive imaging plays a large part in the diagnosis of AIP, and in the differentiation between AIP subtypes and alternative diagnosis.Making the diagnosis of AIP can be challenging, often misdiagnosed as pancreatic cancer. Conversely, imaging when suggestive of the diagnosis of AIP, may be useful to exclude the possibility of malignancy and prevent unnecessary surgery.

TABLE OF CONTENTS/OUTLINE

Enlargement of the pancreatic gland with sausage shape appearance, irregular narrowing of the main pancreatic duct (MPD) and capsule-like rim are common CT or MR features for both AIP types.Type 1 appears more often as a diffuse form or localized to the head, whereas pancreatic tail cut off sign was only seen in type 2.Focal AIP may be differentiated from pancreatic cancer, due to delayed enhancement on both the portal and late phases, longer stenosed MPD, without significant dilation (5mm) of the MPD.Type 1 is a multisystemic IgG4 related-sclerosing disease, while type 2 is confined to the pancreas and is frequently associated with inflammatory bowel disease.

GI319-ED-X

Hepatoid Carcinoma of Pancreas: The Perfect Mimicker-Keys to Not Forget it

All Day Room: GI Community, Learning Center

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TEACHING POINTS

To describe the main characteristics of Hepatoid Carcinoma of Pancreas (HCP) in Computed Tomography (CT) and Magnetic Resonance Imaging (MRI).
To show the importance of Alpha-fetoprotein (AFP) as a neoplasm marker to diagnose HCP.
To review the main features that differentiate Hepatoid Carcinoma of Hepatocellular carcinoma metastatic tumor.
To enphasize the importance to consider HCP in the differential diagnosis of pancreatic tumors.

TABLE OF CONTENTS/OUTLINE

We describe the pathogenesis of Hepatoid Tumor. Characterization of the clinical presentation of HCP. We correlated the histological and immunohistochemical findings with imaging findings. Review of imaging findings on CT and MRI. Diagnostic criteria for hepatoid adenocarcinoma. Differential diagnosis of HCP. We realize a pictographic review of metastatic HCP.

GI320-ED-X

Small Bowel Crohn's Disease: Its Many Faces

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Awards
Certificate of Merit

Participants
Catarina A. Silva, MD, Senhora da Hora, Portugal (*Presenter*) Nothing to Disclose
Dean D. Maglinte, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1.Review the different phenotypes of Crohn´s Disease (CD) according to the recently updated Montreal classification with rad-path correlation2. Learn the imaging characteristics of the complications of chronic CD 2. Elucidate the proper terms to address and use at CT and MR enterography/enteroclysis reports when diagnosing and staging CD.

TABLE OF CONTENTS/OUTLINE

Classification of Crohn´s disease (CD) activity based solely on clinical and laboratory parameters has not been clinically reproducible. Montreal classification of inflammatory bowel disease (CD): controversies, consensus, and implicationsImaging phenotypes at CT and MRI enterography/enteroclysis with pathological correlation:•Active inflammatory subtype
•Fibrostenotic subtype (stricturing phenotype)
•Perforation/fistulizing subtype
•Quiescent disease
•Perianal Disease
•Reparative or regenerative subtypeMost frequent long term complications of chronic Crohns disease Neoplasms Small bowel obstruction Malabsorption Gallstones Musculoskeletal complications OthersRecommended Lexicon to use in the diagnosis and staging of Crohn´s DiseaseSummary

GI321-ED-X

Computed Tomography Evaluation of Acute Gastrointestinal Bleeding

All Day Room: GI Community, Learning Center

Awards
Identified for RadioGraphics

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TEACHING POINTS

- Appropriateness and technique used for CT evaluation of acute overt GI bleeding depends on patient factors including suspected site and rate of bleeding, comorbidities, hemodynamic stability, surgical/medical history.
- CT must be used appropriately in the context of alternative diagnostic and therapeutic modalities including endoscopy, pill endoscopy, fluoroscopic angiography, nuclear imaging and surgery.
- Acute overt brisk GI bleeding in a hemodynamically stable patient with suspected source distal to the ligament of Treitz can be evaluated rapidly with CT angiography.
- Intermittent or slow overt or occult small bowel bleeding can be evaluated with CT enterography.

TABLE OF CONTENTS/OUTLINE

GI bleeding definitions
Initial clinical management of acute GI bleeding
Evaluation of upper GI bleeding
-Describe role of endoscopy as primary diagnostic/therapeutic tool
-Define situations in which radiologic modalities for are most usefulEvaluation of overt lower GI bleeding
-Discuss patient factors which influence initial choice of diagnostic modality or intervention.
-Compare endoscopy, CT angiography, nuclear imaging and fluoroscopic angiography as primary tools for assessment.
Suspected small bowel bleeding and occult bleeding
-Discuss factors influencing choice between pill endoscopy and CT enterography.
-Discuss use of extended endoscopy

GI322-ED-X

The Gut Buster: Bowel Injuries in Blunt Trauma

All Day Room: GI Community, Learning Center

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TEACHING POINTS

- Blunt traumatic bowel injuries are rife with downstream complications; prompt radiologic attention to and diagnosis of these at the time of presentation can significantly affect the immediate management and long-term prognosis for the patient- In the absence of evidence of traumatic injury to the liver, spleen, kidneys, or bladder, free fluid within the abdomen and/or pelvis should raise high suspicion for bowel injury.

TABLE OF CONTENTS/OUTLINE

Introduction Epidemiology Mechanisms Bowel injuries: Imaging findings and management Perforation Serosal tear Intramural hematoma Mesenteric hematoma Mesenteric laceration Mesenteric avulsion Ischemia/Shock bowel Summary

GI323-ED-X

Transarterial Embolization of Neuroendocrine Tumor Hepatic Metastases: Can Pre-therapy Enhancement Patterns Predict Response to Treatment?

All Day Room: GI Community, Learning Center

Participants

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Daniel Jeong, MD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. 80% of NET hepatic metastases are hypervascular and 20% are hypovascular.
2. For hypovascular NET mets, DWI and Octreoscan/FDG-PET correlation are important for diagnosis.
3. There is relatively decreased arterial enhancement and increased possibility of transient hypoxia related motion with Gadoxetate compared to full renally excreted agents.
4. Hypervascular colorectal liver mets respond better to transarterial embolization (increased ratio arterial:portal blood flow allows more efficient targeting of tumor). Corresponding studies are unavailable for NET metastases.
5. When monitoring response to targeted therapy (RECIST is relatively insensitive), enhancement, restricted diffusion, and somatostatin receptor activity are most sensitive.

TABLE OF CONTENTS/OUTLINE

1. Neuroendocrine tumor (NET) overview, background, multimodality radiologic review
2. Dynamic enhancement patterns of NET hepatic metastases
3. Functional imaging correlation to MRI enhancement pattern
4. Review NET biomarkers and dynamic enhancement patterns
5. Review pre targeted therapy dynamic enhancement and post transarterial embolization (bland, chemo, or Y-90) response
6. Present patterns of enhancement/response from our institution: > 50 consecutive transarterial embolizations of NET hepatic metastases
7. Discuss the potential for improved response with hypervascular metastases

GI324-ED-X

Portal Biliopathy: A Multitechnique Imaging Approach

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
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TEACHING POINTS

Portal biliopathy refers to biliary obstruction secundary to chronic portal vein thrombosis. The mechanism may envolve extrinsec compression of the common bile duct by collateral vessels, fibrotic tissue, or a combination of these two factors. It may be classified in three patterns according to the main factor envolved: varicoid, fibrotic or mixed pattern. Ocasionally the biliary obstruction may be mistaken for malignant conditions and consequently the patient may undergo biopsy or surgery. Therefore, it is important to understand and recognize the imaging findings in portal biliopathy in order to avoid unnecessary invasive procedures and thus provide a better treatment strategy for the patient.

TABLE OF CONTENTS/OUTLINE

Mechanisms and patterns of portal biliopathy.Radiological findings in this condition and the main characteristics that can help in the differentiation from other pathologies, mainly from the malignant ones.Illustration of some cases of different patterns of portal biliopathy.

GI325-ED-X

Big Problems While Getting Small: Imaging Appearance of the Complications Associated with Bariatric Surgery

All Day Room: GI Community, Learning Center

Participants
Christina Boyd, MD, Morristown, NJ (*Presenter*) Nothing to Disclose
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Pardeep K. Mittal, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Common bariatric surgery procedures include gastric lap band, gastric sleeve and gastric bypass
2. Knowledge of surgical technique is key to recognize normal post-operative radiographic appearance after bariatric surgery
3. Imaging plays an important role in identifying complications associated with bariatric surgery

TABLE OF CONTENTS/OUTLINE

Review the common surgical technique associated with bariatric surgery procedures such as gastric lap band, gastric sleeve and gastric bypass procedures. Learn the normal post-operative radiographic appearance after these procedures. Discuss various complications associated with each procedure and learn key imaging characteristics.***Cases to be presented include:*****Gastric Lap Band:**Normal Phi angle
Anterior Band slippage
Posterior Band slippage
Intra-gastric erosion
Port site infection**Gastric Sleeve:**Gastric obstruction
Intra-abdominal abscess and empyema
Gastric perforation and leak**Gastric Bypass:**Small bowel obstruction of the Roux limb: Internal hernia, Volvulus
Afferent Loop Syndrome: Obstruction of the biliary limb, Stricture
Intra-abdominal fistula
Gastric staple line dehiscence
Gastric- Gastric fistula
Ventral and Internal hernias
Intussusception
Retroperitoneal abscess
Gastric pouch Bezoar

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Courtney A. Coursey Moreno, MD - 2016 Honored Educator
Pardeep K. Mittal, MD - 2016 Honored Educator

GI326-ED-X

Orphan in the Abdomen: Cross-Sectional Imaging Spectrum of Non-Traumatic Splenic Emergencies

All Day Room: GI Community, Learning Center

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TEACHING POINTS

1. To describe the imaging manifestations of non-traumatic splenic emergencies and discuss the clinical implications of specific imaging findings.2. To discuss the role of imaging and image-guided interventions in the management of these patients.

TABLE OF CONTENTS/OUTLINE

Introduction, etiopathogenesis and clinical presentation of splenic emergencies.Role of cross-sectional imaging modalities (particularly CT)Imaging spectrum of non-traumatic splenic emergencies (splenic infarct, abscess, infective endocarditis, fungal infection, splenic vein thrombosis, splenic artery aneurysm, torsion and spontaneous splenic rupture from a variety of causes including malaria, thrombocytopenia, anticoagulation, Osler Weber Rendu syndrome, lymhoma etc.)Rare splenic emergencies such as peliosis of the spleen with rupture and hemoperitoneum are also illustrated.

GI327-ED-X

Solid Pseudopapillary Neoplasm of the Pancreas: Clinical Features, Common and Uncommon Findings, and Radiologic-pathologic Correlation

All Day Room: GI Community, Learning Center

Participants

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TEACHING POINTS

a. Solid pseudopapillary neoplasm (SPN) rarely occurs in pancreas. Most SPNs are low grade malignant tumors, but sometimes take an aggressive behavior. b. In pathological diagnosis, the well-defined tumor has fibrous capsule, and frequently contains varying amounts of necrosis, hemorrhage, calcification and cystic change. c. Common imaging findings are as follows: 1) well-encapsulated mass with varying solid and cystic components due to hemorrhagic degeneration 2) solid areas are slightly enhanced in contrast-enhanced CT/MRI 3) calcifications may be present at the periphery of the mass 4) MRI is sensitive of hemorrhagic change 5) FDG uptake in solid component d. While most lesions are benign prognosis, up to 15% of SPN can be malignant prognosis. Complete resection is recommended for long-term survival even in the presence of metastatic disease.

TABLE OF CONTENTS/OUTLINE

a. Clinical features, prognosis and treatment of SPN b. Criteria for pathological diagnosis and common pathological findings of SPN c. Characteristic imaging findings (ultrasonography, multiphasic contrast-enhanced CT and MRI and FDG-PET) and differential diagnosis d. Representative imaging findings of aggressive SPN: local invasion, metastasis and dissemination

GI328-ED-X

Hepatobiliary Pancreatic Lesions Depiction Performance of Ultra-high-resolution CT with 0.25-mm Slice Thickness-128 Detector Rows

All Day Room: GI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Hirobumi Nagasawa, RT, Tokyo, Japan (*Presenter*) Nothing to Disclose
Yuto Kakuta, RT, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Tomohiko Aso, RT, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuzuru Kono, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Masahiro Suzuki, Chuo-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Yusuke Miyamoto, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasuo Saito, BS, Otawara-Shi, Japan (*Abstract Co-Author*) Employee, Toshiba Corporation

TEACHING POINTS

The spatial resolution of Ultra-High-Resolution CT with 0.25-mm Slice Thickness * 128 Detector Rows is significantly higher than that of conventional Multi-Detector row CT（MDCT）, which is expected to advance greatly in CT imaging of the various areas of clinical, particularly in peripheral regions.This presentation shows the diagnostic performance change and usefulness of hepatobiliary pancreatic lesions in the ultra-high-resolution CT image while comparing the postoperative specimen image.

TABLE OF CONTENTS/OUTLINE

1.Introduction of hepatobiliary pancreatic lesions of features.2.To show a comparison data scanned the surgically-resected specimen of hepatobiliary pancreatic lesions in the ultra-high-resolution CT and MDCT image.3.To compare the capability of visualizing lesions ranging from surgical specimen image to ultra-high-resolution CT image.

GI329-ED-X

Advanced Imaging Techniques in Improving Image Quality of CT Abdomen

All Day Room: GI Community, Learning Center

Participants
Kenneth K. Lau, MBBS, FRANZCR, Melbourne, Australia (*Presenter*) Nothing to Disclose
Dana M. Jackson, RT, Clayton, Australia (*Abstract Co-Author*) Nothing to Disclose
Ahilan Kuganesan, Clayton, Australia (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Superior image quality improves diagnostic accuracy in CT of abdomen and pelvis (CTAP). CT image quality is defined by contrast resolution, spatial resolution, image noise, and artefacts. The abdominal pathology assessment can also be limited by motion, beam-hardening artifact from calcifications and devices and poor contrast opacification of organs. The aim of this exhibit is to review various latest imaging techniques that can improve the image quality and diagnostic utility of CTAP.

TABLE OF CONTENTS/OUTLINE

Latest techniques that are available: a) water equivalent diameter for radiation dose appropriation, b) improved temporal resolution for motion artifact reduction, c) lowering KVp for better contrast visibility, d) model-based iterative reconstruction for noise reduction and better low subject contrast organ visibility, e) fine focal spot to minimize x-ray penumbra effect for improved lesion clarity and calcium blooming artifact reduction, f) liver detection algorithm for increased dose distribution to upper abdomen, g) dual energy for organ contrast optimization and calcium/metal artifact removal, h) single photon metal artifact reduction technique for metallic device artifact reduction. These latest CTAP imaging techniques are shown to improve the organ and lesion clarity. They aid more accurate abdominal pathology assessment.

GI330-ED-X

Vascular Disorders of the Liver - A Systematic Approach

All Day Room: GI Community, Learning Center

Participants
Brunna Oliveira, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Hugo C. Carneiro, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Camila C. Tavares, MD, Sao Paulo Sp, Brazil (*Abstract Co-Author*) Nothing to Disclose
Pedro J. Pereira, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Natally d. Horvat, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Manoel S. Rocha, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the hepatic vascular anatomy and its main anatomic variants;To review the imaging findings at multi-imaging modalities of hepatic vascular disorders, illustrated with clinical cases from our radiology department;To discuss its main differential diagnosis.

TABLE OF CONTENTS/OUTLINE

Hepatic vascular anatomy and its main anatomic variants; Didactic approach of the main hepatic vascular disorders with illustrated teaching cases (abdominal US, CT and MR), emphasizing the images features that may contribute to the diagnosis, including: Portal disorders: Decrease of portal flow or portal obstruction; Arterioportal shunts; Obliterative portal venopathy; Congenital absence of the portal vein; Arterial disorders: Decrease or disparition of arterial blood flow; Hepatic artery aneurysm; Hepatic veins abnormalities: Budd-Chiari syndrome; Veno-occlusive disease; Right-sided heart failure; Intrahepatic vascular communication: Porto-hepatic and arterio-hepatic shunts; Hepatic lesions and perfusional disorders: Liver cirrhosis; Hepatic neoplasms; Hepatic trauma; Hereditary hemorrhagic telangiectasia; Steal phenomenon by hypervascular tumors; Inflammatory changes; Other causes.

GI331-ED-X

Wirsungocele and Santorinicele: MRCP Findings and Clinical Outcomes

All Day Room: GI Community, Learning Center

Participants
Temel Tirkes, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose
Fatih Akisik, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose
Kumaresan Sandrasegaran, MD, Carmel, IN (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Define Wirsungocele and Santorinicele Pathophysiology Imaging features on MRCP Significance and associations Clinical outcomes

TABLE OF CONTENTS/OUTLINE

MRCP can detect the presence of a Santorinicele, which is a focal distention of distal dorsal (Santorini) duct and Wirsungocele at the ventral duct (duct of Wirsung). The accuracy of diagnosing Wirsungocele and Santorinicele with MRCP is increased with use of secretin. Probable pathophysiology for Santorinicele is impaired flow though the minor papilla. It has been suggested that patients with pancreas divisum and a santorinicele are at higher risk of recurrent pancreatitis.

Honored Educators

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Temel Tirkes, MD - 2013 Honored Educator
Temel Tirkes, MD - 2014 Honored Educator
Kumaresan Sandrasegaran, MD - 2013 Honored Educator
Kumaresan Sandrasegaran, MD - 2014 Honored Educator
Kumaresan Sandrasegaran, MD - 2016 Honored Educator
Fatih Akisik, MD - 2014 Honored Educator

GI332-ED-X

Vascular Compression Syndromes in Abdomen and Pelvis: Current Concepts and Controversies

All Day Room: GI Community, Learning Center

Awards
Cum Laude

Participants
Aliaksei Salei, MD, Darby, PA (*Presenter*) Nothing to Disclose
Vivek Gowdra Halappa, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Karl H. Schuleri, MD, Darby, PA (*Abstract Co-Author*) Nothing to Disclose
Oleg Teytelboym, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Stanley U. Chan, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review imaging appearances of vascular compression syndromes in abdomen and pelvis. Learn clinical and imaging criteria helping to differentiate compression syndromes from normal variants. Illustrate differential diagnosis and diagnostic pitfalls. Highlight current approaches to work-up and treatment.

TABLE OF CONTENTS/OUTLINE

Epidemiology and pathophysiology of vascular compression syndromes in abdomen and pelvis. Clinical presentation of vascular compression syndromes. Pictorial review of imaging appearances of vascular compression syndromes, including median arcuate ligament syndrome, superior mesenteric artery syndrome, Nutcracker syndrome, ureteric compression syndromes and May-Thurner syndrome. Diagnostic workup of patients with vascular compression syndromes. Diagnostic controversies and pitfalls. Imaging clues to differentiate from normal anatomic variants. Current approaches to treatment of vascular compression syndromes. Review of commonly used interventional and surgical procedures.

GI333-ED-X

CT Spectrum of Small Bowel Gastrointestinal Stromal Tumors

All Day Room: GI Community, Learning Center

Awards
Cum Laude

Participants
Steven Dolan, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Rogerio Vasconcelos, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Stephanie Hansel, MD, Rochester, MN (*Abstract Co-Author*) Research support, Given Imaging Ltd Advisory Board, Medtronic, Inc
Madeline Miller, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Joel G. Fletcher, MD, Rochester, MN (*Abstract Co-Author*) Grant, Siemens AG; ;
John M. Barlow, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Gastrointestinal Stromal Tumor (GIST) is the most common mesenchymal tumor of the GI tract. Small bowel (SB) GISTs are less common than gastric GISTs. GI bleeding is most common clinical presentation of SB GIST. SB GISTs are typically solitary, well-marginated, heterogenously enhancing, mostly exophytic, proximal SB masses by CT. When an SB mass demonstrates typical CT findings of GIST, this mass is highly likely to be classified pathologically as GIST after resection.

TABLE OF CONTENTS/OUTLINE

1. Epidemiology Most common mesenchymal tumor of the GI tract 4- 5,000 GIST diagnoses in USA annually 2. Pathophysiology Gastric GIST (60%) more common than SB GIST (30%) SB GIST more aggressive than gastric GIST 3. Clinical presentation Abdominal pain Gastrointestinal bleeding 4. Common CT findings of SB GIST Single mass Well-marginated Heterogeneously enhancing Mostly exophytic Proximal SB 5. Less common CT findings of SB GIST Multiple masses Poorly marginated Homogeneously enhancing Mostly endophytic Distal SB 6. Common sites of metastases (rare) Liver Peritoneum

GI334-ED-X

MRI Evaluation for Acute Appendicitis during Pregnancy

All Day Room: GI Community, Learning Center

Participants
Varun Mehta, BA, MD, Staten Island, NY (*Presenter*) Nothing to Disclose
Varun Chowdhary, MD, BS, Staten Island, NY (*Abstract Co-Author*) Nothing to Disclose
Melody Mar, BA, MD, Staten Island, NY (*Abstract Co-Author*) Nothing to Disclose
Jesse Chen, MD, Staten Island, NY (*Abstract Co-Author*) Nothing to Disclose
Steven Peti, MD, Staten Island, NY (*Abstract Co-Author*) Nothing to Disclose
Gail Yarmish, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:
1. To discuss the workup of suspected appendicitis in pregnant women, with a focused review of the literature.
2. To review the MRI technique.
3. To illustrate the MRI findings of the normal appendix and the inflamed appendix.
4. To review the differential diagnosis of right lower quadrant pain in a pregnant patient.

TABLE OF CONTENTS/OUTLINE

1. Introduction
2. Imaging Techniques
3. Normal Appendix
4. Acute Appendicitis
5. Differential Diagnosis
6. Summary

GI335-ED-X

Focal Hepatic Lesions; Pitfalls, Pseudolesions and Misdiagnoses

All Day Room: GI Community, Learning Center

Awards
Cum Laude

Participants
Khaled M. Elsayes, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Janio Szklaruk, MD, PhD, Bala Cynwyd, PA (*Abstract Co-Author*) Nothing to Disclose
Richard L. Baron, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- Describe most commonly encountered imaging pitfalls, pseudolesions and misdiagnoses which can mimic other pathologies- Discuss relevant technical background. pathophysiology and hemodynamics of these pitfalls.- Correlate imaging features of these masses with clinical and pathologic findings.- Provide useful pearls and clues to reach a specific diagnosis

TABLE OF CONTENTS/OUTLINE

1. Technical pitfalls a. CT, US, MR specific issues that create difficulties in diagnosis b. Technique pitfalls2. Diagnostic pitfalls a. Specific issues for cirrhotic and non-cirrhotic liver b. Mistaking benign lesions for malignant lesions c. Mistaking malignant lesions for benign lesions3. Atypical presentations of common lesions4. Organization according to imaging findingsSUMMARYThere is a wide range of common pitfalls and pseudo-lesions encountered in liver imaging, which can lead to incorrect diagnoses mainly because many radiologists are not completely familiar with anatomical, morphological, physiological, hemodynamic and biological principles. This leads to common misinterpretations which would further results in wrong management with potentially negative outcome. In this exhibit, we will discuss the spectrum of these pathologies and provide clues to correct diagnoses

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Khaled M. Elsayes, MD - 2014 Honored Educator

GI336-ED-X

MR-Enterography and Cine-sequences: A Complete Evaluation in Small Bowel Diseases

All Day Room: GI Community, Learning Center

Participants
Filippo Barbiera, Sciacca, Italy (*Abstract Co-Author*) Nothing to Disclose
Elena Murmura, MD, Sciacca, Italy (*Presenter*) Nothing to Disclose
Maria Accardi, Sciacca, Italy (*Abstract Co-Author*) Nothing to Disclose
Salvatore Serraino, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Bruno Murmura, Sciacca, Italy (*Abstract Co-Author*) Nothing to Disclose
Giuseppe Maggio, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Antonella Botta, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Ludovico La Grutta, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To outline how to perform and interpret cine MR-Enterography (MRE)
To suggest including cine-sequences in MRE protocol

TABLE OF CONTENTS/OUTLINE

Background
Multiphasic cine imaging is a useful component of MRE evaluation because it provides functional information about bowel motility. Currently, cine sequences remain underutilized, even if the evaluation of intestinal motility has been incorporated into activity scoring systems for Crohn disease(CD).Materials and Methods
In addition to static sequences(FIESTA T2, LAVA T1), we use FIESTA T2 cine-sequences (FOV 40, matrix 200x200, thickness 26mm, 1 NEX, 300 phases in 1 minute and 46 seconds). Between March 2015 and January 2016, 27 cine-MRE were acquired. We compared the diameter of lumen in static and cine sequences and gastro-intestinal motilityImaging Findings and Results
In all cases, cine-sequence allowed an optimal evaluation of intestinal motility, strictures, endoluminal lesions. We evaluated the diameter of lumen comparing static and cine sequences to distinguish strictures than functional narrowing: there is a statistically significant difference ($p<0.05$) of lumen caliber between the sequences. In all cases, motility alterations in cine sequence were related to MR findings in static sequences.Conclusions
Cine-sequence should be included in MRE protocol

GI337-ED-X

To Drain or Not to Drain? What Radiologists Need to Know about Management of Abscesses

All Day Room: GI Community, Learning Center

Participants
Aliaksei Salei, MD, Darby, PA (*Abstract Co-Author*) Nothing to Disclose
Pouya Ziai, MD, Darby, PA (*Abstract Co-Author*) Nothing to Disclose
Najmeh Rohani, MD, Darby, PA (*Presenter*) Nothing to Disclose
Salmi Simmons, MD, Darby, PA (*Abstract Co-Author*) Nothing to Disclose
Aaron Brandis, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review predisposing factors, microbiology, and pathophysiology of abscesses in chest, abdomen and pelvis. Illustrate differential diagnosis and diagnostic pitfalls. Learn general treatment approaches based on location and morphology. Review percutaneous techniques utilized in the management of abscesses.

TABLE OF CONTENTS/OUTLINE

Epidemiology and pathophysiology of abscess formation. Pictorial review of imaging appearances of abscesses in chest, abdomen, and pelvis. Differential diagnosis. Indications for medical management, aspiration, percutaneous drainage, and surgery. Advantages and disadvantages of percutaneous drainage in comparison to surgical procedures. Pertinent clinical guidelines. Pitfalls and challenges in percutaneous management of abscesses. Complications encountered in percutaneous drainage of abscesses. Tube management, signs of successful drainage, and timing of tube removal. Signs of treatment failure and techniques to improve success of percutaneous drainage.

GI338-ED-X

Diagnostic Approach of Enteropathies: What the Gastroenterologist Needs to Know

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Pedro Panizza, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Felipe L. Costa, MD , Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Daniela F. Vieira Vendramini, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Natalia S. Queiroz, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Natally d. Horvat, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Marcelo A. Queiroz, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Antonio S. Marcelino, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Publio C. Viana, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Claudia D. Leite, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Research Grant, General Electric Company
Marcos R. Menezes, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Giovanni G. Cerri, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- To review the distinct and overlapping clinical, radiological and pathologic characteristics of the enterophaties.- The objective of this exhibit is demonstrate the role of radiology as a tool for diagnosis, staging and therapeutic assessment of patients with diseases related to the small bowel.- It will be illustrated cases of our database, emphasizing on clinical, surgical and radiological features of the enteropathies.- The diseases will be categorized according to the etiology and it will be presented the relevant information for the radiologist and the request physician.

TABLE OF CONTENTS/OUTLINE

- Morphostructural changes have important clinical connotation as they may be responsible for the bacterial overgrowth syndrome or atypical causes of abdominal pain.- Infectious diseases may have presumed agents according to the distribution in the small intestine.
Inflammatory bowel diseases currently have radiological examinations as a key tool in the evaluation of disease activity.- Iatrogenic enteropathy may result from iodinated contrast, ACE inhibitors and radiation therapy.- Vascular enteropathy diagnosis requires great expertise and it is crucial to patient management due its high mortality.- Main neoplastic enteropathy related to the small intestine are adenocarcinoma, neuroendocrine tumors, lymphoma and GIST.

GI340-ED-X

Don't MESH This Up!: Spectrum of Imaging Findings in Abdominal Hernia Repair with Mesh, from Common to Obscure

All Day Room: GI Community, Learning Center

Participants

Sagine A. Berry-Tony, MD, New Hyde Park, NY (*Presenter*) Nothing to Disclose
Ruth D. Sarmiento, MD, New Hyde Park, NY (*Abstract Co-Author*) Nothing to Disclose
Ekta Gupta, MD, Floral Park, NY (*Abstract Co-Author*) Nothing to Disclose
Priya K. Shah, MD, Manhasset Hills, NY (*Abstract Co-Author*) Nothing to Disclose
Suzanne McElligott, MD, Manhasset, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

More than one million hernia repairs are performed yearly in the US with an increasing percentage involving mesh. Radiologists should be aware of the most common types of mesh and the normal imaging appearance on CT, US, MR, and x-ray. Suspected complications of hernia repairs are best evaluated with CT. Early normal post-operative appearance can overlap with that of pathologic processes; knowledge of expected post-operative findings and clinical correlation is crucial. Complications after hernia repair occur in up to 50% of cases and may be related to the mesh as a foreign body or to the surgery itself. CT diagnosis can facilitate treatment and prevent later, potentially more serious complications.

TABLE OF CONTENTS/OUTLINE

I.IntroductionII.Imaging features Most common types of mesh used and surgical placement Normal imaging findings in the early and late post-operative periods.III.Early and late complicationsIV.Common mesh related complications Hernia recurrence- Most common complication after hernia repair Infection/abscess HematomaV.Rare chronic mesh related complications Adhesion to bowel/Small bowel obstruction/enterocutaneous fistula Studding with implants Detachment from wall/migration/crenulation Mesh defectVI.Conclusion

GI341-ED-X

Emerging Concepts on Oral Contrast Media for CT

All Day Room: GI Community, Learning Center

Awards
Certificate of Merit

Participants
Manuel Patino, MD, Boston, MA (*Presenter*) Nothing to Disclose
Diana Murcia, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Avinash R. Kambadakone, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Dushyant V. Sahani, MD, Boston, MA (*Abstract Co-Author*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc

TEACHING POINTS

1. Positive oral contrast media (OCM) use continues to grow in outpatient indications and after major abdominal surgery; however, it is not commonly used in emergency settings. 2. Low X-ray photon energy CT imaging increases considerably the attenuation of positive OCM, which may obscure bowel wall, and predispose streak artifacts that affect surrounding organs. 3. Use of positive OCM is associated with increased tube current demand on automatic exposure control systems. 4. It is desirable to optimize positive OCM dose for new CT technology to improve image quality, 5. A combination of material-density and virtual monochromatic image datasets from DECT enables differentiation among different contrast materials administered at the same time. 6. Materials such as tungsten, and bismuth can be used for opacification of the gastrointestinal tract

TABLE OF CONTENTS/OUTLINE

1. Review the current utilization of positive, neutral and negative OCM in outpatient facilities and emergency settings. 2. Discuss the influence of clinical indication on the selection of OCM. 3. Describe new CT technologies, including dual energy CT and low tube voltage CT scanning, and review their effect on oral contrast media. 4. Discuss strategies for optimization of oral contrast media using new CT technologies. 5. Discuss the current status of alternative contrast media in abdominal CT.

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Dushyant V. Sahani, MD - 2012 Honored Educator
Dushyant V. Sahani, MD - 2015 Honored Educator
Dushyant V. Sahani, MD - 2016 Honored Educator

GI342-ED-X

Cross Sectional Imaging of Pancreatic Masses; Pearls, Mimics and Pitfalls

All Day Room: GI Community, Learning Center

Participants

Khaled M. Elsayes, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Akram M. Shaaban, MBBCh, Salt Lake City, UT (*Abstract Co-Author*) Nothing to Disclose
Ajaykumar C. Morani, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Priya R. Bhosale, MD, Bellaire, TX (*Abstract Co-Author*) Nothing to Disclose
Mohamed I. Elshikh, MBBCh, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Naveen Garg, MD, Houston, TX (*Abstract Co-Author*) Consultant, Document Storage Systems, Inc CEO, Garglet LLC
Brinda Rao, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- Illustrate various imaging pitfalls and misinterpretations frequently encountered with pancreatic masses that can lead to erroneous diagnoses.- Illustrate most commonly encountered pearls pathognomonic for pancreatic masses.- Describe relevant technical background. pathophysiology and hemodynamics of these pitfalls.

TABLE OF CONTENTS/OUTLINE

- Variants: Lateral Contour Lobulations of the pancreatic head mimicking exophytic mass- Technical pitfalls leading to misdiagnoses- Mimics of pancreatic ductal adenocarcinoma (such as focal fat infiltration, focal chronic fibrosis and focal autoimmune pancreatitis)- Features favoring Malignancy- Atypical findings suggesting diagnoses other than adenocarcinoma- Mimics of neuroendocrine tumor (such as intrapancreatic accessory spleen, aneurysm, solid variant of serous cystadenoma and pancreatic intraductal calculus)- Classic signs: - Double duct sign - Duct cutoff sign -The duct Penetrating sign - Eggshell calcification - Central scar, calcification, honeycomb pattern- Sausage Pancreas - Hypo-attenuating rim

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Khaled M. Elsayes, MD - 2014 Honored Educator
Akram M. Shaaban, MBBCh - 2015 Honored Educator
Akram M. Shaaban, MBBCh - 2016 Honored Educator
Priya R. Bhosale, MD - 2012 Honored Educator

ED005-SU

Gastrointestinal Sunday Case of the Day

Sunday, Nov. 27 7:00AM - 11:59PM Room: Case of Day, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

Participants

Christine M. Peterson, MD, Hummelstown, PA (*Presenter*) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Constantine A. Raptis, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Rex A. Parker III, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Elizabeth B. Maddox, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Christopher Molloy, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Andrew P. Robbins, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Andrew L. Warren, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Vincent M. Mellnick, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Oscar Garcia-Fraga, MD, Hershey, PA (*Abstract Co-Author*) Nothing to Disclose
Kelly Tung, MD,MS, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) Each GI case of the day will be taken from disorders of the luminal GI tract as well as the liver, spleen, pancreas, and biliary system. The findings may be uncommon manifestations of common diseases or common manifestations of uncommon diseases.

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Perry J. Pickhardt, MD - 2014 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

SPIO11

Oncodiagnosis Panel: Liver Cancer

Sunday, Nov. 27 10:45AM - 12:15PM Room: E353C

GI IR OI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Kathryn J. Fowler, MD, Chesterfield, MO (*Moderator*) Nothing to Disclose

Sub-Events

SPIO11A Pretreatment Imaging Evaluation of Liver Cancer

Participants
Ihab R. Kamel, MD, PhD, Baltimore, MD (*Presenter*) Research Grant, Siemens AG

SPIO11B Surgical Intervention for Liver Cancer

Participants
Sam G. Pappas, MD, FACS, Maywood, IL (*Presenter*) Nothing to Disclose

SPIO11C Interventional Radiology Procedures for Liver Cancer

Participants
Sandeep Vaidya, MD, Seattle, WA (*Presenter*) Nothing to Disclose

SPIO11D Radiotherapy for Liver Cancer and Post-RT Evaluation of Response

Participants
Michael I. Lock, MD, FRCPC, London, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand how to distinguish normal post radiation image changes versus recurrence. 2) Review an approach to liver image interpretation post radiation.

ABSTRACT

Radiation for liver is becoming common. However, the literature reveals a large variation in practice and outcome. This review of the data will provide an organized summary of the evidence and an understanding of the various methods of radiating liver cancers. The primary objective is to review an approach to liver image interpretation post radiation. The presentation will cover expected imaging changes with time after radiation, provide predictive imaging tools to identify i) which patients will progress ii) when patients will progress and iii) which patients will survive.

URL

none

SSA07

Science Session with Keynote: Gastrointestinal (Rectal Cancer)

Sunday, Nov. 27 10:45AM - 12:15PM Room: E353A

CT GI MR MI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Kedar Jambhekar, MD, Little Rock, AR (*Moderator*) Nothing to Disclose
Mukesh G. Harisinghani, MD, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

SSA07-01 Gastrointestinal Keynote Speaker: Evolving Expectations from Imaging in the Management of Rectal Cancer

Sunday, Nov. 27 10:45AM - 10:55AM Room: E353A

Participants
Mukesh G. Harisinghani, MD, Boston, MA (*Presenter*) Nothing to Disclose

SSA07-02 Clinical Impact of Preoperative Gadoxetic Acid-enhanced Liver MRI in the Evaluation of Synchronous Liver Metastasis of Colon Cancer

Sunday, Nov. 27 10:55AM - 11:05AM Room: E353A

Awards
Student Travel Stipend Award

Participants
Cherry Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
So Yeon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Min-Ju Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung Soo Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seong Ho Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, DONGKOOK Pharmaceutical Co, Ltd
Kyu-Pyo Kim, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Yong Sik Yoon, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Chan Wook Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Hoon Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Moon-Gyu Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate whether additional MRI with gadoxetic acid increases the survival rate of patients with synchronous liver metastasis of colon cancer (sCLM) planning to undergo curative-intended treatment, compared with patients assessed only with CT.

METHOD AND MATERIALS

We retrospectively identified 117 patients with sCLM who underwent curative-intended treatment for colon cancer with resectable sCLM from 2006 to 2010 and who were initially evaluated using CT. Among these patients, 65 underwent additional gadoxetic acid-enhanced MRI (CT+MRI group) before surgery. The remaining 52 patients who were assessed using only CT constituted the CT group. We compared the baseline characteristics, including pathologic staging and the surgical margin status in the two groups. In the CT+MRI group, we analyzed patients with discrepancy between CT and MRI. We correlated the detected sCLM with the pathologic findings. The 5-year survival rate was compared between the two groups, and multivariable analyses were performed using a Cox proportional hazard model. The inverse probability treatment weighting analysis (IPTW) adjusted by propensity scores was done to reduce the effect of selection bias.

RESULTS

The CT and CT+MRI groups were comparable regarding the baseline characteristics. In the CT+MRI group, 43 patients (66.2%, 43/65) showed a discrepancy in the numbers of sCLM between CT and MRI and MRI detected 25 additional sCLM (38.5%, 25/65) which were initially missed on CT. The numbers of detected sCLM were correlated with the pathologic findings better in the CT+MRI group (86.2%) than in the CT group (65.4%) (P=0.014). The 5-year survival rate was significantly higher in the CT+MRI group than in the CT group (70.8% vs. 48.1%, P=0.003). On multivariate analyses, the CT+MRI group showed a lower mortality rate (HR, 0.413; 95% CI, 0.256 - 0.830) than the CT group. After the IPTW, the CT+MRI group was associated with a significantly lower risk of overall mortality (HR, 0.434; 95% CI, 0.226 - 0.831) than the CT group.

CONCLUSION

In patients with colon cancer and sCLM who underwent CT, additional preoperative evaluation by gadoxetic acid-enhanced MRI allowed us to detect sCLM more precisely and consequently increased the overall survival.

CLINICAL RELEVANCE/APPLICATION

Optimal preoperative staging using gadoxetic acid-enhanced liver MRI for synchronous liver metastasis in patients with colon cancer can improve the overall survival.

SSA07-03 Tumor Enhancement on Gadoxetate-enhanced MRI is Associated with Long-term Survival in Patients with Colorectal Liver Metastases

Sunday, Nov. 27 11:05AM - 11:15AM Room: E353A

Awards
Student Travel Stipend Award

Participants
Helen Cheung, MD, Toronto, ON (*Presenter*) Nothing to Disclose
Paul Karanicolas, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Natalie Coburn, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Calvin Law, MD, FRCPC, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Laurent Milot, MD, MSc, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Surgical resection is the standard of care for treatment of colorectal liver metastases (CRLM) and gadoxetate-enhanced MRI is routinely used for preoperative diagnosis and staging. Tumor fibrosis on post-hepatectomy specimens is associated with long-term survival and delayed enhancement on gadolinium-enhanced MRI is associated with fibrosis in other disease processes. Therefore, the goal of this study is to determine whether tumor enhancement on preoperative delayed-phase gadoxetate-enhanced MRI can predict disease-specific survival in patients with CRLM post-hepatectomy.

METHOD AND MATERIALS

Patients who received a preoperative gadoxetate-enhanced MRI prior to liver resection for CRLM from January 1, 2010 to December 31, 2012 were included in this retrospective study. The signal-to-noise ratio (SNR) was measured on the noncontrast and 10-minute delayed phases. Tumor enhancement was calculated as the percentage increase in SNR from noncontrast to 10-minute delayed phase. If there were multiple lesions, we calculated the mean tumor enhancement, weighted by size of tumor (largest axial diameter). Per patient tumor enhancement was stratified into weak and strong enhancement based on the a cutoff determined by the Youden J statistic for 3-year survival. Kaplan-Meier and Cox-Regression analyses were used to determine whether tumor enhancement could predict disease-specific survival, independent of potential confounders.

RESULTS

Eighty-four patients met inclusion/exclusion criteria. Based on the Youden Index, the threshold for weak and strong tumor enhancement was a 12% increase in SNR between noncontrast and delayed phase. Tumor enhancement predicted disease-specific death with 61.1% surviving at 3 years in those with weak enhancement vs. 85.5% surviving in those with strong enhancement (p=0.01). The adjusted hazard ratio of death in patients who had weak tumor enhancement after adjusting for potential confounders was 3.48 (p=0.009).

CONCLUSION

Tumor enhancement seen on gadoxetate-enhanced MRI is associated with survival in patients with CRLM post-hepatectomy.

CLINICAL RELEVANCE/APPLICATION

Tumor enhancement of colorectal liver metastases on preoperative delayed-phase gadoxetate-enhanced MRI is a biomarker of long-term survival and may be helpful in preoperative patient risk-stratification.

SSA07-04 Discriminating Stages of Rectal Cancer by Texture Analysis on Apparent Diffusion Coefficient Maps

Sunday, Nov. 27 11:15AM - 11:25AM Room: E353A

Participants
Liheng Liu, MD, Jinan, China (*Presenter*) Nothing to Disclose
Wenwu Li, MD, Shandong, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To explore the potential of texture analysis based on apparent diffusion coefficient (ADC) maps, as a predictor of local invasion depth (stage T1-2 vs. T3-4) and nodal status (N0 vs. N1-2) of rectal cancer.

METHOD AND MATERIALS

In this retrospective study, 68 patients with rectal cancer who underwent preoperative MRI with diffusion-weighted sequence prior to the surgery were enrolled. Texture features of ADC maps of the mass lesions (skewness, kurtosis, entropy, contrast, correlation) and routine ADC variables (ADCmean, ADCmin, ADCmax) were compared between T1-2 and T3-4 stages, between N0 and N1-2 stages, as well as between overall stages.

RESULTS

Significant inter-group differences were observed with respect to skewness (P=0.015), entropy (P=0.004) and contrast (P=0.017) between T1-2 and T3-4 tumors. The three parameters were significantly lower in patients with T1-2 as compared to those with T3-4 tumors (skewness, 0.166 vs. 0.476; entropy, 3.212 vs. 3.441; contrast, 10.773 vs. 13.596). Further, skewness and entropy were identified as independent predictors for extramural invasion of tumors (stage T3-4). Using a logistic regression model that factored skewness and entropy to differentiate T3-4 from T1-2 tumors, we achieved an area under the receiver-operating characteristic curve (AUC) of 0.743. Significant differences were observed between N0 and N1-2 tumors with respect to ADCmean (P=0.023), ADCmax (P=0.005) and entropy (P=0.015). ADCmax. and entropy were independent predictors of positive nodal status. An AUC of 0.750 was achieved by using this logistic model. In addition, ADCmean, skewness, entropy and contrast were significantly different among the overall stages (stage I, II, III and IV).

CONCLUSION

Texture analysis on ADC maps could provide valuable information in indentifying locally advanced rectal cancer.

CLINICAL RELEVANCE/APPLICATION

The findings might be help for the preoperative evaluatation of rectal cancer.

SSA07-05 Survival Prediction in Patients Treated by Folfiri and Bevacizumab using Contrast-enhanced CT

Texture Analysis: Ancillary Study of a Multicenter Prospective Study (PRODIGE 9)

Sunday, Nov. 27 11:25AM - 11:35AM Room: E353A

Participants
Anthony Dohan, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Benoit P. Gallix, MD, PhD, Montpellier, France (*Abstract Co-Author*) Nothing to Disclose
Caroline Reinhold, MD, MSc, Montreal, QC (*Abstract Co-Author*) Consultant, GlaxoSmithKline plc
Philippe A. Soyer, MD, PhD, Paris, France (*Abstract Co-Author*) Consultant, Guerbet SA;
Boris Guiu, MD, Dijon, France (*Abstract Co-Author*) Nothing to Disclose
Karine Le Malicot, Dijon, France (*Abstract Co-Author*) Nothing to Disclose
Jaafar Bennouna, MD, Saint-Herblain, France (*Abstract Co-Author*) Nothing to Disclose
Francois Ghiringhelli, Dijon, France (*Abstract Co-Author*) Nothing to Disclose
Valerie Boige, MD,PhD, Villejuif, France (*Abstract Co-Author*) Research Grant, Merck KGaA; Research Consultant, Bayer AG; Research Consultant, Merck KGaA
Julien Taieb, MD,PhD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Olivier Bouche, Reims, France (*Abstract Co-Author*) Nothing to Disclose
Eric Francois, MD, Nice, France (*Abstract Co-Author*) Nothing to Disclose
Jean-Marc Phelip, MD, Saint-Priest-En-Jarez, France (*Abstract Co-Author*) Nothing to Disclose
Christian Borel, MD, Strasbourg, France (*Abstract Co-Author*) Nothing to Disclose
Roger Faroux, MD, La Roche Sur Yon, France (*Abstract Co-Author*) Nothing to Disclose
Jean-Francois Seitz, MD, Marseille, France (*Abstract Co-Author*) Nothing to Disclose
Stephane Jacquot, MD, Montpellier, France (*Abstract Co-Author*) Nothing to Disclose
Dominique Genet, MD, Limoges, France (*Abstract Co-Author*) Nothing to Disclose
Jean-Louis Jouve, MD, Dijon, France (*Abstract Co-Author*) Nothing to Disclose
Francoise Desseigne, MD, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
Come Lepage I, MD,PhD, Dijon, France (*Abstract Co-Author*) Nothing to Disclose
Thomas Aparicio, MD,PhD, Bobigny, France (*Abstract Co-Author*) Nothing to Disclose
Christine C. Hoeffel, MD, Reims, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine whether surface area (SA) measurement and texture analysis (TA) on pre-treatment and two months post-chemotherapy computed tomography (CT) images can predict 2-year survival in patients with liver metastases from colo-rectal cancer (CRC) treated by Folfiri and bevacizumab.

METHOD AND MATERIALS

This is an ancillary study from PRODIGE-9 multicenter prospective study for which 494 patients with CRC metastatic to the liver and treated by Folfiri and bevacizumab had been enrolled. In 223 patients, TA was performed by two radiologists in consensus using TexRAD® software on the dominant liver lesion during the venous phase of a contrast-enhanced CT examination, at baseline and two months post-chemotherapy. Metastasis SA, TA parameters and their changes were correlated with the 2-year survival status. Receiver operating characteristic (ROC) curves were performed and the 4 strongest parameters were incorporated into a multivariate logistic regression model to identify predictive factors for 2-year survival and their odd-ratios(OR). A score combining these 4 factors was built and optimal cutoff values for predicting 2-year survival status was determined with ROC curve analysis. Survival was estimated with the Kaplan-Meier method and compared between groups with the log-rank test.

RESULTS

The strongest independent predictive factors for 2-year survival status were decrease in SA(AUC=.67;(.59-.74)), decrease in kurtosis value (ssf=0)(AUC=.54;(.56-.62)), the baseline mean value (ssf=0)(AUC=.64;(.56-.72)) and the baseline Mean Positive Pixels (MPP) value (ssf=0)(AUC=.63;(.56-.71)). Using multivariate analysis, predictive factors of 2-year survival status were the decrease in SA>44%(OR=2.6,P=.002), the decrease in kurtosis value (ssf=0)(OR=2.49,P=.030), baseline mean value (ssf=0)>62.27UH (OR=2.15,P=.39) and baseline MPP value (ssf=0)>67.05 UH,(OR=2.15,P=.11). A score ranging from 0 to 16 was built. AUC of the score for predicting 2-year survival was .72(.66-.79) with a sensitivity of 67% and specificity of 61% for a cutoff value of 7. Patients with a score>7 had a higher survival rate (P<.001).

CONCLUSION

SA and TA parameters on baseline and first evaluation CT may be able to predict which patient will have an increased survival in CRC with liver metastases treated by Folfiri and bevacizumab.

CLINICAL RELEVANCE/APPLICATION

TA performed on liver metastases from CRC treated by Folfiri and bevacizumab allows prediction of patients 2-year survival.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Caroline Reinhold, MD, MSc - 2013 Honored Educator
Caroline Reinhold, MD, MSc - 2014 Honored Educator

SSA07-06 Using Quantitative Imaging Features of Colorectal Liver Metastases on Pre-Treatment CT to Predict Volumetric Response to Chemotherapy

Sunday, Nov. 27 11:35AM - 11:45AM Room: E353A

Participants
Hairong Chen, New York, NY (*Abstract Co-Author*) Nothing to Disclose
John M. Creasy, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Richard Kinh Gian Do, MD, PhD, New York, NY (*Presenter*) Nothing to Disclose

Lauryn B. Adams, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Camilla Gomes, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Mithat Gonen, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Patrick Seastedt, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Michael D'Angelica, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Amber Simpson, New York, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigates whether quantitative imaging features that measure tumor heterogeneity can be used to predict volumetric response in patients with colorectal liver metastases (CRLM).

METHOD AND MATERIALS

An IRB approved retrospective study included 103 patients from two prospective clinical trials on hepatic arterial infusion chemotherapy. Index tumors were extracted from contrast enhanced CT using Scout Liver (Pathfinder Technologies Inc., TN) at baseline and at 8 weeks follow-up. Volumetric response (as a percentage change) was assessed as a continuous variable. Imaging features (summary statistics including Hounsfield Unit -HU, texture, and shape properties) were extracted from index tumor volumes in the baseline CT scan using Matlab (Natick, MA). Imaging features statistically significant for volumetric response on univariate analysis were included in the regression model.The data were randomly split into training (n=93) and test sets (n=10). Random forest regression models were employed with cross validation on the training set. Test data were input into the trained regression models. Predicted accuracy of volumetric response was averaged over the models. Imaging features of CRLM in patients with partial response (PR) and stable disease (SD) defined by RECIST were also compared.

RESULTS

Predicted accuracy of volumetric response for CRLM after chemotherapy was 86.68% (CI: 85.35% - 88%). HU and the short run emphasis (SRE: a feature measuring consecutive pixels with the same intensity values) were the top two predictors of volumetric response. Mean HU values in PR were 91.2 (n=56) and 82.2 for SD (n=47), while SRE for PR was lower than the SD group (0.0864 vs. 0.098), suggesting that higher density and coarser grained image texture (more heterogeneity) may be related to better response. Increased heterogeneity reflects greater intravenous contrast uptake, which may translate to greater intake of chemotherapy within CRLM and subsequent volumetric response.

CONCLUSION

Quantitative imaging features extracted from pre-treatment CT are promising predictors of volumetric response to chemotherapy in patients with CRLM. External validation is required prior to using these novel imaging marker in a clinical setting.

CLINICAL RELEVANCE/APPLICATION

Pre-treatment prediction of response to chemotherapy using quantitative data from CT imaging has the potential to better select patients for chemotherapy.

SSA07-07 Correlation between Intravoxel Incoherent Motion (IVIM) and Dynamic Contrast-enhanced Magnetic Resonance Imaging (DCE-MRI) Parameters in Rectal Cancer

Sunday, Nov. 27 11:45AM - 11:55AM Room: E353A

Participants
Yanyan Xu, Beijing, China (*Presenter*) Nothing to Disclose
Hongliang Sun, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Wu Wang, MD, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Kaining Shi, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the correlation between intravoxel incoherent motion (IVIM) and multiphase dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) quantitative parameters in rectal cancer.

METHOD AND MATERIALS

Ninety-seven patients with histological diagnosis of rectal cancer were included in this study. All pelvis magnetic resonance imaging were performed in a 3.0T MR unit including diffusion-weighted imaging with 16 b-values (0, 10, 20, 30, 40, 60, 80, 100, 150, 200, 400, 800, 1000, 1200, 1500 and 2000s/mm2) and DCE-MRI(40 dynamic phases) as reference. IVIM perfusion-related parameters (f, perfusion fraction; D*, pseudo-diffusion coefficient; f·D*, the multiplication of the two parameters) were calculated by bi-exponential analysis. Quantitative parameters included Ktrans [transfer constant between blood plasma and extravascular extracellular space (EES)], Kep (rate between EES and blood plasma), Ve (extravascular Volume fraction), Vp (plasma volume fraction). DCE-MRI parameters were automatically calculated after region of interest (ROI) being selected along the outline of tumor maximal dimension (axial view), meanwhile relevant signal intensity (SI) time curves were obtained. Correlations between f and quantitative DCE-MRI parameters were respectively analyzed using Pearson's or Spearman's correlation coefficients, D* and f·D* were also similarly analyzed. Interobserver agreements were evaluated using the intraclass correlation coefficient (ICC) and Bland-Altman analysis.

RESULTS

There were 75 males and 22 females with a median age of 58.8 years (range, 26-85 years). Interobserver reproducibility for IVIM parameters, DCE-MRI semi-quantitative and quantitative parameters were good to excellent (ICC=0.9417-0.9618, ICC=0.7695-0.9905, ICC=0.7826-0.9488, respectively; narrow with of 95% limits of agreement). D* demonstrated significant correlations with Vp ($r= -0.370$; $p<0.001$), meanwhile, f·D* demonstrated significant correlations with TTP($r= -0.387$; $p=0.001$). However, no correlation was observed between f and DCE-MRI quantitative parameters.

CONCLUSION

IVIM perfusion-related parameters, especially f·D*, demonstrated moderate correlations with DCE-MRI quantitative parameters in rectal cancer.

CLINICAL RELEVANCE/APPLICATION

IVIM imaging parameters can be used as alternatives to DCE-MRI in reflecting the changes of rectal cancer perfusion in longitudinal monitoring treatment response.

SSA07-08 The Development and Validation of a CT-based Radiomics Signature for the Preoperative Discrimination of Stage I-II and State III-IV Colorectal Cancer

Sunday, Nov. 27 11:55AM - 12:05PM Room: E353A

Participants
Yanqi Huang, Guangzhou, China (*Presenter*) Nothing to Disclose
Zaiyi Liu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigative the predictive ability of radiomics signature based on CT image for the preoperative staging (I-II vs. III-IV) of primary colorectal cancer (CRC).

METHOD AND MATERIALS

The ethical-approved retrospective study consisted of 494 consecutive patients (training dataset: n=286; and validation cohort, n=208) with stage I–IV CRC. A radiomics signature was constructed based on the radiomics features extracted from CT images using LASSO logistic regression model. The potential association between the radiomics signature and CRC staging was explored. The classification performance of the radiomics signature was explored with respect to the receiver operating characteristics (ROC) curve, with accuracy, sensitivity and specificity obtained.

RESULTS

The developed 16-feature based radiomics signature was an independent predictor for the staging of CRC patients, which successfully discriminate stage I-II and stage III-IV CRC patients ($p < 0.0001$) in both the training and validation dataset. The median value of the radiomics signature of stage III-IV patients was significantly higher than that of the stage I-II patients. As for the classification performance of the radiomics signature in CRC staging, the yielded AUC was 0.792 (95%CI: 0.741-0.853), with a sensitivity of 0.667 and a specificity of 0.874. The validity of the signature in the validation dataset obtained an AUC of 0.708 (95%CI: 0.639-0.778), a sensitivity of 0.685, and a specificity of 0.690.

CONCLUSION

A radiomics signature was developed and validated to be a significant predictor for the discrimination of stage I-II from stage III-IV CRC, which may serve as a complementary tool for the preoperative tumor staging in CRC patients.

CLINICAL RELEVANCE/APPLICATION

The developed and validated radiomics signature could be used to discriminate stage I-II from stage III-IV CRC patients, which may serve as a noninvasive tool for the preoperative tumor staging in CRC patients.

SSA07-09 Can MRI Predict Recurrence in Patients with Locally Advanced Rectal Cancer?

Sunday, Nov. 27 12:05PM - 12:15PM Room: E353A

Awards
Student Travel Stipend Award

Participants
Cinthia Cruz, MD, Boston, MA (*Presenter*) Nothing to Disclose
Betsa Parsai Salehi, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
James H. Thrall, MD, Boston, MA (*Abstract Co-Author*) Stockholder, Peregrine Pharmaceuticals, Inc; Stockholder, iBio, Inc; Stockholder, Antares Pharma, Inc; Speaker, Bracco Group; ;
Mukesh G. Harisinghani, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Determine MRI findings in locally advanced rectal cancer that can be used as predictors of disease recurrence.

METHOD AND MATERIALS

Single center retrospective study. 152 potential consecutive subjects. Inclusion criteria: diagnosis of locally advanced rectal cancer(T3) between 2010-2015, neo-adjuvant therapy, radical surgery and availability of a baseline MR imaging scan and 1 year follow up pelvic MRI within our PACS (Picture Archiving and Communications System). Recurrence: abnormal follow-up MRI in the evaluated period. Scans were performed in a 1.5T(GE™) or 3T(Siemens™) clinical scanners, using the standard departmental rectal protocol. Scans were read by two radiologists blinded to outcomes. Recorded data: location (upper, mid or lower rectum or combination); transverse diameter of the tumor, length, shortest distance from the tumor to the mesorectal fascia (DMRF), lymphnode involvement (≥ 5) (LI), sphincter and extramural vessel involvement (EMV). Interobserver variability was evaluated. Fisher's exact and Z tests were applied.

RESULTS

Sixty-nine patients, 22 women, 47 men. Mean age 57.8 years(y). No gender difference in recurrence incidence. Recurrent(19/69 28%) versus non-recurrent(50/69 72%) tumors showed no significant differences in length, diameter, LI or EMV. Length 48.8:51.5mm (p>0.05), diameter 19.1:17.7mm(p>0.05), MRF 3.1:5.1mm (p=0.03), LI 9/19(47%):30/50(60%)(p=0.3), mid-lower rectum 14/19(74%): 21/50(42%) (p=0.01), sphincter involvement 9/19(47%):10/50(20%) (p=0.02) and EMV 2/19(10%):2/50(4%) (p>0.05). Tumors with DMRF <3.9mm(14/19, 74%) as well as those located in the mid-lower rectum(14/19, 74%), were highly associated with recurrence (p=0.01 and p=0.03, respectively). Mid-lower rectum involvement, MRF<4mm and sphincter involvement in combination (9/19(47%) vs 0/50(0) p=0.03), were highly associated with recurrence (OR=91, 95% CI:5 to 1695, p=0.002) demonstrating a sensitivity and specificity of 100% and 83%, respectively. Acceptable variation among readers ranged from 1.2-5.5%.

CONCLUSION

Mid-lower rectum involvement and MRF<4mm are highly associated with rectal cancer recurrence when found on 1 year follow-up MRI. In combination with sphincter involvement, such tumors demonstrated a 91-fold greater chance of recurring.

CLINICAL RELEVANCE/APPLICATION

MRI features and tumor location may be used to predict recurrence and markers of worst prognosis in locally advanced rectal cancer at 1-year-follow up scans.

SSA08

Science Session with Keynote: Gastrointestinal (CT Dose)

Sunday, Nov. 27 10:45AM - 12:15PM Room: E450A

CT GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
William P. Shuman, MD, Seattle, WA (*Moderator*) Research Grant, General Electric Company
Andrea Laghi, MD, Rome, Italy (*Moderator*) Speaker, Bracco Group Speaker, Bayer AG Speaker, General Electric Company Speaker, Koninklijke Philips NV
Jeong Min Lee, MD, Seoul, Korea, Republic Of (*Moderator*) Grant, Guerbet SA; Support, Siemens AG; Grant, Bayer AG; Grant, General Electric Company; Grant, STARmed Co, Ltd; Grant, RF Medical Co, Ltd; Grant, Toshiba Corporation; Grant, Samsung Medical Healthcare

Sub-Events

SSA08-01 Gastrointestinal Keynote Speaker: Novel CT Image Reconstruction Techniques

Sunday, Nov. 27 10:45AM - 10:55AM Room: E450A

Participants
William P. Shuman, MD, Seattle, WA (*Presenter*) Research Grant, General Electric Company

SSA08-02 Image Noise and CNR: Are These Meaningful Parameters to Assess the Potential for Dose Reduction for Abdominal CT at Different Tube Voltages in the Era of Advanced Modeled Iterative Reconstruction? A 12-reader Phantom Study

Sunday, Nov. 27 10:55AM - 11:05AM Room: E450A

Awards
Student Travel Stipend Award

Participants
Andre Euler, MD, Basel, Switzerland (*Presenter*) Nothing to Disclose
Zsolt Szucs-Farkas, MD, PhD, Berne, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Bram Stieltjes, MD, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Reto M. Eichenberger, MD, Basel , Switzerland (*Abstract Co-Author*) Nothing to Disclose
Clemens Reisinger, MD, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Anna Hirschmann, MD, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Caroline Zahringer, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Achim Kircher, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Sebastien Kopp, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Sebastian T. Schindera, MD, Basel, Switzerland (*Abstract Co-Author*) Research Grant, Siemens AG; Research Grant, Ulrich GmbH & Co KG; Research Grant, Bayer AG; Speakers Bureau, Bayer AG

PURPOSE

To assess the impact of changes in image noise (IN) and contrast-to-noise-ratio (CNR) on low-contrast-detectability by applying advanced modeled iterative reconstruction algorithm and low-kVp abdominal CT in phantoms of different phantom sizes with simulated liver lesions.

METHOD AND MATERIALS

A multi-energy liver phantom with 45 hypoattenuating, iodine-containing lesions (diameters of 5, 10, 15 mm; lesion-to-liver contrast of 10, 25, 50 HU) was placed in water containers mimicking a medium and large patient (diameters: 30 and 40 cm). The phantom was scanned at 70, 80, 100 and 120 kVp (SOMATOM Force, Siemens). The 120 kVp-protocol served as the reference protocol and the mAs settings of the other protocols were adjusted to keep the CTDIvol constant. The datasets were reconstructed with advanced modeled iterative reconstruction (ADMIRE, strength 3) and filtered back projection (FBP). IN was measured and CNR was calculated. Low-contrast lesion detection was independently assessed by twelve radiologists. Descriptive statistics and Fisher exact test were applied.

RESULTS

Applying iterative reconstruction, the IN decreased on average by 24% and by 27% and the CNR increased on average by 28% and by 34% for the medium and the large phantom, respectively. Lowering the tube voltage, the CNR increased on average by 72%, 59%, 35% at 70, 80, 100 kVp, respectively compared with 120 kVp in the medium phantom and by 4%, 16%, 7% in the large phantom.Despite the improvement of quantitative image quality by applying iterative reconstruction or low-kVp-imaging, there was no significant difference in overall detection rate within each phantom size (medium: 79% to 82%; large: 57% to 65%; P-value range: 0.37 to 1). Interobserver agreement was very good for both groups (κ-range of 0.8 to 0.9).

CONCLUSION

Improvement of quantitative image quality by advanced modeled iterative reconstruction or low-kVp-imaging did not impact low-contrast lesion detection in phantoms simulating medium and large patients.

CLINICAL RELEVANCE/APPLICATION

IN and CNR are well accepted parameters to grade quantitative image quality. However, they do not encompass the effects of dose optimization. More sophisticated image quality parameters are needed.

SSA08-03 Comparison of Measured and Estimated Organ Doses from Two Radiation Dose Tracking Software at Different kV

Sunday, Nov. 27 11:05AM - 11:15AM Room: E450A

Participants
Atul Padole, MD, Boston, MA (*Presenter*) Nothing to Disclose
Yiming Gao, Troy, NY (*Abstract Co-Author*) Employee, Virtual Phantoms, Inc
Alexi Otrakji, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Bob Liu, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
George Xu, PhD, Troy, NY (*Abstract Co-Author*) Nothing to Disclose
Mannudeep K. Kalra, MD, Boston, MA (*Abstract Co-Author*) Technical support, Siemens AG; Technical support, Medical Vision

PURPOSE

To compare the measured and estimated CT organ doses from two radiation dose tracking (RDT) software at different tube voltage (kV) using fixed tube current (mAs) and automatic exposure control (AEC) techniques in a human cadaver.

METHOD AND MATERIALS

In an IRB approved study, ionization chambers (Radcal) were surgically implanted in an adult male human cadaver (88 yrs, male, 68 kg) in six locations including the liver, stomach, small intestine, left kidney, colon, and urinary bladder. The cadaver was scanned with routine abdomenopelvis CT protocol on a 128-slice dual-source MDCT scanner (Siemens Definition FLASH) at 8 different settings – 4 with AEC (at constant CTDIvol 2.5mGy) & 4 with fixed mAs (at constant CTDIvol 4mGy). Scans were performed at 80, 100, 120 and 140 kV with mA values changed to achieve the abovementioned CTDIvol for each kV. All other scanning parameter were held constant including pitch of 0.9:1, rotation time of 0.5 second, and detector configuration of 128*0.6 mm. Scanning was repeated three times for each setting and organ doses were recorded for each acquisition (total series = 4*3*2=24). All CT image series were exported to the web-based RDT software: eXposure (Bayer, Germany) and VirtualDose (Albany, NY) to obtain estimated organ doses.

RESULTS

At constant CTDIvol, there was a variation (not statistically significant) in measured organ doses at different kV (both fixed mAs and AEC); lower kV was associated with lower organ doses ($p=0.7$). However, there were significant variation in estimated organ doses from both RDT software at different kV ($p<0.02$). The estimated organ doses from both RDT software were lowest at 80 kV compared to 140 kV ($p<0.02$). The estimated organ doses from VirtualDose were significantly lower than measured (except for 80 kV) and estimated organ doses from eXposure for both fixed mAs and AEC ($p<0.02$). The estimated organ doses from eXposure were slightly higher than most measured organ doses, however this difference was not statistically significant ($p=0.9$).

CONCLUSION

At constant CTDIvol, both measured and estimated organ doses fluctuate with different kV; lower kV settings are associated with lower dose for both fixed mAs and AEC. The estimated organ doses from VirtualDose were substantially lower than measured and estimated organ doses from eXposure.

CLINICAL RELEVANCE/APPLICATION

CT at lower kV settings is associated with lower organ doses even at constant CTDIvol.

SSA08-04 Comparison of Abdomen CT Radiation Doses (CTDIvol, DLP, & SSDE) from ACR Dose Index Registry based on Age and Type of Medical Facility in Different Geographical Regions of US

Sunday, Nov. 27 11:15AM - 11:25AM Room: E450A

Participants
Amirhossein Mozafarykhamseh, MD, boston, MA (*Presenter*) Nothing to Disclose
Atul Padole, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
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Subba R. Digumarthy, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Mannudeep K. Kalra, MD, Boston, MA (*Abstract Co-Author*) Technical support, Siemens AG; Technical support, Medical Vision
Mythreyi Bhargavan-Chatfield, PhD, Reston, VA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare abdomen CT radiation dose (CTDIvol, DLP & SSDE) from the ACR Dose Index Registry (DIR) across different types of facilities and geographical regions in US

METHOD AND MATERIALS

Using Radiology Playbook identification (RPID) numbers, we assessed CT dose metrics CTDIvol, DLP and size-specific dose estimates SSDE in 271287 abdomen CT exams (mean age 54.7±18.8 yrs) in the ACR DIR from 2011-2015 (10% sample). Data were stratified according to the geographic census in to New England (NE), Middle Atlantic (MA), South Atlantic (SA), East North Central(ENC), East South Central (ESC),West South Central (WSC), Mountain (MO) and Pacific(PA)) regions and then sub-stratified by year of CT (2011-15), patient age (≤ 40 years; 41-64 years; ≥65 years) and type of facility where CT was done (academic, community, multispecialty, freestanding). Mean and standard deviations for maximum CTDIvol (mGy), DLP (mGy.cm) and SSDE were calculated. ANOVA tests were used for analysis

RESULTS

The national mean CTDIvol, SSDE and DLP for abdomen CT were 15±8, 17±8 and 736±426 . There were significant variations for CTDIvol, DLP and SSDE values between census divisions.The highest CTDIvol and DLP was seen for WSC (15±11, 721±471 n=8916) and the lowest CTDIvol and DLP was for PA (11±6, 496±302, n=27095) ($p<0.0001$). For SSDE values, NE had the highest (25±8, n=17011), while, PA had the lowest (8±7, n=13758). The mean SSDE values of academic, community, multispecialty and freestanding facilities were 16±7, 17±9, 19±8, and 15±6 ($p<0.0001$), respectively. Among all 8 census divisions, no significant difference in dose based on age was noted. The mean±SD CTDIvol, DLP and SSDE for <40 years age group were 14±8, 737±441,

16±9; while, 16±9, 771±441and 17±8 for 41-64 years and 15±8, 633±388 and 17±8 for >64 years (p value > 0.1). Since the inception of the ACR DIR in 2011, abdomen SSDE has decreased by average 12.2% in different census divisions. The biggest decrease (25.6%) was in ENC; while there was only 1.2% decrease in PA region

CONCLUSION

There were significant variations in the values of CTDIvol, DLP, and SSDE for abdomen CT among different US census regions. There was no significant difference in dose metrics based on age, among all 8 census divisions

CLINICAL RELEVANCE/APPLICATION

The ACR DIR reveals that there is decrease in radiation dose for abdomen CT in the last 5 years. Improved effort is needed to achieve similar dose levels in all regions of US

Honored Educators

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Subba R. Digumarthy, MD - 2013 Honored Educator

SSA08-05 Comparison of Low kVp and Automatic Spectral Imaging Mode Selection Protocols in Abdominal CT with Statistical Iterative Reconstruction and Low Contrast Agent Dose: A Prospective Matched Cohort Study

Sunday, Nov. 27 11:25AM - 11:35AM Room: E450A

Participants
Peijie Lv, MD, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose
Liying Zhang, Zhengzhou, China (*Presenter*) Nothing to Disclose
Jianbo Gao, MD, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

A prospective matched cohort study was performed to compare the image quality and radiation dose obtained with automatic spectral imaging mode selection (ASIS) and adaptive statistical iterative reconstruction (ASIR) with that obtained with low kVp with ASIR in abdominal multiphase computed tomography (CT) with low contrast agent dose.

METHOD AND MATERIALS

This prospective study was institutional review board approved and written informed consents from all patients were obtained. Four groups of 60 patients each underwent the arterial-phase (AP) and portal venous phase (PVP) contrast-enhanced abdominal CT scan with low kVp (80 kVp or 100 kVp) or spectral CT imaging with ASIS modes, matched by age, gender, body mass index(BMI) , cross sectional area of the abdomen and contrast agent dose. One hundred and twenty patients (group A, 80 kVp and group B, spectral CT imaging) accepted contrast agent dose of 300mgI/kg with BMI < or = 23.9 kg/m2 while 120 patients (group C, 100 kVp and group D, spectral CT imaging) accepted 450mgI/kg contrast agent dose with BMI from 24 to 28.9 kg/m2. ASIR 50% was used to reconstruct the low-kVp images and monochromatic images (40-60keV) from spectral CT imaging. Quantitative parameters (CT attenuation and contrast-to-noise ratio of the liver, pancreas, aorta and portal vein, image noise in HU) and qualitative visual parameters (overall image quality as graded on a 5-point scale) were compared by using two sample t tests or Mann-Whitney U test.

RESULTS

Compared to 80-kVp and 100-kVp images, 40-keV images showed similar contrast and overall image quality despite the higher image noise, 50-keV images provided higher image noise but similar or higher contrast and overall image quality, 60-keV images provided similar image noise and contrast but similar or higher overall image quality. The CTDIvol and DLP in group A were lower than group B(P = 0.001and 0.042 respectively), but were similar between group C and group D.

CONCLUSION

In abdominal CT with low contrast agent dose, application of ASIR and ASIS to monochromatic imaging from 40 to 60keV maintained good image quality with higher radiation dose than 80 kVp and without increasing radiation dose than 100 kVp.

CLINICAL RELEVANCE/APPLICATION

Combined use of automatic spectral imaging protocol selection and iterative reconstruction can maintain good image quality with low contrast agent dose and have the potential to reduce radiation dose.

SSA08-07 Dose-Equivalent Triple Arterial Phase CT Imaging of the Liver: Initial Experience in Comparison to Single Arterial Phase at 80kV

Sunday, Nov. 27 11:45AM - 11:55AM Room: E450A

Participants
Katharina Brehmer, MD, Stockholm, Sweden (*Presenter*) Nothing to Disclose
Torkel B. Brismar, MD, PhD, Stockholm, Sweden (*Abstract Co-Author*) Nothing to Disclose
Anders P. Svensson, PhD, Stockholm, Sweden (*Abstract Co-Author*) Nothing to Disclose
Antonios Tzortzakakis, Gothenburg, Sweden (*Abstract Co-Author*) Nothing to Disclose
Nikolaos Voulgarakis, MD, Stockholm, Sweden (*Abstract Co-Author*) Nothing to Disclose
Michael A. Fischer, MD, Stockholm, Sweden (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To develop an optimized triple arterial phase CT (triple arterial CT) liver protocol from previously acquired perfusion CT data and to

prospectively evaluate the image quality (IQ) and diagnostic accuracy in comparison to standard single arterial phase CT (standard-CT) in patients with suspicion of hepatocellular carcinoma (HCC).

METHOD AND MATERIALS

A total of 42 patients prospectively underwent clinically indicated standard multiphasic liver CT and perfusion-CT at the same day using a dual-source 128-slice CT-scanner. A so called time maximum intensity projection (time-MIP) was reconstructed by fusion of three dedicated arterial time points of the perfusion split-series. Arterial time points were depicted prospectively based on arterial peak enhancement times (TTP) of 27 HCC lesions derived retrospectively from a previously acquired perfusion CT series of 15 patients. Single arterial phase of the standard liver CT and arterial time-MIP were compared by two readers (R1; R2) who assessed image quality and detection-rate of HCC. A third reader assessed image-noise, lesion-to-liver-contrast-ratio (LLR) and contrast-to-noise-ratio(CNR).

RESULTS

The triple arterial CT consisted of three low-dose scans (80 kV; 160 mAs) at 8.1/13.4/23.7 sec (min/mean/max values of TTP in 27 HCC) after a contrast enhancement of 160 HU was reached in the abdominal aorta. Mean CTDIvol (CT Dose Index) of triple arterial CT and standard-CT was 11.5 mGy and 12.2 mGy respectively. Time-MIP showed significantly lower noise and better CNR as compared to standard-CT ($P<0.001$; both). There was no significant difference in LLR between time-MIP and standard-CT ($P=0.26$). Inter-reader agreement and subjective IQ was good for both protocols. In total there were 73 HCC. Detection rate was 89/88 % (R1/R2) at time-MIP and 86/82% (R1/R2) at standard-CT. Time-MIP detected additional 7 (R1) respectively 9 (R2) HCC, which were missed on standard-CT.

CONCLUSION

Time-MIP derived from dose-equivalent triple arterial phase CT has the potential to improve both image quality and detection rate of HCC in comparison to standard single arterial phase CT.

CLINICAL RELEVANCE/APPLICATION

Dose-equivalent triple arterial phase CT scanning of the liver has the potential to improve diagnostic accuracy for HCC and thus improve oncologic patient care.

SSA08-08 Observer Performance at Varying Dose Levels and Reconstruction Methods for Detection of Hepatic Metastases

Sunday, Nov. 27 11:55AM - 12:05PM Room: E450A

Participants
Joel G. Fletcher, MD, Rochester, MN (*Presenter*) Grant, Siemens AG; ;
Jeff L. Fidler, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Sudhakar K. Venkatesh, MD, FRCR, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
David M. Hough, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Naoki Takahashi, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
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Adam Bartley, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Shuai Leng, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
David R. Holmes Iii, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Alicia Toledano, DSc, Kensington, MD (*Abstract Co-Author*) Consultant, iCAD, Inc
Rickey Carter, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Cynthia H. McCollough, PhD, Rochester, MN (*Abstract Co-Author*) Research Grant, Siemens AG

PURPOSE

To estimate the ability of abdominal radiologists to detect hepatic metastases (HM) at varying dose levels with or without iterative reconstruction (sinogram-affirmed iterative reconstruction; IR).

METHOD AND MATERIALS

Projection data from 83 CT contrast-enhanced exams were collected (42 with HM). HM was defined by histopathology or progression/regression on CT/MR. Using a validated noise insertion technique, each exam was reconstructed with filtered back projection (FBP) or IR at 5 dose levels (automatic exposure control settings of 80, 100, 120, 160 and 200 quality reference mAs [QRM]) to generate 8 dose-reconstruction configurations (664 cases). Three abdominal radiologists used a dedicated workstation to circle suspected HM, indicate a confidence score (0 – 100), and grade image quality, evaluating each patient once/session. Automated matching of reference and reader HMs was performed. Non-inferiority was assessed using JAFROC analysis and reader agreement rules. JAFROC analysis was performed on a per-lesion basis for HM using a narrow non-inferiority limit of -0.05. For reader agreement, a successful reading for lower dose configurations was defined as ≥ 2 readers circling all HM identified by ≥ 2 readers at routine dose (or no non-lesion localizations in negative cases), with a priori rules requiring ≥ 71 successful readings for each configuration.

RESULTS

There were 123 HM with a median size of 1.4 ± 1.0cm with median CDTIvol = 11 mGy (mean CDTIvol of 12.4 ± 6.0 mGy; mean SSDE of 14.6 ± 4.7 mGy). Using JAFROC FOM, configurations using 80 and 100 QRM and either FBP or IR failed to meet non-inferiority criteria, with estimated differences from routine dose being - 0.04 (95% CI: -0.06 to -0.01). 5 of the 8 configurations had successful interpretations in 71 – 77 of 83 patients, corresponding to dose levels of ≥120 QRM (i.e., ≥ 8.8 mGy SSDE). Intraclass correlation coefficient for reader FOM was 0.44. At each dose level, IR improved image quality ($p<0.05$) but not performance.

CONCLUSION

Lower dose CT images reconstructed at dose levels corresponding to 120 QRM (SSDE 8.8 mGy) and higher performed similar to 200 QRM FBP in this large pilot study for detection of hepatic metastases.

CLINICAL RELEVANCE/APPLICATION

Pilot data obtained over a range of doses suggests that substantial dose reduction is possible without compromising observer

Pilot data obtained over a range of doses suggests that substantial dose reduction is possible without compromising observer performance. IR did not appear to improve performance.

Honored Educators

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Naoki Takahashi, MD - 2012 Honored Educator

SSA08-09 Personalized Liver CT Examination Protocol Based on BMI: Combination of Optimized kVp and Iodine Injection Protocol

Sunday, Nov. 27 12:05PM - 12:15PM Room: E450A

Participants
Jian Jiang, MD, Beijing, China (*Presenter*) Research Grant, General Electric Company
Xiaoying Wang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Ke Wang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate whether the personalized liver CT examination protocol based on body mass index (BMI) could obtain the diagnostic image quality.

METHOD AND MATERIALS

This prospective study was approved by institutional review board. From 2014 May to 2016 March, patients with known or suspected hepatocellular carcinoma were recruited consecutively, who underwent MDCT examination (Siemens, Somatom Definition Flash). Patients were scanned with different tube voltage (70-120 kVp) in combination with different amount of iodine contrast medium (352 mgI/kg to 550 mgI/kg) based on their body mass index (BMI): BMI ≤18.0, 70-kVp, 352mgI/kg; BMI 18.1-24.0, 80-kVp, 352mgI/kg; BMI 24.1-28.0, 100-kVp, 440 mgI/kg; BMI ≥28.1, 120-kVp, 550 mgI/kg.Images in all phases for 70-kVp and 80-kVp protocol were reconstructed with strength SAFIRE 3 and those for 100-kVp and 120-kVp protocol were reconstructed by using strength SAFIRE 2. The image noise, attenuation, contrast-to-noise ratio (CNR), and figure of merit (FOM) were measured and calculated. The estimated effective dose (ED) and Size-specific dose estimate (SSDE) of the 4 protocols were also calculated and compared. Radiologists independently graded images quality, as well as the timing of late arterial phase.

RESULTS

Totally 165 patients were recruited. Dynamic CT demonstrated that a reduction from 120-kVp protocol to 80- and 70-kVp protocols led to a reduction in the SSDE of 36% and 56%. 92% of the arterial phase with the 4 protocols was classified as the accurate late arterial phase. There was no significant difference in the mean image noise, CNRs and FOMs of the portal vein and liver between the 100- and 120-kVp protocols. Mean image noise and FOMs was significantly higher with the 70-kVp protocol than with the others. For the liver, significantly lower CNRs were found with the 80-kVp protocol than with the others. Moreover, in the comparison of the 80-, 100- and 120-kVp protocols, they had no statistically significant difference, for image quality score ($P > 0.05$).

CONCLUSION

High quality liver CT images could be obtained by using personalized liver CT protocol based on BMI, with combination of optimized kVp and iodine injection method.

CLINICAL RELEVANCE/APPLICATION

This method will be of benefit to the patients with lower BMI, who will receive lower contrast dosage, significantly less radiation dose compared with the conventional uniform method.

SSA09

Science Session with Keynote: Gastrointestinal (Liver Fibrosis)

Sunday, Nov. 27 10:45AM - 12:15PM Room: E450B

GI BQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Claude B. Sirlin, MD, San Diego, CA (*Moderator*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;
Sudhakar K. Venkatesh, MD, FRCR, Rochester, MN (*Moderator*) Nothing to Disclose
Anthony E. Samir, MD, Boston, MA (*Moderator*) Consultant, Pfizer Inc Consultant, General Electric Company Consultant, PAREXEL International Corporation Research Grant, Koninklijke Philips NV Research Grant, Siemens AG Research Grant, Toshiba Corporation Research Grant, General Electric Company Research Grant, Samsung Electronics Co, Ltd Research Grant, Analogic Corporation Research support, SuperSonic Imagine Research support, Hitachi, Ltd

Sub-Events

SSA09-01 2D Ultrasound Shearwave for Staging Liver Fibrosis: Preliminary Results of a Prospective Multicentre European Study

Sunday, Nov. 27 10:45AM - 10:55AM Room: E450B

Participants
Adrian K. Lim, MD, FRCR, London, United Kingdom (*Presenter*) Luminary, Toshiba Corporation
Maxime Ronot, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Giovanna Ferraioli, MD, Pavia, Italy (*Abstract Co-Author*) Speaker, Koninklijke Philips NV; Speaker, Hitachi Ltd; Speaker, Toshiba Corporation
Hans Peter Mueller, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Mireen Friedrich-Rust, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
David O. Cosgrove, MBBCh, FRCR, London, United Kingdom (*Abstract Co-Author*) Research Consultant, SuperSonic Imagine Research Consultant, Bracco Group Speakers Bureau, Toshiba Corporation
Carlo Filice, MD, Pavia, Italy (*Abstract Co-Author*) Speaker, Koninklijke Philips NV; Speaker, Hitachi, Ltd ; Research Grant, Bracco Group; Research Grant, Hitachi, Ltd; Research Grant, Toshiba Corporation; Research Grant, Esaote SpA
Valerie Vilgrain, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Ultrasound Shearwave (SW) speed measurements using Transient Elastography (TE) is an accepted non-invasive test of liver stiffness and indirectly the presence of significant liver fibrosis. Newer SW technologies have since been developed but have yet to be validated against this standard of care test.To assess the reliability and accuracy of 2D Ultrasound SW technology at grading the severity of Liver Fibrosis using TE as the gold standard.

METHOD AND MATERIALS

Centers from France, Germany, Italy and United Kingdom were involved. Patients were recruited prospectively with a variety of chronic liver diseases to have 2D Ultrasound Shearwave (ToSWE) (Toshiba Medical Systems) and TE (Echosens) performed on the same day.10 valid measurements were obtained from fasted patients (>8 hours) using both techniques and the median result in kPa was used for analysis. Based on a previous meta-analysis (Tsochatzis, et al. J Hepatol 2011) for staging liver fibrosis (F), TE cut-offs of 7.0, 9.5 and 12.0 kPa, were used to denote liver fibrosis stages of significant fibrosis (F≥2), advanced fibrosis (F≥3), and cirrhosis (F = 4) respectively. A TE value of < 7.0 kPa was used to denote no significant fibrosis (F0/F1). The measurements obtained from ToSWE were correlated with the TE-derived stages of fibrosis.

RESULTS

367 patients have been recruited to date, (215 M:152 F) with a mean age of 53 years (range: 21-88 years). The main etiologies of liver disease were HCV-related (64%) and HBV-related (23%). The rest comprised a mixture of ALD, AIH and NAFLD.350 datasets were complete showing excellent correlation of liver stiffness values between the ToSWE and TE techniques at all centres (R2 correlation range: 0.78-0.92). The mean elasticity values using ToSWE for each liver fibrosis stage as described above was: F0/F1 (n= 179: 6.0 ± 1.4 kPa), F2 (n = 54: 7.0 ± 3.0 kPa), F3 (n = 42: 9.2 ± 2.2 kPa) and F4 (n = 75: 16.7 ± 11.8 kPa). This was highly statistically significant between all groups (Mann Whitney U test: $p<0.001$ for all pairs).

CONCLUSION

The liver stiffness measurements using ToSWE correlates well with TE and can be used to distinguish patients with significant liver fibrosis non-invasively in the appropriate clinical setting.

CLINICAL RELEVANCE/APPLICATION

2D Shearwave elastography is a useful non-invasive tool for grading the severity of chronic liver disease and can be linked with current established treatment algorithms for TE.

SSA09-02 Comparison of Elastography Point Quantification with Transient Elastography in Patients with Chronic Viral Hepatitis and Nonalcoholic Fatty Liver Disease: A Prospective Study

Sunday, Nov. 27 10:55AM - 11:05AM Room: E450B

Awards

Student Travel Stipend Award

Participants
Savinay Kapur, MBBS,MD, Chandigarh, India (*Presenter*) Nothing to Disclose
Naveen Kalra, MBBS, MD, Chandigarh, India (*Abstract Co-Author*) Nothing to Disclose
Ajay Duseja, Chandigarh, India (*Abstract Co-Author*) Nothing to Disclose
Ashim Das, MD, Chandigarh, India (*Abstract Co-Author*) Nothing to Disclose
Yogesh Chawla, Chandigarh, India (*Abstract Co-Author*) Nothing to Disclose
Niranjan Khandelwal, MD, Chandigarh, India (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To measure liver stiffness using a novel ultrasound-based point shear-wave elastography technique – Elastography Point Quantification (ElastPQ) and to compare its diagnostic accuracy with transient elastography (TE) and liver histology in patients with chronic viral hepatitis (CVH) and nonalcoholic fatty liver disease (NAFLD).

METHOD AND MATERIALS

32 patients of chronic liver disease (CVH=15; NAFLD=17) were evaluated by ElastPQ (iU22 xMATRIX System, Philips) and TE (FibroScan®, Echosens) within 7 days of liver biopsy by two independent observers who were blinded to each other's observations and to the results of the biopsy. Within the CVH group (n=15), subgroup analysis was done in patients with end stage renal disease (ESRD) (n=8) and in patients without ESRD (n=7). Within the NAFLD group, subgroup analysis was done in patients with HBsAg carrier state (n=6) and without HBsAg carrier state (n=11). AUROC curves were calculated for ElastPQ and TE. The optimal cut-off values were determined using Youden's index. DeLong test was used to compare AUROC curves.

RESULTS

Liver stiffness measurement by ElastPQ correlated significantly with the stage of fibrosis (ρ= 0.826; $p<0.0001$). In the combined analysis of all patients, AUROCs of ElastPQ and TE for diagnosing any fibrosis (F>=1), significant fibrosis (F>=2) and severe fibrosis (F>=3) were 0.907, 0.959, 0.926 and 0.870, 0.770, 0.881, respectively, at optimal cut-off values of 5.37, 5.96, 8.42 kPa and 6.0, 8.8, 11.2 kPa, respectively. ElastPQ was superior to TE in diagnosing significant fibrosis in the combined analysis (p=0.0149) and in the CVH group (p=0.0391). The diagnostic accuracy of both ElastPQ and TE was excellent in NAFLD patients irrespective of their HBsAg carrier state. However the accuracy of both these techniques was poor in the CVH with ESRD subgroup. There was significant positive correlation between the two techniques (ρ=0.704; $p<0.0001$) with excellent intra-observer reproducibility of liver stiffness measurement by ElastPQ (Intraclass correlation coefficient=0.95).

CONCLUSION

ElastPQ is a good non-invasive diagnostic tool for evaluating liver fibrosis in patients of CVH and NAFLD comparing well with TE and liver biopsy. Its role in patients of CVH with ESRD needs further evaluation.

CLINICAL RELEVANCE/APPLICATION

ElastPQ can be effectively used for non-invasive assessment of liver fibrosis during routine sonographic evaluation of liver without the need of any additional equipment.

SSA09-03 Accuracy of Liver Surface Nodularity Quantification at MDCT as a Noninvasive Biomarker for Staging Liver Fibrosis

Sunday, Nov. 27 11:05AM - 11:15AM Room: E450B

Awards
Student Travel Stipend Award

Participants
Kyle Malecki, Ma, WI (*Presenter*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV

PURPOSE

To investigate objective semi-automated measurement of liver surface nodularity (LSN) at MDCT for prediction of underlying liver fibrosis (stages F0-F4).

METHOD AND MATERIALS

We evaluated 367 total patients (mean age, 51.1 years; 191M/176F), including a healthy (F0) control group (n=119) and fibrosis stages F1 (n=47), F2 (n=38), F3 (n=67), and F4/cirrhosis (n=97). Contrast-enhanced abdominal MDCT scans (120 kVp, variable mA, PV phase) were assessed utilizing an independently validated semi-automated surface nodularity tool. A series of ≥10 consecutive ROI measurements along the anterior liver, totaling ≥80 cm in length, were made using the left lateral segment as default. All intermediate stages of fibrosis (F1-F3) were based on liver biopsy within one year of MDCT.

RESULTS

MDCT-based liver surface nodularity scores increased with stage of fibrosis: 2.01±0.28 for F0, 2.34±0.39 for F1, 2.37±0.39 for F2, 2.88±0.68 for F3, and 4.11±0.95 for F4. For discriminating significant fibrosis (≥F2), advanced fibrosis (≥F3), and cirrhosis (≥F4), ROC AUC were 0.902, 0.932, and 0.959, respectively. Sensitivity and specificity for significant fibrosis (≥F2; LSN threshold=2.38) was 80.2% and 80.2%; for advanced fibrosis (≥F3; LSN threshold=2.53) was 89.0% and 84.2%; and cirrhosis (≥F4; LSN threshold=2.81) was 97.9% and 84.8%.

CONCLUSION

Objective quantification of liver surface nodularity at MDCT allows for accurate discrimination between stages of hepatic fibrosis, especially at more advanced levels. Although the results are comparable to elastography, this simple semi-automated biomarker can be obtained retrospectively without additional equipment or patient time.

CLINICAL RELEVANCE/APPLICATION

Quantification of liver surface nodularity at MDCT can serve as a useful noninvasive biomarker for staging liver fibrosis and, unlike elastography or biopsy, can be obtained retrospectively.

Honored Educators

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Perry J. Pickhardt, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator

SSA09-04 Staging Liver Fibrosis Induced by HBV Infection using Contrast-Enhanced Dual-Energy CT

Sunday, Nov. 27 11:15AM - 11:25AM Room: E450B

Awards
Student Travel Stipend Award

Participants
Ke Wang, MD, Beijing, China (*Presenter*) Nothing to Disclose
Hong Zhao, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
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Ze Peng, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xuedong Yang, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xiaojie Lin, Shanghai, China (*Abstract Co-Author*) Employee, General Electric Company
Guiqiang Wang, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xiaoying Wang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the utility of the contrast-enhanced Dual Energy Computed Tomography (DECT) for staging liver fibrosis induced by HBV infection.

METHOD AND MATERIALS

A total of 57 patients (45m/12f; mean age, 42; age range, 19–63) diagnosed as chronic hepatitis B and had undergone both liver biopsy (fibrosis stage S1-S4) and contrast-enhanced DECT were enrolled. The interval between biopsy and CT was one week to two months. The DECT consisted of a non-enhanced scan followed by arterial, portal venous and delayed phase scans at 25, 65 and 180 seconds after administration of contrast media (1.5 ml/kg, 320 mg/ml, 3.5 ml/s). The iodine concentration of aorta (αaorta) and liver parenchyma (αliver) was measured and the normalized iodine concentration (NIC, αliver/αaorta) was used to measure the severity of liver fibrosis. Two different methods were used to draw ROI in the liver parenchyma (①putting one single ROI under the 8th intercostal space- the place of liver biopsy; ②putting 4 ROIs in different segments of liver). Three different techniques were used to calculate the NIC on 4 different phases: Hounsfied Unit (HU), Iodine Material Density (MD) Map, and Iodine Multi-Material Decomposition (MMD) Map. NIC correlation with the fibrosis stage was determined via ANOVA and Spearman's rank correlation. Significance between fibrosis subgroups was determined via Tukey test. Bland-Altman analysis was used to determine the agreement between the two ROI methods.

RESULTS

Using method 1, only the NIC on delayed by using iodine MD and MMD map showed statistical significance between different liver fibrosis stages ($p<0.05$). The NIC measured on delayed phase by using iodine MD and MMD map showed reasonable correlation with fibrosis stage (Spearman r value was 0.6126 for MD and 0.7197 for MMD) (Figure 1, 2). The results of Tukey's test showed that the NIC values calculated from both the MD and MMD map can differentiate mild from severe fibrosis groups (Table 1). Method 2 showed similar result. There was good agreement between the two methods of ROI placement (Figure 3).

CONCLUSION

DECT provides a quantitative method to stage liver fibrosis, and can serve to supplement and augment the clinical management of patients with chronic HBV.

CLINICAL RELEVANCE/APPLICATION

DECT provides a noninvasive quantitative method to stage liver fibrosis, and can serve to supplement and augment the clinical management of patients with chronic HBV.

SSA09-05 Efficacy of T1 Mapping on Gd-EOB-DTPA-Enhanced MRI for Staging Liver Fibrosis in Chronic Hepatitis B Patients with Normal Alanine Transaminase <= 40 IU/L

Sunday, Nov. 27 11:25AM - 11:35AM Room: E450B

Participants
Li Yang I, MD, Shanghai, China (*Presenter*) Nothing to Disclose
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PURPOSE

The purpose of this study was to retrospectively assess the diagnostic efficacy of T1 mapping on Gd-EOB-DTPA-enhanced MRI for liver fibrosis staging in chronic hepatitis B (CHB) patients with normal ALT level.

METHOD AND MATERIALS

This retrospective study included 100 CHB patients (mean age: 54.8 years; 82 men and 18 women) who underwent Gd-EOB-DTPA-enhanced MRI including T1 mapping. Liver function tests were performed and alanine transaminase (ALT) levels were ≤ 40 IU/L. T1 mapping was performed before and 20-min hepatobiliary phase (HBP) after injection of Gd-EOB-DTPA (Primovist, Bayer-Schering). Liver fibrosis stages were histologically determined according to Scheuer scoring system: S0 (n=18), S1 (n=13), S2 (n=15), S3 (n=12) and S4 (n=42). Pre-contrast and HBP T1 relaxation times were measured and the reduction rate (Δ%) of the T1 relaxation times was calculated. Spearman's rank correlation coefficients between T1 relaxation times and histological hepatic fibrosis stages were calculated and receivers operating characteristic (ROC) curves were built to assess the diagnostic performance of T1 mapping in staging liver fibrosis.

RESULTS

The HBP, Δ% of T1 relaxation times showed significant correlations with liver fibrosis stage (rho: 0.70, -0.61, respectively, both $P<0.05$). The area under ROC curves (AUROC) of pre-contrast, HBP, Δ% T1 relaxation time for the diagnosis of no (S=0), mild (S≤1), significant (S≥2), advanced fibrosis(S≥3) and cirrhosis (S=4) are shown in the Figs 1. The AUROCs of HBP and Δ% T1 relaxation time for identification of various degree of fibrosis were significantly greater than pre-contrast T1 relaxation times ($P< 0.05$).The sensitivities, specificities of HBP T1 relaxation times for identification of significant fibrosis were 81.48% and 84.78% at the cutoff of 212.4, and the sensitivities, specificities of Δ% of T1 relaxation times for prediction of significant fibrosis were 79.63% and 69.57% at the cutoff of 69.06%.

CONCLUSION

The Gd-EOB-DTPA-enhanced T1 mapping is accurate for staging liver fibrosis in CHB patients with normal ALT level.

CLINICAL RELEVANCE/APPLICATION

About one fifth of CHB patients with normal ALT concentrations had stages 2-4 fibrosis, which may lead to low positive predictive value of commonly used serum fibrosis markers, such as FIB-4 index and APRI.

SSA09-06 Failure of Liver MR Elastography: What Are the Predictive Factors?

Sunday, Nov. 27 11:35AM - 11:45AM Room: E450B

Participants
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James S. Babb, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Richard L. Ehman, MD, Rochester, MN (*Abstract Co-Author*) CEO, Resoundant, Inc; Stockholder, Resoundant, Inc;
Bachir Taouli, MD, New York, NY (*Abstract Co-Author*) Consultant, MEDIAN Technologies ; Grant, Guerbet SA

PURPOSE

To determine technical failure rate of liver magnetic resonance elastography (MRE) and to assess the determinants of technical failure of liver MRE in a large series of patients.

METHOD AND MATERIALS

Seven hundred and eighty-one MRE examinations in 691 consecutive patients (mean age 58 y, 63% male) performed in a single center between 6/2013 and 8/2014 were retrospectively evaluated. MRE was acquired either on a 3.0T (n=443) or 1.5T system (n=338), using a Gradient-Recalled-Echo (GRE) MRE sequence (4 axial slices). Image analysis was performed by two observers. Technical failure was defined as no pixel with confidence index higher than 95% and/or no apparent shear waves imaged. The following parameters were noted: presence of cirrhosis, degree of ascites, steatosis, iron deposition and subcutaneous fat thickness. Logistic regression analysis was performed to assess the link between MRE technical failure and potential predictive factors of failure.

RESULTS

Failure occurred in 80 cases (10%). The technical failure rate for MRE exams at 1.5T was 4% (12/338), while it was higher, 15% (63/443), at 3.0T ($P<0.0001$). On univariate analysis, BMI, liver iron deposition, massive ascites, use of 3.0T, presence of cirrhosis, alcoholic liver disease were all significantly associated with MRE failure ($P<0.004$); while on multivariable analysis, only BMI, liver iron deposition, massive ascites and use of 3.0T were significantly associated with MRE failure ($P<0.004$). Presence of steatosis and subcutaneous fat had no significant impact on failure rate ($P>0.05$).

CONCLUSION

MR elastography with a GRE-based sequence at 1.5T had a low technical failure rate. Use of a GRE-based MRE sequence at 3.0T resulted in a substantially higher technical failure rate. Massive ascites and iron deposition are also independent factors associated with liver MRE failure.

CLINICAL RELEVANCE/APPLICATION

Technical failure rate of MR elastography with a GRE-based sequence is higher at 3.0T than at 1.5T; which provides motivation for the use of alternative sequences at 3.0T.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Richard L. Ehman, MD - 2016 Honored Educator

SSA09-07 Reliability of ARFI Shear Velocity Cut-Off for Diagnosis of Cirrhosis in Chronic Hepatitis C: A 'Real World' Two Centre Simultaneous Biopsy-Controlled Study

Sunday, Nov. 27 11:45AM - 11:55AM Room: E450B

Participants
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Paul Tadrous, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Michael Heneghan, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Philip J. Shorvon, FRCR, FRCPC, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Paul S. Sidhu, MRCP, FRCR, London, United Kingdom (*Abstract Co-Author*) Speaker, Koninklijke Philips NV; Speaker, Bracco Group; Speaker, Hitachi, Ltd; Speaker, Siemens AG
David I. Sherman, London, United Kingdom (*Presenter*) Nothing to Disclose

PURPOSE

Non-invasive liver fibrosis assessment with elastography recently received FDA clearance and is increasingly used as the sole diagnostic method to assess suitability for new anti-viral therapies in patients with HCV infection. As shear velocity (SV) cut-offs for Metavir F4 fibrosis with ARFI technique (virtual touch quantification™) are based upon historical studies, there is a need for disease specific, population adjusted data. We report results from a biopsy controlled study from two centres, designed to investigate optimal ARFI cut-offs for determining cirrhosis in our population.

METHOD AND MATERIALS

Our database of 96 patients with HCV infection obtained from two centres was interrogated. ARFI SV estimation was performed with 10 right lobe measurements. Fibrosis stage was confirmed in 84 by right lobe liver biopsy within 2 hours of ARFI, and cirrhosis was confirmed by B-mode US imaging criteria in the remaining 12. B-mode and histopathological data was collated retrospectively. Diagnostic performance of ARFI was determined by ROC analysis, using: a) reference SV cut-off values for Metavir stage, and b) optimal SV thresholds for cirrhosis derived from our local data, including subgroup analysis.

RESULTS

Three subgroups were analysed: 1) all 96 cases, including 20 patients with co-pathology (HBV, NAFLD, or ALD); 2) 76 cases with HCV only; 3) 84 cases who had simultaneous biopsy. Cirrhosis was present in 26, 20 and 14, respectively. Predictive accuracy for Metavir F4 using the reference threshold of 1.75 m/sec was 90%, 92% and 88% in groups 1, 2 and 3, respectively. Using new thresholds and ARFI mean SVs required a higher cutoff of 1.99 in group 1 compared with 1.64 in groups 2 and 3 to achieve accuracies of 87% – 93%, whereas more consistent performance across all groups was achieved with median SVs at a cutoff of 1.89, achieving accuracies of 93%, 96% and 92%, respectively.

CONCLUSION

These “real world” data confirm high predictive accuracy of ARFI for Metavir F4 cirrhosis in our local HCV cohort. Optimal performance was seen for median SV cutoff of 1.89 m/sec. However, adjustment of diagnostic thresholds may be necessary when making treatment decisions for less selected populations and in patients with co-existent pathology.

CLINICAL RELEVANCE/APPLICATION

ARFI has high predictive accuracy for Metavir F4 cirrhosis in real world HCV patients. However, population specific diagnostic thresholds are recommended to optimise accuracy.

SSA09-08 Liver Inflammation and Fibrosis (LIF) Scores in a Large Population Study: Normal values by Body Mass Index and Liver Fat

Sunday, Nov. 27 11:55AM - 12:05PM Room: E450B

Participants
Catherine Kelly, MSc,DPhil, Oxford, United Kingdom (*Abstract Co-Author*) Employees, Perspectum Diagnostics
Matt Kelly, PhD, Oxford, United Kingdom (*Abstract Co-Author*) Employee, Perspectum Diagnostics
Rajarshi Banerjee, MD,DPhil, Oxford, United Kingdom (*Presenter*) CEO, Perspectum Diagnostics
Stella Kin, MSc, Oxford, United Kingdom (*Abstract Co-Author*) Employee, Perspectum Diagnostics
Miranda Phillips, BSC, Oxford, United Kingdom (*Abstract Co-Author*) Employee, Perspectum Diagnostics
Amy Herlihy, PhD, Oxford, United Kingdom (*Abstract Co-Author*) Employee, Perspectum Diagnostics

PURPOSE

Multiparametric MRI is increasingly used in the non-invasive assessment of liver physiology, with recent application in the assessment of fatty liver disease (FLD). FLD is characterised by the presence of elevated liver fat which can develop into steatohepatitis and fibrosis. Normal values for hepatic fat (specifically proton density fat fraction - PDFF) are widely established. The Liver Inflammation and Fibrosis (LIF) score is a novel metric for assessing liver inflammation and fibrosis, based on T1 mapping technology corrected for liver iron content. It has been shown to predict clinical outcomes. The purpose of this study was to describe the normal values of LIF using data from the world's largest prospective liver imaging study.

METHOD AND MATERIALS

Three thousand and seventy-one participants aged from 40-59 underwent a multiparametric MRI scan as part of the UK Biobank imaging study. All data were collected on a 1.5T Siemens Aera. The proton density fat fraction (PDFF) and LIF score were calculated from the MRI data.Normality in terms of liver health was defined as a BMI < 25 (BMI is a risk factor for non-alcoholic fatty liver disease) and PDFF<5% (the clinical threshold for steatosis).

RESULTS

Out of the 3071 initial subjects, 1687 (55%) of the population were defined as obese (BMI > 25) and 618 (20%) had a PDFF measurement of greater than 5%, suggestive of fatty liver disease. This is in agreement with previous reported estimates. 1289 (42%) of the subjects were defined as normal (where PDFF<5% and a BMI < 25). The distribution of LIF values in three populations (not obese, no steatosis and no steatosis AND not obese) is shown in the Figure. For the normal population, the LIF score ranged from 0.3334 and 2.632 with a median value of 0.82 (IQR 0.7106-0.9529) and a mean value of 0.8802 (std dev 0.28).

CONCLUSION

The normal range of LIF values in a population with no indicators for fatty liver disease is 0.7106-0.9529 [IQR] with an upper limit of normal of 1.45 (mean + 2 sd).

CLINICAL RELEVANCE/APPLICATION

The normogram presented in this study can serve as a benchmark for other studies using the LIF score to assess the normality of their population. Previous studies have shown that a cutoff value of 2 predicts clinical outcomes (Pavlides et al. 2016) with a negative predictive value of 100%. This suggests that maintaining a healthy BMI and liver fat percentage reduces the likelihood of suffering from liver-related clinical outcomes.

SSA09-09 Gastrointestinal Keynote Speaker: Image-based Liver Fibrosis Quantification

Sunday, Nov. 27 12:05PM - 12:15PM Room: E450B

Participants
Claude B. Sirlin, MD, San Diego, CA (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;

SSA25

Vascular Interventional (Percutaneous Ablation of the Liver)

Sunday, Nov. 27 10:45AM - 12:15PM Room: E352

GI IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
James T. Bui, MD, Chicago, IL (*Moderator*) Nothing to Disclose
Nael E. Saad, MBBCh, Saint Louis, MO (*Moderator*) Research Consultant, Veran Medical Technologies, Inc; Proctor, Sirtex Medical Ltd

Sub-Events

SSA25-01 Effectiveness of Contrast-Enhanced Ultrasonography as a Planning Modality for Radiofrequency Ablation of Isoechoic Hepatocellular Carcinoma

Sunday, Nov. 27 10:45AM - 10:55AM Room: E352

Participants
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Jong Mee Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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Cheol Min Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To demonstrate the added value of contrast-enhanced ultrasonography (CEUS) as a radiofrequency ablation (RFA) planning modality for hepatocellular carcinoma (HCC) compared with conventional gray-scale ultrasonography (GSUS)

METHOD AND MATERIALS

This retrospective study was approved by our institutional review board and the requirement for informed consent was waived. Total sixty-four HCCs from 57 patients (men:women=41:16; mean age, 62.6) who have undergone GSUS & CEUS for RFA planning were retrospectively reviewed. Sonographic contrast agent was used for CEUS after conventional GSUS. Two radiologists reviewed the recorded images of GSUS and CEUS in consensus. On GSUS, the size, location, & echogenicity of each HCC were reviewed. Also the definition of HCC on GSUS was categorized to clearly-visible, equivocal, and invisible.

RESULTS

The mean size of HCCs was 1.8 cm (range, 0.9-4.8 cm). Among 64 HCCs, hyperechoic nodules were 11; isoechoic, 24; hypoechoic, 22; and mixed echogenicity, 7 on GSUS. Among the 24 isoechoic nodules, three nodules were clearly visible due to hypoechoic rim on GSUS, two were equivocal, and 19 were invisible. One hypoechoic nodule and two mixed nodule were equivocal on GSUS. Total 40 nodules were clearly visible, 5 were equivocal, and 19 were invisible. By performing CEUS, 11 out of 19 invisible, isoechoic nodules and 5 out of 5 equivocal nodules were identified. Forty out of 64 nodules were identified on GSUS, however 56 out of 64 nodules were identified by performing GSUS and CEUS (detection rate: 62.5% vs 87.5%, p-value < 0.001).

CONCLUSION

Total 48 HCCs were enrolled in RFA by using CEUS, compared to 40 HCCs on GSUS only (40% increase). CEUS is a useful RFA planning modality when a target HCC is poorly defined or invisible on GSUS.

CLINICAL RELEVANCE/APPLICATION

Small HCC invisible on GSUS can not be a candidate for US-guided RFA, however CEUS can help detect isoechoic HCC more clearly thus expands candidates for US-guided RFA.

SSA25-02 No Touch Multibipolar Radiofrequency Ablation Improves Sustained Local Response of HCC<=5cm Compared to Monopolar Techniques: A Multicentric Study

Sunday, Nov. 27 10:55AM - 11:05AM Room: E352

Participants
Arnaud Hocquelet, Pessac, France (*Presenter*) Nothing to Disclose
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Olivier Seror, Bondy, France (*Abstract Co-Author*) Consultant, Angiodynamics, Inc Consultant, Olympus Corporation Consultant, Bayer AG

PURPOSE

The aim of this study was to compare global radiofrequency ablation failure between monopolar RFA (MonoRFA) versus NoTouch MultiBipolar RFA (NTmbpRFA) for HCC≤5cm in cirrhotic patients.

METHOD AND MATERIALS

The study involved 362 cirrhotic patients (181 per groups) observed in 4 French centers. Global RFA failure (primary RFA failure or local tumor progression) was analysed using the Kaplan Meier method after coarsened exact matching. Cox regression models were used to identify factors associated with global RF failure and overall survival.

RESULTS

Patients were well-matched according tumor size (≤30/>30mm); Tumor number (one/several); Tumor location (subcapsular and near large vessel); Serum AFP (<10; 10-100; >100ng/ml); Child-Pugh score (A/B) and platelet count (30mm and HCC near large vessel were independent factors associated with global RFA failure. The 5-years overall survival were 37.2% following MonoRFA versus 46.4% following NTmbpRFA P=0.378.

CONCLUSION

This large multicentric matched study showed that NTmbpRF provided better primary RF success and sustained local tumor response without increasing severe complications rates, for HCC≤5cm. Consequently, NTmbpRF should be proposed as the standard RF Ablative technique for treatment of HCC≤5cm.

CLINICAL RELEVANCE/APPLICATION

NoTouch MultiBipolar RFA should be proposed as the standard RF Ablative technique for treatment of HCC≤5cm.

SSA25-03 Multimodality Imaging to Assess Immediate Response following Irreversible Electroporation in Patients with Malignant Hepatic Tumors

Sunday, Nov. 27 11:05AM - 11:15AM Room: E352

Participants
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Kazuhiro Saito, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Fuminori Moriyasu, MD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Takao Itoi, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the diagnostic accuracy in identifying residual tumor of contrast-enhanced ultrasound (CEUS), contrast-enhanced multiphase CT (CECT), and gadoxetic acid-enhanced MRI (EOB-MRI) in the subacute follow-up of patients with malignant hepatic tumors treated by irreversible electroporation (IRE).

METHOD AND MATERIALS

From February 2014 to January 2016, we enrolled 16 patients with 21 hepatic lesions (primary/secondary hepatic tumors, 16/5; tumor size range, 9-36 mm; mean tumor size, 19.8 mm) treated by IRE and examined by CEUS, CECT, and EOB-MRI at 1, 1, and 7 days after IRE, respectively. Follow-up examinations by EOB-MRI or CECT and CEUS were performed at 3-month intervals. Two experienced radiologists independently reviewed the images and assessed the probability of residual tumor using a five-point scale with receiver operating characteristic (ROC) curve analysis. The sensitivity and specificity were also evaluated. Verifiable local recurrence was also assessed using follow-up imaging as the reference standard.

RESULTS

The mean area under the ROC curve was significantly higher for CEUS (0.980) than for CECT (0.742: P=0.001) and EOB-MRI (0.806: P=0.002), as were the sensitivity and specificity (mean 85.7% and 85.7% for CEUS, respectively, vs 64.3% and 46.4% for CECT and 78.6% and 64.3% for EOB-MRI). The interobserver agreement rate for CEUS (0.781) was higher than for CECT (0.734) and EOB-MRI (0.577).

CONCLUSION

CEUS was found to be superior to CECT and EOB-MRI for the diagnosis of residual tumor in the subacute phase following IRE.

CLINICAL RELEVANCE/APPLICATION

Checking the ablation results in an early phase of treatment using CEUS should help to increase the likelihood of complete ablation.

SSA25-04 High-Powered Microwaves (MWS) Ablation of Intermediate Hepatocellular Carcinoma (HCC) in Cirrhosis: A Multicenter, Prospective Study

Sunday, Nov. 27 11:15AM - 11:25AM Room: E352

Participants
Maria Gabriella Merola, MD, Naples, Italy (*Abstract Co-Author*) Nothing to Disclose
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Pietro Gatti, MD, Ostuni, Italy (*Presenter*) Nothing to Disclose
Carmine Coppola, MD, NAPLES, Italy (*Abstract Co-Author*) Nothing to Disclose
Bruno Santoro, Caserta, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesca Merola, Salerno, Italy (*Abstract Co-Author*) Nothing to Disclose
Valentina Giorgio, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

AASLD and EASLD guidelines recommend TACE in treatment of intermediate HCC in cirrhosis. The aim of our study was to report the results in treatment of intermediate HCC in cirrhotic patients using new high-powered microwaves for percutaneous ablation under US guidance.

METHOD AND MATERIALS

From 2010 to 2014, 277 cirrhotics with intermediate HCC were asked to undergo MWS percutaneous ablation instead of TACE. 215

patients (149 Child A, 66 Child B) accepted MWS ablation forming the study group. 109 patients had a single nodule (Ø 5.3-8.2 cm, mean 6.4 cm) [group A]; 70 patients had 2 nodules (Ø 3-6 cm, with at least one nodule >5cm) [group B] and 36 patients had 3-5 nodules (Ø 1.5–6.7 cm with at least one nodule >5cm) [group C]. No patient had ascites or portal venous thrombosis or extrahepatic spread of HCC. In patients with one nodule, 1-2 sessions were scheduled; for group B from 2 to 3 sessions were scheduled and for group C patients up to 4 session were scheduled. Percutaneous ablation was performed using high powered MWS device (100-180 W) at 2450MHZ, under US guidance. 10 possible factors affecting survival were analyzed.

RESULTS

All patients but one were treated according to the scheduled protocol. The complete ablation rates were 83% for the 1°ablation and 100% for the 2°ablation for 3-5 cm lesions, while 64% and 86% respectively for 5-8.2 cm lesions.1 patient (Child A; 80years; HCC Ø6cm;1 session) died for haemoperitoneum. No other major bleeding, liver rupture, or liver abscesses occurred. The 1,3 and 5-year survival rates were 89,81,60,40 and 21% respectively. At univariate analysis, age, number of nodules, Ø of HCC, number of insertions and pre-ablation bilirubin were independent factors for survival. At multivariate analysis bilirubin and number of insertions were independent factors in predicting survival.

CONCLUSION

High powered percutaneous US guided MWS ablation of intermediate HCC in cirrhotic patients is safe and effective in this stage of cancer disease. Our data, although obtained in an non-randomized trial, indicate that percutaneous ablation using new high-powered MWS should have long term survival similar to TACE in treatment of intermediate HCC in cirrhosis. Pre-ablation bilirubin and number of antenna insertions seem independent predictors for long-term survival.

CLINICAL RELEVANCE/APPLICATION

High powered percutaneous MWS ablation of intermediate HCC in cirrhotic patients is safe and effective in this stage of cancer disease.

SSA25-05 Microwave versus Radiofrequency Ablation of Hepatocellular Carcinoma: A Randomized Trial

Sunday, Nov. 27 11:25AM - 11:35AM Room: E352

Participants
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Lena-Maria Klohmann, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
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Nour-Eldin A. Nour-Eldin, MD,PhD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To prospectively determine and compare therapy response and safety of microwave (MWA) and radiofrequency ablation (RFA) of hepatocellular carcinoma (HCC) in a randomized trial.

METHOD AND MATERIALS

In this prospective study 36 patients underwent CT-guided thermal ablation: 18 received RFA and 18 MWA (31 males, 5 females; mean 64 years; range 42 to 82; SD of 9.98). Using magnetic resonance imaging (MRI) the location of the HCC and changes in size, volume, necrotic area, diffusion and ADC-value in the malignant tissue were evaluated. First MRI control was performed before thermal ablation. The follow-up contained MRI controls 24 hours after ablation and then within 12 months in three monthly intervals.

RESULTS

36 HCC lesions with a mean diameter of 2.4cm (range 0.9-5cm; MWA 2.5cm, RFA 2.2cm) were treated with thermal ablation. The mean volume 24 hours after ablation was 47.3cm3: 62cm3 for MWA and 32.7cm3 for RFA. Complete ablation was recorded in 88.9% (32/36): 83.3% (15/18) in the MWA group and 94.4% (17/18) in the RFA group. The recurrence rate within one year for both groups was 11.1% (4/36): 16.7% (3/18) for MWA and 5.6% (1/18) for RFA. The rate for new malignant formations in another location than the ablated lesion is 22.2% (4/18) for both groups. The mortality rate for this trial is 0% and no major complications were noticed.

CONCLUSION

No significant differences in mortality or complication rates between RFA and MWA were documented. The study shows that the thermal treatment with MWA generates greater ablation volumes and the 1-year follow-up of the MWA group shows a slightly higher rate of local recurrences.

CLINICAL RELEVANCE/APPLICATION

MWA and RFA present similar results with greater ablation volumes and a slightly higher recurrence rate for MWA.

SSA25-06 Increased Risk of Needle Tract Seeding after Irreversible Electroporation (IRE) of Malignant Liver Tumors

Sunday, Nov. 27 11:35AM - 11:45AM Room: E352

Participants
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Alexandra Barabasch, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Heil, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

IRE has been proposed as a non-thermal ablation technique for the treatment of unresectable tumors because it offers specific

IRE has been proposed as a non-thermal ablation technique for the treatment of unresectable tumors because it offers specific advantages, notably absence of heat-sink effect or of thermal damage to adjacent vessels or bile ducts. A possible disadvantage of this method is that no ablation of the needle tract is possible. Our aim was to investigate the local efficacy and the rate of needle tract seeding after CT-guided IRE for liver metastases located adjacent to major portal and hepatic veins.

METHOD AND MATERIALS

29 patients with 43 liver malignancies, underwent percutaneous CT-guided IRE. All lesions were located immediately adjacent to major hepatic veins (20), portal vein branches (15), or both (8), and therefore not eligible for RFA or MWA. 2 - 5 IRE probes (median of 3) were placed strictly parallel under CT-guidance. All patients underwent hepatic ce-MRI according to a standardized protocol before treatment and at standardized intervals after IRE in order to systematically search for local recurrence and/or evidence of needle tract seeding.

RESULTS

Based on the immediate post-interventional CT and post-interventional MRI, complete ablation was achieved in 40/43 (93%) lesions, with a safety margin of at least 5-10 mm. All adjacent vessels remained perfused at mean follow-up time of 24 ± 7 months. In 13 of the 40 lesions (33%) where complete ablation had been achieved, local recurrence was observed between 2 and 18 months after treatment. Of these 13, only 2 cases (15%) were observed within or immediately adjacent to the ablation zone. In the remaining 11 cases (85%), metastatic growth was observed along the needle tract. Accordingly, needle tract seeding was observed in 11 of 43 lesions (26%). None of the two "true" local recurrences occurred at the side of the vessel.

CONCLUSION

None of the 40 lesions with complete ablation exhibited a local recurrence at the site of the vessel triggering the decision to use IRE rather than RFA or MWA. This suggests that IRE is indeed useful to avoid incomplete ablation of lesions due to heat sink effects. However, needle tract seeding was observed in as many as 26% of lesions treated. Therefore, improved IRE methods are urgently needed that address this issue.

CLINICAL RELEVANCE/APPLICATION

IRE is an effective method to treat liver tumors located in areas where thermal ablation is not an option.However, the high rate of needle tract seeding is a concern that deserves immediate attention.

SSA25-07 Ablation Treatment of Primary and Secondary Liver Tumors Under Contrast-Enhanced Ultrasound (CEUS) Guidance: A Multicenter Study

Sunday, Nov. 27 11:45AM - 11:55AM Room: E352

Participants
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Paola Roselli, Viterbo, Italy (*Abstract Co-Author*) Nothing to Disclose
Mariano Scaglione, MD, Castel Volturno, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Aim of this study was to quantify the use of CEUS as guidance technique for percutaneous ablation treatment of primary and secondary liver tumors in field practice of five centers with high-volume ablation activity

METHOD AND MATERIALS

The five participating centers retrospectively selected all patients in whom therapeutic needles for Percutaneous Ethanol Injection (PEI), Radiofrequency (RF), Microwave (MW) had been positioned into the target during CEUS with a Low Mechanical Index Ultrasound Contrast Agent. The rate of CEUS-guided ablation was calculated on the whole liver ablation activity of each center between 2005 and 2015. In addition, contrast media consumption, procedure indications, therapeutic effectiveness and complications were assessed.

RESULTS

CEUS-guided ablation was carried out 101 patients (70M/ 31F; mean age 71.5 yrs) with 94 Hepatocellular Carcinoma nodules (mean size 17.3 mm) and 13 metastases (mean size 17.3 mm) by using PEI in 50 cases (46.7%), RF in 41 cases (38.3%) and MW in 16 cases (15%).CEUS-guided ablation represented 6.2% (range 1.8%-13.5%) of 1728 liver ablations performed at the participating centers. Indications to CEUS-guided ablation were: a target lesion not visible on non-enchanced ultrasound (19.6%), improvement of conspicuity of the target (29%), detection of vital area/s in nodules with either incomplete ablation after a previous treatment without CEUS guidance or local tumor progression (51.4%). A single standard dose (2,4 ml) of medium contrast was used in 73 of the treated nodules (68.2%). No complications ensued infusion of contrast medium. Minor complications (pleural effusion) were observed in 2 cases (1.8%) after ablation. Complete ablation was obtained in 73 of the treated tumors (68.2%). Altogether hyperthemic techniques (RF and MW) performed better than PEI (complete ablation rate 86% vs. 48%).

CONCLUSION

To the best of our knowledge, it is the first time that the use of CEUS as guidance technique for liver ablation has been quantified. In experienced hands such a procedure seems to have limited indications (6.2% of 1728 ablative sessions), but is deemed necessary to reach both small, ill-defined focal lesions and vital area/s in nodules with previous incomplete ablation or local tumor progression.

CLINICAL RELEVANCE/APPLICATION

Quantification of the use of CEUS-guided ablation of liver malignancies in field practice of high-volume ablative centers

SSA25-08 High Frequency versus Low Frequency Microwave Ablation in Malignant Liver Tumors: Evaluation of Local Tumor Control and Survival

Sunday, Nov. 27 11:55AM - 12:05PM Room: E352

Participants
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Presenter*) Nothing to Disclose
Ahmad Hagar, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Nour-Eldin A. Nour-Eldin, MD,PhD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
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Katrin Eichler, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To compare local tumor control and survival rates in patients with liver metastases treated with microwave ablation (MWA) with either a low frequency (LF) (915 MHz) or high frequency (HF) system (2.45 GHz).

METHOD AND MATERIALS

The retrospective study included 221 patients (mean age: 61.7 years) with 356 malignant hepatic lesions. 94 patients with 133 lesions underwent LF-MWA, 127 patients with 223 lesions were treated with HF-MWA. MRI was performed 24 hours after each procedure and at 3, 6, 12, 18, and 24 months post-ablation. Both groups were compared with the Fisher's exact test. Survival rates were calculated using the Kaplan-Meier test.

RESULTS

The mean initial ablation volume of LF-MWA was nearly half of HF-MWA (19.1mL vs. 39.9mL). The difference in volume between both systems was significant ($p<0.0001$). At follow-up, 39/133 lesions (29.32%) treated using LF-MWA progressed while in HF-MWA 32/223 (14.35%) progressed. The mean time to progression was 5.03 and 5.31 months for lesions treated with LF-MWA and HF-MWA systems respectively. The difference between both systems was significant ($p=0.00059$). The 1-year, 2-year and 4-year overall survival rates were 98.9%, 95.7% and 83% for LF-MWA and 100%, 97.6% and 92.9% for HF-MWA. The difference in survival rates was not significant ($p>0.05$).

CONCLUSION

Both LF- and HF-MWA generator systems are effective treatment options for malignant oligonodular liver lesions, but significantly higher ablation volumes, longer time to progression and lower progression rates were observed in HF-MWA.

CLINICAL RELEVANCE/APPLICATION

HF-MWA is superior to LF-MWA regarding ablation volumes and results in lower progression rate.

SSA25-09 Long-term Therapeutic Outcomes of Radiofrequency Ablation (RFA) for Small to Intermediate Perivascular Hepatocellular Carcinomas: RFA Only Versus Combined Transarterial Chemoembolization and RFA

Sunday, Nov. 27 12:05PM - 12:15PM Room: E352

Participants
So Yeon Park, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
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Kyeong Ah Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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Myung Gyu Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Tae Seok Seo, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compared the therapeutic outcomes of perivascular hepatocellular carcinoma (HCC) between radiofrequency ablation (RFA) only and combined transarterial chemoembolization (TACE) and RFA.

METHOD AND MATERIALS

This retrospective study was approved by our institutional review board and the requirement for informed consent was waived. Between March 2000 and May 2014, 185 perivascular HCCs were selected among 635 HCCs treated by RFA. The perivascular HCC is defined HCC located less than 3 mm away from large vessels which diameter measuring ≥ 3 mm in axial CT/MR images. 185 perivascular HCCs were from 183 patients consisting of 130 men and 53 women; mean age 60.3,range, 29-83 years.The HCCs were classified into two groups according to the absence or presence of combined TACE: A group underwent RFA only (n=79) and the other group underwent combined TACE and RFA (n=106).Technical success, overall adverse event rates, recurrence rates and local tumor progression within 24 months were compared between the two groups.

RESULTS

The technical success of RFA was achieved in 178 out of 185 cases (96.2%). The median follow-up time was 46.7 months (range, 3.2 – 165). RFA only group included 79 HCCs (mean size = 1.63 cm) from 78 patients and combined TACE & RFA group, 106 HCCs (mean size = 1.91 cm) from 105 patients. The local tumor progression rates between two groups were not statistically different: RFA only group 8.9% (7/79) vs. combined TACE and RFA group 11.2% (12/106) ($P > .05$). The overall recurrence rates within 24 months between two groups were not statistically different: RFA only group 33.8% vs. combined TACE and RFA group 32.9% ($P > .95$). The adverse event rates within 24 months between two groups were not statistically different: RFA only group 28.3% vs.

combined TACE and RFA group 36.5% (P > .83).

CONCLUSION

RFA only is similar to combined TACE and RFA for the treatment of perivascular HCC in terms of local tumor progress, overall recurrence, and disease free survival.

CLINICAL RELEVANCE/APPLICATION

In the treatment of perivascular HCC, RFA only seems to be as effective as combined TACE and RFA therapy; thus TACE prior to RFA is not mandatory.

GIS-SUA

Gastrointestinal Sunday Poster Discussions

Sunday, Nov. 27 12:30PM - 1:00PM Room: GI Community, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
Sanjeeva P. Kalva, MD, Dallas, TX (*Moderator*) Consultant, CeloNova BioSciences, Inc

Sub-Events

GI344-SD-SUA2 Diagnosis of Gastrogastric Fistula on Computed Tomography: A Quantitative Approach

Station #2

Awards
Student Travel Stipend Award

Participants
Guangzu Gao, MD, New Haven, CT (*Presenter*) Nothing to Disclose
Nariman Nezami, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Mahan Mathur, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Patricia Balcacer, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Mike Spektor, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Logic and observation suggest that after gastric bypass, dense oral contrast in the excluded stomach favors the diagnosis of a gastrogastric fistula, whereas diluted contrast is more likely secondary to reflux. We aim to construct a quantitative method base on this hypothesis.

METHOD AND MATERIALS

After receiving IRB approval with the waiver of informed consent, a retrospective study was performed. A Montage search between 2004 and 2016 identified correlative CTs within 30 days of an upper GI (UGI) exam for patients who had a weight-loss bypass surgery. UGI done on postoperative day 1 was excluded from the search. Imaging review of CTs further selected cases that had oral contrast present in both the excluded stomach and gastric pouch. All CTs showed contrast past the jejunojejunostomy. All charts were reviewed to ensure that there was no surgical intervention between CT and UGI. These cases were randomized and blindly assigned to two radiology attending readers, who recorded their impression of fistula versus reflux for each case, and then computed a relative intensity (RI) ratio (HU in remnant/ HU in pouch). Statistical analysis was performed (SPSS version 20.0) to determine if RI values correlated with UGI findings of gastrogastric fistula.

RESULTS

Of 634 cases analyzed, 13 CTs met study criteria. Of these, 46.2% (6/13) were confirmed to have a fistula by UGI. Patients' characteristics (average age 43.2, 84.6% female) and time between CT and UGI (mean 14.2 days, range 3-30 days) were similar for each group. 76.9% (10/13) CTs were performed prior to the UGI.Statistical analysis demonstrated a significant difference in RI ratio ($P < 0.05$) between the fistula group (RI ratio 1.12, SD 0.29) and the reflux group (RI 0.56, SD 0.19). There was excellent inter-observer reliability (interclass correlation 0.97, $p < 0.001$). A receiver operating characteristic analysis identified a RI ratio of 0.8 that maximized sensitivity (100%), in expense of specificity (78.6%), for diagnosing gastrogastric fistula. In comparison, the attending radiologists' interpretation yielded a much lower sensitivity (45.8%), and a higher specificity (89.2%).

CONCLUSION

The relative intensity ratio can be a reliable diagnostic tool for gastrogastric fistula.

CLINICAL RELEVANCE/APPLICATION

We describe a reliable and easy-to-perform quantitative method that markedly improves the sensitivity for diagnosing gastrogastric fistula on computed tomography.

GI345-SD-SUA3 Development of Cancer in Gall Bladder Polyps Detected on Ultrasound in High Risk Population

Station #3

Awards
Student Travel Stipend Award

Participants
Wasey M. Jilani, MBBS, Karachi, Pakistan (*Presenter*) Nothing to Disclose
Waseem Akhtar, Karachi, Pakistan (*Abstract Co-Author*) Nothing to Disclose
Madiha Jilani, MBBS, Karachi, Pakistan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Management of gall bladder polyps according to the current guideline recommends ultrasound followup for polyps less than 10 mm in size and cholecystectomy for polyps that are greater or equal to 10 mm. While this is helpful for managing patients with large polyps, it does not clearly indicate the size after which follow up is required, the interval and duration of follow-up.

Current literature on this important question is minimal in our region, which is known to have one of the highest risk of developing gall bladder carcinoma. In our study we determined the course of sonographically detected incidental polyps in the gall bladder and on the basis of their size, suggest appropriate management guidelines for these lesions.

METHOD AND MATERIALS

Radiological data of all "gall bladder polyps" detected on abdominal ultrasounds done between January 2001 and February 2015 were taken at a tertiary care institution. All ultrasound results of included examinations were evaluated to see changes in the size of GB polyps. The medical record files were reviewed to obtain pathologic and clinical follow-up.

RESULTS

A total of 1226 patients were shortlisted for the reporting engine and One Hundred and fifty five (mean age, 52.6 years; range, 18–92 years) with GB polyps were included. This included 72 men (46%) and 83 women (54%). US follow-up was performed in a total of 149 patients with minimum follow-up duration of 2 years. Change in size greater or equal to 2 mm was considered relevant. Polyp size was stable in 65 (42%) polyps, decreased in 25 (16 %), increased in 12 (7 %), and resolved in 53 (34%). No neoplastic polyp was found in the 1–6 mm range, one neoplastic polyp was seen in those 7 mm or larger.

CONCLUSION

The risk of malignancy of the gall bladder resulting from sonographically detected incidental polyps is very low. GB polyps that are incidentally detected on ultrasound measuring 6 mm or less, may require no additional follow-up. Further studies are required for polyps greater than 7 mm as the available data is inconclusive.

CLINICAL RELEVANCE/APPLICATION

The risk of malignancy of the gall bladder resulting from sonographically detected incidental polyps is very low. GB polyps that are incidentally detected on ultrasound measuring 6 mm or less, may require no additional follow-up.

GI348-SD-SUA6 Quantification of Hepatic Steatosis in Living Liver Donor Candidates: Comparison Among Automated Two-point Dixon Reconstruction with Dual-ratio Signal Discrimination Algorithm, Multi-Gradient-Echo Sequence and MR Spectroscopy

Station #6

Participants
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So Yeon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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So Jung Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Gi Won Song, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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Eun Sil Yu, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the diagnostic performance of automated two-point Dixon reconstruction with dual-ratio signal discrimination algorithm ("screening" Dixon), six-point multi-echo 3D gradient-echo (multiple gradient-echo) technique, and high-speed multi-echo 1H MR spectroscopy (MRS) for quantification of hepatic steatosis in living liver donor candidates by using histologic assessment as a reference standard.

METHOD AND MATERIALS

This retrospective study included 223 living liver donor candidates who underwent preoperative fat quantification at a 3.0-T MR imaging system and histological evaluation using liver biopsy (mean time between MR imaging and liver biopsy, 3 days). Quantitative MR imaging was performed using the screening Dixon, multiple gradient-echo, and MRS techniques. Results from each technique was correlated with histologic fat fraction. The correlation between the MR techniques was assessed. Receiver operating characteristic (ROC) curve analysis to detect substantial steatosis (macrovesicular fat ≥ 10%) was performed.

RESULTS

The screening Dixon technique labelled 172 patients as normal, 48 patients as fat and 3 patients as combined, corresponding to the mean values of histological fat fraction of 1.91%, 18.17%, and 0.67%, respectively. The correlation coefficients of multiple gradient-echo and MRS with histologic fat fraction were 0.90 and 0.88, respectively ($p<.0001$). The fat fraction estimated in the screening Dixon showed a strong correlation with that from the multiple gradient-echo technique ($R=0.97$, $p<.0001$) and MRS ($R=0.93$; $p<.0001$). The fat fractions between the multiple gradient-echo and MRS were correlated well ($R=0.95$; $p<.0001$). The areas under the ROC curve (AUROC) of the screening Dixon, multiple gradient-echo and MRS for the detection of substantial macrovesicular steatosis were 0.921, 0.983, and 0.969; the AUROC of the screening Dixon was significantly lower than the other techniques ($p\leq.018$).

CONCLUSION

Our study validated the capability of the screening Dixon technique in assessing hepatic fat content. Both the six-point multiple gradient-echo technique and MRS showed an excellent diagnostic performance in hepatic fat quantification with a strong correlation between the two techniques.

CLINICAL RELEVANCE/APPLICATION

The screening sequence using automated two-point Dixon reconstruction and dual-ratio signal discrimination algorithm can be a quick tool for hepatic fat quantification.

GIS-SUB

Gastrointestinal Sunday Poster Discussions

Sunday, Nov. 27 1:00PM - 1:30PM Room: GI Community, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
Sanjeeva P. Kalva, MD, Dallas, TX (*Moderator*) Consultant, CeloNova BioSciences, Inc

Sub-Events

GI349-SD-SUB1 The Utility of LI-RADS v2014 to Characterize the Nodules Detected during Hepatocarcinogenesis in HBV-related Liver Cirrhosis: A Comparative Study of MR Imaging and Pathology

Station #1

Participants
Zhang Qi, Beijing, China (*Presenter*) Nothing to Disclose
Hongjun Li, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To study the correlationship between the Liver Imaging and Reporting Data System(LI-RADS)v2014 with magnetic resonance(MR)imaging and hisological grade of nodules in HBV-related liver cirrhosis.

METHOD AND MATERIALS

Between Decemember 2012 to February 2016, 178 patients with HBV-related liver cirrhosis who had nodules 30mm or smaller detected at MRI were included and all patients provided written informed consent before the study . A LI-RADS category was retrospectively assigned to each nodule on MRI. Final diagnosis was assessed using pathologic diagnosis only (operation or biopsy). We calculate the percentage of the nodules in each LI-RADS category,and analyze with the Chi-square test(P<0.001).The diagnostic accuracy for each LI-RADS category was described by sensitivity, specificity, and positive and negative predictive values .

RESULTS

we finally analyzed 192 nodules ,8 regenerative nodules(RNs),16 low grade dysplastic nodules(LGDNs),30 high grade dysplastic nodules(HGDNs),35 early HCCs(eHCCs),103 progressed HCCs(pHCCs).None (0%) of five LI-RADS category 1 lesions,1(9.9%)nodules had a LR-2 assement,consisting of 7 (36.8%)RNs and 12(63.2%)LGDNs;23(12%),a LR-3 assement,consisting of 1(4.3%) RNs,4 (17.4%)LGDNs,12(52.2%)HGDNs,4 (17.4%) eHCCs and 2(8.7%) pHCCs;62(32.3%)a LR-4 assement, including 16(25.8%) HGDNs, 25(40.3%)eHCCs and 21 (33.9%)pHCCs;88(45.8%)a LR-5 assement, including 2(,2.3%) HGDNs, 6(6.7%) eHCCs and 80(90.9%) pHCCs(P<0.001).PPV,sensitivity of HCC diagnosis for LR-5 were higher than that for LR-4(97.7%,65.2% VS 74.2%,34.8%).PPV,sensitivity of LR-3 for HCC+HGDN diagnosis were higher than that for HCC diagnosis only(78.3%,11%vs 26.1%,4.9%).

CONCLUSION

There is no dirrect correlationship between the LI-RADS with magnetic resonance(MR)imaging and hisological grade of nodules in HBV-related liver cirrhosis,whereas LR-5 criteria had excellent PPV for diagnosing HCC, LR-4 and LR-3 criteria were useful in estimating the probability of malignancy.

CLINICAL RELEVANCE/APPLICATION

LI-RADS is recommended for patients with liver cirrhosis to assess the likelihood of malignancy for MR imaging detected nodules.In particular, a relevant proportion of HGDNs (known as the precancerous lesions) were categorized as LI-RADS category 3 or 4 ,LI-RADS may help to determin the correct diagnostic workup during further clinical practice.

GI351-SD-SUB3 Ultrasonographic Changes at 12 Weeks of Anti-TNF Drugs Predict 1-year Sonographic Response and Clinical Outcome in Crohn Disease: A Multicenter Study

Station #3

Participants
Tomas Ripolles, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Gregorio Martin, MD, Valencia, Spain (*Presenter*) Nothing to Disclose
Mj Martinez-Perez, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Jose M. Paredes, MD, PhD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
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Arantza Jauregui-Amezaga, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Jose Vizuete, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Fructuoso Delgado, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

to assess the long-term effect of biological treatment on transmural lesions of Crohn's Disease (CD) evaluated with ultrasound, including contrast-enhanced US (CEUS).

METHOD AND MATERIALS

51 patients with active CD were included in a prospective multicenter longitudinal study. All patients underwent a clinical

51 patients with active CD were included in a prospective multicenter longitudinal study. All patients underwent a clinical assessment and sonographic examination at baseline, 12 weeks after treatment initiation and after 1-year of treatment. Patients were clinically followed at least 2 years from inclusion until the end of the study. Ultrasonographic evaluation included bowel wall thickness, color Doppler grade, parietal enhancement and presence of transmural complications or stenosis. Sonographic changes after treatment were classified as normalization, improvement or lack of response.

RESULTS

improvement at 52 weeks was more frequent in patients with improvement at final of induction (12 weeks) compared with patients who did not improve (85% versus 28%; p <0.0001). 1-year sonographic evolution correlated with clinical response; 28 out of 29 (96,5%) patients with sonographic improvement at 52 weeks showed clinical remission or response. Patients without sonographic improvement at 52 weeks of treatment were more likely to have a change or intensification in medication or surgery (13/20, 65%) during the next year of follow-up than patients with improvement on the sonography (3/28, 11%). Stricturing behavior was the only sonographic feature associated to a negative predictive value of response (p=0.0001).

CONCLUSION

sonographic response after 12 weeks of therapy is more pronounced and predicts 1-year sonographic response. Sonographic response at 1-year examination correlates with 1-year clinical response and is a predictor of further treatment's efficacy, 1-year or longer period of follow-up.

CLINICAL RELEVANCE/APPLICATION

Clinical assessment of CD has low accuracy to predict active disease or remission.Therapeutic responses should be monitored objectively -not only based on symptom control-Monitoring the disease through the use of cross-sectional imaging is gaining increased acceptance as it has advantages over endoscopy.Achievement transmural healing or improvement on sonographic examination after anti-TNF therapy is associated with better outcomesImaging monitoring allows medical optimization and individualization of treatment

GI352-SD-SUB4 Comparison of Measured and Estimated Organ Doses from Two Radiation Dose Tracking Software at Different kV

Station #4

Participants
Atul Padole, MD, Boston, MA (*Presenter*) Nothing to Disclose
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Alexi Otrakji, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Bob Liu, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
George Xu, PhD, Troy, NY (*Abstract Co-Author*) Nothing to Disclose
Mannudeep K. Kalra, MD, Boston, MA (*Abstract Co-Author*) Technical support, Siemens AG; Technical support, Medical Vision

PURPOSE

To compare the measured and estimated CT organ doses from two radiation dose tracking (RDT) software at different tube voltage (kV) using fixed tube current (mAs) and automatic exposure control (AEC) techniques in a human cadaver.

METHOD AND MATERIALS

In an IRB approved study, ionization chambers (Radcal) were surgically implanted in an adult male human cadaver (88 yrs, male, 68 kg) in six locations including the liver, stomach, small intestine, left kidney, colon, and urinary bladder. The cadaver was scanned with routine abdomenopelvis CT protocol on a 128-slice dual-source MDCT scanner (Siemens Definition FLASH) at 8 different settings – 4 with AEC (at constant CTDIvol 2.5mGy) & 4 with fixed mAs (at constant CTDIvol 4mGy). Scans were performed at 80, 100, 120 and 140 kV with mA values changed to achieve the abovementioned CTDIvol for each kV. All other scanning parameter were held constant including pitch of 0.9:1, rotation time of 0.5 second, and detector configuration of 128*0.6 mm. Scanning was repeated three times for each setting and organ doses were recorded for each acquisition (total series = 4*3*2=24). All CT image series were exported to the web-based RDT software: eXposure (Bayer, Germany) and VirtualDose (Albany, NY) to obtain estimated organ doses.

RESULTS

At constant CTDIvol, there was a variation (not statistically significant) in measured organ doses at different kV (both fixed mAs and AEC); lower kV was associated with lower organ doses (p=0.7). However, there were significant variation in estimated organ doses from both RDT software at different kV (p<0.02). The estimated organ doses from both RDT software were lowest at 80 kV compared to 140 kV (p<0.02). The estimated organ doses from VirtualDose were significantly lower than measured (except for 80 kV) and estimated organ doses from eXposure for both fixed mAs and AEC (p<0.02). The estimated organ doses from eXposure were slightly higher than most measured organ doses, however this difference was not statistically significant (p=0.9).

CONCLUSION

At constant CTDIvol, both measured and estimated organ doses fluctuate with different kV; lower kV settings are associated with lower dose for both fixed mAs and AEC. The estimated organ doses from VirtualDose were substantially lower than measured and estimated organ doses from eXposure.

CLINICAL RELEVANCE/APPLICATION

CT at lower kV settings is associated with lower organ doses even at constant CTDIvol.

GI353-SD-SUB5 Intravoxel Incoherent Motion Diffusion-weighted Imaging: Measurement Repeatability of Quantitative Parameters in Rectal Cancer with Different b Values

Station #5

Participants
Hongliang Sun, MD, Beijing, China (*Presenter*) Nothing to Disclose

Yanyan Xu, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Kaining Shi, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Wu Wang, MD, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To verify the possible influence of different b values on intravoxel incoherent motion imaging (IVIM) parameters in rectal cancer.

METHOD AND MATERIALS

Twenty-six patients with rectal cancer were included in this retrospective study. All diffusion-weighted imaging (DWI) scanning was completed in a 3.0T MR with 16 b-values (0-2000s/mm2). IVIM parameters [D (diffusion coefficient), f (perfusion fraction) and D* (pseudodiffusion coefficient)] quantification and image analysis were all conducted by IDL 6.3 software with the whole range of adopted b values(0, 10,20,30,40,60,80,100,150,200,400,800,1000,1200,1500 and 2000s/mm2) and 8 of adopted b values(0, 40, 80, 100, 150, 400, 800 and 1000s/mm2), respectively. Quantitative analysis was performed by two observers with manually defined regions of interest (ROI) along the outline of tumor maximal dimension. The IVIM parameters values calculated with 16 b-values and 8 b-values, as well as the corresponding inter-observer variation values, were compared by using paired samples t test or Wilcoxon signed ranks test, respectively. The inter-observer variation of the IVIM parameters were assessed based on the repeatability coefficient and Bland-Altman limits of agreement.

RESULTS

No significant differences were demonstrated in the values of these three parameters with different b-values ($p = 0.111$ for D, $p = 0.517$ for f, and $p = 0.657$ for D*), as well as in the inter-observer variation of the IVIM parameters($p = 0.230$ for D, $p = 0.050$ for f, and $p = 0.304$ for D*). However, the repeatability coefficient and Bland-Altman bias of eight b-values relevant IVIM parameters (35.2%, 126.3%, and 197.4% for D, f, and D* respectively; 6.6%, -21.6%, and -20.7% for D, f, and D* respectively) were greater than that of 16 b-values relevant IVIM parameters (14.6%, 50.8%, and 55.2% for D, f, and D* respectively; -0.3%, -7.6%, and 3.6% for D, f, and D* respectively).

CONCLUSION

Although no significant differences were established between 8 and 16 b-values IVIM parameters, the latter ones showed less repeatability coefficient and Bland-Altman bias, indicating better measurement repeatability.

CLINICAL RELEVANCE/APPLICATION

Rectal IVIM with more b values may provide accurate parameters for assessing diffusion and perfusion , which is helpful for longitudinal evaluation of therapy response.

GI354-SD-SUB6 MRI Liver Surface Nodularity Score as a New Noninvasive Biomarker for Chronic Viral Hepatitis

Station #6

Participants
Kelly L. Cox, DO, Atlanta, GA (*Presenter*) Nothing to Disclose
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Zhengjia Chen, PhD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Chao Zhang, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Andrew D. Smith, MD, PhD, Jackson, MS (*Abstract Co-Author*) Research Grant, Pfizer Inc; President, Radiostics LLC; President, Liver Nodularity LLC; President, Color Enhanced Detection LLC; President, eMASS LLC; Pending patent, Liver Nodularity LLC; Pending patent, Color Enhanced Detection LLC; Pending patent, eMASS LLC;

PURPOSE

Evaluate the accuracy of liver surface nodularity (LSN) score on magnetic resonance imaging (MRI) as a quantitative imaging biomarker for diagnosing cirrhosis in patients with viral chronic liver disease (vCLD) alone and in combination with fibrosis-4 (FIB-4) index.

METHOD AND MATERIALS

IRB approved, HIPAA compliant database search identified patients with vCLD who underwent liver MRI during 2005-2015, had a liver biopsy within 6 months of MRI or any prior biopsy with cirrhosis, and laboratory data to calculate FIB-4 index within 3 months of MRI. 10 LSN scores per patient were measured utilizing Liver Surface Nodularity Software on all cases by reviewer 1 and 50 cases by reviewer 2. LSN score mean, median (mdn) and standard deviation (SD) were calculated. Intra-class correlation between reviewers was estimated with Cronbach's alpha. Wilcoxon rank-sum test explored associations between LSN scores, FIB-4 index and Scheuer staging. Receiver operator characteristic (ROC) curve analysis assessed accuracy of LSN score alone and in combination with FIB-4 index.

RESULTS

152 cases (54 F: 98 M) of which 45 were non-cirrhotic and 107 were cirrhotic. Mean and mdn LSN scores were 3.85 and 3.68 (SD=0.91) with high inter-observer agreement between reviewers (Cronbach's alpha=0.950, $p<0.001$). LSN scores were higher for cirrhotic (mdn 4.00, range 2.01-7.68) than for non-cirrhotic cases (mdn 3.31, range 1.76-5.43), $p<0.0001$. FIB-4 index scores were also higher for cirrhotic (mdn 7.75, range 1.44-30.89) than for non-cirrhotic cases (mdn 1.77, range 0.68-9.80), $p<0.001$. LSN scores had high accuracy for differentiating cirrhotic from non-cirrhotic cases (AUC=0.774, $p<0.001$). Accuracy increased when LSN scores were combined with FIB-4 index (AUC=0.923, $p<0.001$).

CONCLUSION

While MRI LSN score alone can be used as a quantitative imaging biomarker for the diagnosis of cirrhosis, the combination of both imaging and clinical biomarkers (LSN score and FIB-4 index) has substantial increased diagnostic accuracy for cirrhosis.

CLINICAL RELEVANCE/APPLICATION

Utilizing MRI LSN score as an imaging biomarker in conjunction with FIB-4 index has high diagnostic accuracy for cirrhosis and could serve as an alternative to liver biopsy in the setting of vCLD.

Honored Educators

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Pardeep K. Mittal, MD - 2016 Honored Educator

GI102-ED-SUB7 Liver Iron Quantification with MRI: A Primer for Radiologists

Station #7

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
Roxanne Labranche, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Kim-Nhien Vu, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Denis Soulieres, MD, MSc, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Guillaume Gilbert, PhD, Montreal, QC (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Leonie Petitclerc, MSc, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Jean-Sebastien S. Billiard, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Milena Cerny, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Damien Olivie, MD, MS, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
An Tang, MD, Montreal, QC (*Abstract Co-Author*) Advisory Board, Imagia Cybernetics Inc

TEACHING POINTS

This educational exhibit will: 1) review the pathophysiology of iron overload, 2) review MRI-based iron quantification techniques, and 3) illustrate these techniques with clinical vignettes.

TABLE OF CONTENTS/OUTLINE

1) Introduction: clinical indications for liver iron quantification (detection, quantification and assessment of treatment response). 2) Overview of etiology and pathophysiology of iron overload:a. Summary of clinical conditions associated with iron overload.b. Anatomical diagrams of iron overload distribution in hemochromatosis and hemosiderosis.3) Review of MRI-based iron quantification techniques: a. Diagrams illustrating the tissue contrast mechanisms for each technique.i. Concepts of R2* and T2* mapping.ii. Concepts of R2 and T2 mapping.iii. Quantitative susceptibility mapping.iv. Liver-muscle signal ratio.b. Summary of MRI protocols with sequences and acquisition parameters.c. Comparison of advantages and limitations of each technique.4) Clinical application:a. Summary table with clinical thresholds for different levels of iron overload severity and associated complications.b. Clinical vignettes.5) Technical pitfalls: severe iron overload.6) Future directions: simultaneous iron and fat quantification; pancreatic iron quantification.7) Summary of key teaching points.

GI192-ED-SUB8 Technical Best Practices for Contrast-enhanced Ultrasound of Focal Liver Lesions

Station #8

Participants
Alexander M. Vezeridis, MD, PhD, La Jolla, CA (*Presenter*) Nothing to Disclose
Yuko Kono, MD, PhD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
David O. Cosgrove, MBBCh, FRCR, London, United Kingdom (*Abstract Co-Author*) Research Consultant, SuperSonic Imagine Research Consultant, Bracco Group Speakers Bureau, Toshiba Corporation
Christoph F. Dietrich, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Hyun-Jung Jang, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Avinash R. Kambadakone, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Tae Kyoung Kim, MD, PhD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Andrej Lyshchik, MD, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Donald G. Mitchell, MD, Philadelphia, PA (*Abstract Co-Author*) Consultant, CMC Contrast AB
Fabio Piscaglia, Bologna, Italy (*Abstract Co-Author*) Research support, Bracco Group Speaker, Bayer AG Advisory Board, Bayer AG Speaker, Siemens AG
Cynthia S. Santillan, MD, San Diego, CA (*Abstract Co-Author*) Consultant, Robarts Clinical Trials, Inc
Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;
Juergen K. Willmann, MD, Stanford, CA (*Abstract Co-Author*) Research Consultant, Bracco Group; Research Grant, Siemens AG; Research Grant, Bracco Group; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company; Advisory Board, Lantheus Medical Imaging, Inc; Advisory Board, Bracco Group
Stephanie R. Wilson, MD, Calgary, AB (*Abstract Co-Author*) Equipment support, Siemens AG; Equipment support, Koninklijke Philips NV

TEACHING POINTS

1. Understand indications for, benefits and limitations of, and common referral patterns for CEUS of focal liver observations2. Review commonly used ultrasound contrast agents for evaluation of focal liver observations3. Understand technical considerations and resources for liver CEUS as a first step towards bringing liver CEUS to the learner's institution

TABLE OF CONTENTS/OUTLINE

1. Indications for, benefits and limitations of, and common referral patterns for CEUS of focal liver observations.2. Ultrasound contrast agents a. Lumason -- the first ultrasound contrast agent approved by the FDA for evaluation of focal liver lesions

b. Definity -- an 'off-label' agent3. Preparation and essential equipment a. Ultrasound machines and transducers b. Contrast-specific harmonic imaging modes c. Data storage and PACS transfer d. Equipment for contrast agent preparation and injection4. Step-by-step approach of a CEUS examination to evaluate focal liver lesions a. Non-contrast examination b. Vascular access c. Contrast agent preparation and injection d. Multiphase CEUS imaging -- including arterial, portal venous, and late phases. Reviewed topics include timing, documentation methods, and troubleshooting tips e. General qualitative and quantitative analysis of ultrasound contrast enhancement

GI339-ED-SUB9 **Pain Management in Cancer Patient: Palliative Care using High Intensity Focused Ultrasound**

Station #9

Awards

Identified for RadioGraphics

Participants
Susan Dababou, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Roberto Scipione, Terracina, Italy (*Abstract Co-Author*) Nothing to Disclose
Hans Peter Erasmus, Rome, Italy (*Presenter*) Nothing to Disclose
Cristina Marrocchio, rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Alessandro Napoli, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. According to BMJ clinical evidence, up to 80% of cancer patients experience pain requiring opioids analgesics. 2. The management of pain in cancer patient is crucial to improve the quality of life and the survival, with oral morphine as the standard opioid used for the management of moderate to severe cancer-related pain.The major benefit of HIFU is the immediate reduction in analgesic consumption with an improvement of the quality of life.3. High Intensity focused ultrasound (HIFU) is a non-invasive ablation method that induces coagulative necrosis through thermal tissue stimulation. In a single session, pain resolution is achieved by using MRI sequences for accurate targeting, real time monitoring and control of energy deposition. 4. The thermal effect of high intensity US beam on the tissue improve the drug delivery, improving the outcome of targeted therapy.

TABLE OF CONTENTS/OUTLINE

1) Cancer-related pain:a) Aetiology and clinical presentation 2) Conventional therapies: a) Pharmacological treatment and other invasive treatments (e.g. nerve blocks)c) Limitations and Side effects 3) MRgFUS:a) Basics b) Pain palliation: comparison with conventional and invasive therapiesc) A multi-pronged approach with HIFUd) CASE REPORTS4) Discussion: a) Future of MRgFUS, its potential in the management of cancer patient.

RC109

Biliary - Potpourri

Sunday, Nov. 27 2:00PM - 3:30PM Room: S402AB

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC109A Imaging of Jaundice

Participants
Silvia D. Chang, MD, Vancouver, BC, (Silvia.Chang@vch.ca) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Demonstrate the MRI findings in common and uncommon benign biliary disease. 2) Convey available MRI techniques and protocols for evaluation of benign biliary disease. 3) Illustrate common pitfalls that can mimic benign biliary disease.

ABSTRACT

RC109B Biliary Post-op Complications

Participants
Chandana G. Lall, MD, Orange, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand underlying mechanism of iatrogenic biliary injury. 2) Review of biliary anatomy: Anatomic variants which may predispose to injury. 3) MR Imaging features of iatrogenic biliary injury. 4) Classification of biliary injuries. 5) Role of hepatobiliary agents in workup of biliary injury.

ABSTRACT

Surgical procedures and underlying mechanism for iatrogenic biliary injuryBiliary anatomy: Anatomic variants which may predispose to injuryImaging features of iatrogenic biliary injury on MR ImagingClassification system in assessing biliary injuriesRole of hepatobiliary agents

Honored Educators

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Chandana G. Lall, MD - 2013 Honored Educator

RC109C Cholangiocarcinoma

Participants
Kartik S. Jhaveri, MD, Toronto, ON (*Presenter*) Speaker, Bayer AG; Speaker,Siemens AG

LEARNING OBJECTIVES

1) Discuss Classification and Imaging Appearances of Cholangiocarcinoma. 2) Discuss Staging Systems and Resectability Evaluation of Cholangiocarcinoma.

ABSTRACT

RC109D Biliary Cases I Missed

Participants
John P. McGahan, MD, Sacramento, CA, (jpmcgahan@ucdavis.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To familiarize the audience with common imaging pitfalls when evaluating the biliary system. 2) To help the audience avoid common mistakes when evaluating the biliary tract with either MRI or CT. 3) To demonstrate to the audience what devasting consequences that may occure when suggesting a specific wrong diagnosis.

ABSTRACT

PS12

Sunday Afternoon Plenary Session

Sunday, Nov. 27 4:00PM - 5:45PM Room: Arie Crown Theater

CH GI MK NR ED PD

AMA PRA Category 1 Credits ™: 1.75
ARRT Category A+ Credits: 1.50

Participants
Richard L. Baron, MD, Chicago, IL (*Presenter*) Nothing to Disclose

Sub-Events

PS12A Report of the RSNA Research and Education Foundation

Participants
Burton P. Drayer, MD, New York, NY (*Presenter*) Advisor, Hologic, Inc

Abstract

The R&E Foundation exemplifies the 2016 Annual Meeting theme "Beyond the Image" as each and every year, R&E grant recipients pursue projects that go beyond radiologic sciences and touch every area of healthcare delivery and discovery. In the annual address of the R&E Foundation, Board of Trustees Chairman Burton P. Drayer, MD will report on this year's record funding of 101 research and education awards totaling over $4 million, and why the need to support the Foundation is greater than ever. With a 30% funding rate of its applicants, the RSNA R&E Foundation provides a critical source of early support for so many young investigators and educators. It is through their awards that these individuals become engaged in research and excited about the prospect of pursuing a career in academic radiology. R&E grant recipients are poised to lead research efforts in the future that will extend beyond radiology into every area of patient care. To support these efforts and continue forth on this path, the Foundation launched Inspire – Innovate – Invest: The Campaign for Funding Radiology's Future at RSNA 2014. The Campaign is moving steadily toward the Campaign goal of $17.5 million with the support of individuals, private practice groups and our corporate colleagues. For the future of radiologic research to belong to the next generation of radiologists, the specialty must put its financial support squarely behind its Foundation—our Foundation. During the meeting week, please take time to visit the R&E Foundation Booth, located on Level 3 of Lakeside Center to learn more about the 2016 grant recipients, their innovative projects and the many available opportunities to support the Foundation through our Campaign.

PS12B Image Interpretation Session

Participants
Ronald J. Zagoria, MD, San Francisco, CA, (ron.zagoria@ucsf.edu) (*Presenter*) Nothing to Disclose
John Eng, MD, Cockeysville, MD (*Presenter*) Nothing to Disclose
Ellen M. Chung, MD, Bethesda, MD (*Presenter*) Nothing to Disclose
Nancy J. Fischbein, MD, Stanford, CA, (fischbein@stanford.edu) (*Presenter*) Nothing to Disclose
John R. Leyendecker, MD, Dallas, TX, (john.leyendecker@utsouthwestern.edu) (*Presenter*) Nothing to Disclose
Christian W. Pfirrmann, MD, MBA, Forch, Switzerland (*Presenter*) Nothing to Disclose
Gautham P. Reddy, MD, Seattle, WA (*Presenter*) Nothing to Disclose

Honored Educators

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Gautham P. Reddy, MD - 2014 Honored Educator

ED005-MO

Gastrointestinal Monday Case of the Day

Monday, Nov. 28 7:00AM - 11:59PM Room: Case of Day, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

Participants

Christine M. Peterson, MD, Hummelstown, PA (*Presenter*) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Constantine A. Raptis, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Rex A. Parker III, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Elizabeth B. Maddox, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Christopher Molloy, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Andrew P. Robbins, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Andrew L. Warren, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Vincent M. Mellnick, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Oscar Garcia-Fraga, MD, Hershey, PA (*Abstract Co-Author*) Nothing to Disclose
Kelly Tung, MD,MS, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) Each GI case of the day will be taken from disorders of the luminal GI tract as well as the liver, spleen, pancreas, and biliary system. The findings may be uncommon manifestations of common diseases or common manifestations of uncommon diseases.

Honored Educators

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Perry J. Pickhardt, MD - 2014 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

SPDL20

RSNA Diagnosis Live™: Winter is Coming

Monday, Nov. 28 7:15AM - 8:15AM Room: E451B

CA GI HN MK NR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Adam E. Flanders, MD, Narberth, PA, (adam.flanders@jefferson.edu) (*Presenter*) Nothing to Disclose
Sandeep P. Deshmukh, MD, Philadelphia, PA, (sandeep.deshmukh@jefferson.edu) (*Presenter*) Nothing to Disclose
Christopher G. Roth, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The participant will be introduced to a series of radiology case studies via an interactive team game approach designed to encourage "active" consumption of educational content. 2) The participant will be able to use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) The attendee will receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance.This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

ABSTRACT

URL

MSRO21

BOOST: Gastrointestinal-Oncology Anatomy (An Interactive Session)

Monday, Nov. 28 8:30AM - 10:00AM Room: S103AB

GI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Mukesh G. Harisinghani, MD, Boston, MA (*Presenter*) Nothing to Disclose
Theodore S. Hong, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Achieve a basic understanding of the anatomy pertinent to the pancreatico-biliary region and imaging appearance of pancreaticobiliary tumors. 2)Understand strengths and limitations of imaging techniques, including MRI, PET-CT and CT, as they are used in delineating primary tumor and staging involved regional nodes. 3) Identify reasons for local recurrence and recognize the imaging appearances of these recurrences. 4) Improve radiation therapy delivery through understanding the contouring recommendations for the gross tumor volume (GTV) and clinical target volumes (CTV) for anorectal tumors, both in the locally advanced and postoperative setting.

ABSTRACT

In this course cross sectional imaging will be used to contour normal pancreatico-biliary anatomy as well as tumors involving this anatomical region. Also patterns of spread of pathological lymph nodes will be shown, and corss sectional imaging will be used to contour the regional nodal lesions. Cases will be
presented and the participants will be stimulated to do the contouring themselves, and will have feed-back on their results

RC208

Emergency Radiology Series: Current Imaging of the Acute Abdomen

Monday, Nov. 28 8:30AM - 12:00PM Room: S102AB

GI CT MR ER

AMA PRA Category 1 Credits ™: 3.50
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Michael N. Patlas, MD, FRCPC, Hamilton, ON, (patlas@hhsc.ca) (*Moderator*) Nothing to Disclose
Zachary S. Delproposto, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose
Douglas S. Katz, MD, Mineola, NY (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To discuss common and uncommon causes of acute abdomen relevant to emergency imagers.

ABSTRACT

Sub-Events

RC208-01 CT of Gastroduodenal Ulcers and Related Disorders

Monday, Nov. 28 8:30AM - 9:00AM Room: S102AB

Participants
Perry J. Pickhardt, MD, Madison, WI, (ppickhardt2@uwhealth.org) (*Presenter*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV

LEARNING OBJECTIVES

1) Comprehend the underestimated role of CT in diagnosing gastroduodenal ulcer disase. 2) Analyze the CT findings of gastroduodenal ulcers, related conditions, and differential diagnosis. 3) Apply these CT features into daily clinical practice to affect patient outcomes.

ABSTRACT

Honored Educators

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Perry J. Pickhardt, MD - 2014 Honored Educator

RC208-02 Diagnosing Gastric Band Slippage in the Emergency Department: Performance of 4 Imaging Signs on Both Radiography and Computed Tomography

Monday, Nov. 28 9:00AM - 9:10AM Room: S102AB

Participants
Michael S. Furman, MD, Providence, RI (*Presenter*) Nothing to Disclose
David W. Swenson, MD, Brooklyn, CT (*Abstract Co-Author*) Nothing to Disclose
Kevin J. Chang, MD, Sharon, MA (*Abstract Co-Author*) Nothing to Disclose
David J. Grand, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Albert A. Scappaticci, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Grayson L. Baird, PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Anna Ellermeier, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Gastric band slippage occurs in up to 30% of gastric band patients. We previously reported the performance of 4 signs (2 old, and 2 new) of slippage on barium swallow exams. This study now evaluates the applicability of these signs to plain radiographs and CT studies performed in the emergency department.

METHOD AND MATERIALS

We identified 45 gastric band patients who underwent radiography and/or CT in the emergency department from 1/1/2008 – 12/31/2014. Of these patients, 13 were surgically diagnosed with band slippage, while 32 were discharged and returned to standard clinical follow-up without evidence of slippage. Three board-certified radiologists retrospectively reviewed all imaging studies while blinded to patient symptoms and clinical outcomes. The following signs were assessed: (1) abnormally increased phi angle (>58º), (2) inferior displacement of the superolateral gastric band margin from the diaphragm by >2.4 cm, (3) presence of an "O Sign", and (4) presence of an air-fluid level above the gastric band. Sensitivity, specificity, and interobserver agreement (Cohen's Kappa statistic) were calculated for each sign.

RESULTS

For a phi angle >58º, sensitivity and specificity for gastric band slippage were 100% and 81%, respectively, on CT (k=0.93), but 73% and 75% on radiography (k=0.94). For inferior displacement by >2.4 cm, sensitivity and specificity were 89% and 100% on CT

(k=0.98), while 100% and 98% on radiography (k=0.92). For presence of an "O sign", sensitivity and specificity were 13% and 100% on CT (k=0.04), while 30% and 94% on radiography (k=0.64). For presence of an air-fluid level above the gastric band, sensitivity and specificity for slippage were 83% and 99% on CT (k=0.92), while 90% and 100% on radiography (k=0.95).

CONCLUSION

Both inferior gastric band displacement by >2.4 cm from the diaphragm, and the presence of an air-fluid level above the gastric band, are highly reproducible signs of band slippage in the emergency department, and can be identified on both radiography and CT.

CLINICAL RELEVANCE/APPLICATION

Signs of gastric band slippage that were recently defined on barium swallow studies can be effectively applied to simple radiography and CT, thus improving efficiency of diagnosis in the emergency department.

RC208-03 Epiploic Appendagitis is Associated with Peritoneal Inflammation and Visceral Obesity

Monday, Nov. 28 9:10AM - 9:20AM Room: S102AB

Participants
James P. Nugent, Vancouver, BC (*Presenter*) Nothing to Disclose
Hugue A. Ouellette, MD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
D. P. O'Leary, PhD, Limerick, Ireland (*Abstract Co-Author*) Nothing to Disclose
Savvas Nicolaou, MD, Vancouver, BC (*Abstract Co-Author*) Institutional research agreement, Siemens AG
Patrick D. McLaughlin, FFRRCSI, Vancouver, BC (*Abstract Co-Author*) Speaker, Siemens AG

PURPOSE

The location, size and coexisting local inflammatory findings in acute epiploic appendagitis have not been reported outside of isolated case reports. The association between EA and increased body mass index is controversial and disputed in the radiological and surgical literature. Our aim is to investigate if abdominal adipose volume (AAV), visceral adipose area (VAA) and subcutaneous adipose area (SAA) quantified by CT scans is higher in EA patients than matched controls. We also report the location, size and frequency of coexisting local inflammatory findings in a series of patients with acute epiploic appendagitis.

METHOD AND MATERIALS

Consecutive patients with an imaging diagnosis of EA scanned between January 2009 and June 2014 were selected for inclusion (n = 100). 100 consecutive patients imaged with abdominal CT for non-EA related acute abdominal pain were selected as controls. OsiriX v.5.5.2 (Pixmeo, Geneva, Switzerland) was used to retrospectively quantify abdominal adipose tissue volume and cross-sectional area using Hounsfield unit threshold based semi-automated segmentation between -50 HU and -180 HU. The site, size and severity of inflammation of the involved appendage was also recorded.

RESULTS

EA had a male sex predilection, with 67% of EA versus 41% of acute abdominal cases ($p = 0.0002$). EA patients had 34% greater AAV, 197% greater VAA, and 135% greater SAA than the control subjects ($p < 0.0001$). The inflamed appendage was found in the sigmoid colon in 49% of cases, descending colon in 23% and right colon in 19%. Peritoneal thickening was a frequently reported associated sign of inflammation found in 76% of cases. Bowel wall thickening was common (47%) and diverticulosis co-existed incidentally in 28% of cases.

CONCLUSION

VAA was almost 200% larger in patients with EA as compared with control subjects. Peritoneal thickening was a frequently reported associated sign of inflammation found in 76% of cases. Inflammation of the parietal peritoneum may contribute to the clinical presentation with acute pain.

CLINICAL RELEVANCE/APPLICATION

The association between EA and increased body mass index is controversial and disputed in radiological and surgical literature. Our study finds that visceral adipose area is almost 200% higher in EA.

RC208-04 CT and MRI of Biliary Tract Emergencies

Monday, Nov. 28 9:20AM - 9:50AM Room: S102AB

Participants
Jorge A. Soto, MD, Boston, MA, (Jorge.Soto@bmc.org) (*Presenter*) Royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Understand the clinical situations where CT or MR are appropriate alternatives to US for the diagnosis of acute conditions affecting the biliary tract. 2) Recognize the CT and MR findings that allow the specific diagnosis of common acute diseases of the biliary tract. 3) Be aware of potential imaging pitfalls that can lead to missed diagnoses or misinterpretations of CT or MR examinations in the setting of suspected acute biliary disease.

Honored Educators

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Jorge A. Soto, MD - 2013 Honored Educator
Jorge A. Soto, MD - 2014 Honored Educator
Jorge A. Soto, MD - 2015 Honored Educator

RC208-05 Abdominal Ultrasound for Identifying Cholecystitis after Pain Medication Administration

Monday, Nov. 28 9:50AM - 10:00AM Room: S102AB

Awards
Student Travel Stipend Award

Participants
Joel P. Thompson, MD, Rochester, NY (*Presenter*) Nothing to Disclose
Jason G. Birnbaum, MD, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Timothy M. Baran, PhD, Rochester, NY (*Abstract Co-Author*) Research Consultant, Zenalux Biomedical Inc
Vikram S. Dogra, MD, Rochester, NY (*Abstract Co-Author*) Editor, Wolters Kluwer nv ;

PURPOSE

The Murphy sign is reported to have the highest likelihood ratio and specificity for the diagnosis of acute cholecystitis with or without the presence of gallstones. However, many patients receive pain medication prior to ultrasound (US) examination, limiting the ability to elicit a Murphy sign. We sought to identify US signs of cholecystitis in patients after pain medication administration.

METHOD AND MATERIALS

IRB-approved retrospective review of adult emergency department and inpatients with right upper quadrant pain who received an US within 2 hours of receiving pain medication. Cholescintigraphy (HIDA) performed within 48 hours of the US served as the gold standard to identify patients with and without cholecystitis. Patients post cholecystectomy were excluded. US exams were reviewed for the presence of gallstones, gallbladder distention, wall thickening, sludge, wall hyperemia, and pericholecystic fluid. Gallbladder length and width was measured on a single sagittal image and were used to calculate gallbladder volume.57 patients met inclusion criteria; 6 patients with hepatitis or choledocholithiasis were excluded. US findings compared between 16/51 patients with normal HIDA and 35/51 with positive HIDA.

RESULTS

Stones in the gallbladder neck were highly associated with cholecystitis (40% vs 6% of controls, p=0.002), particularly when stones were immobile (29% vs 0%, p=0.001). Increased gallbladder distention and lumen width were associated with cholecystitis (67 mL3 vs 34 mL3, p=0.002; width 34 mm vs 27 mm, p=0.014). Lumen width >31 mm had a sensitivity of 60% and specificity of 88% for cholecystitis. Gallbladder sludge was also associated with cholecystitis (54% vs 25%, p=0.045). The presence of gallstones, gallbladder wall thickening, and wall hyperemia were not significantly associated with cholecystitis. No US findings significantly differentiated acute from chronic cholecystitis.

CONCLUSION

US can reliably identify cholecystitis even when a Murphy's sign cannot be elicited in patients medicated for pain. Immobile gallbladder neck stones, sludge, gallbladder distention, and gallbladder lumen width >31mm are highly associated with cholecystitis.

CLINICAL RELEVANCE/APPLICATION

US can reliably identify cholecystitis even when a Murphy's sign cannot be elicited in patients medicated for pain, potentially decreasing time to diagnosis and treatment.

RC208-06 Seeing is Believing: Visualization of Radiolucent Gallstones on Dual-Energy CT

Monday, Nov. 28 10:00AM - 10:10AM Room: S102AB

Participants
Tim O'Connell, MD, Meng, Vancouver, BC (*Presenter*) President, Resolve Radiologic Ltd Speake, Siemens AG
Patrick D. McLaughlin, FFRRCSI, Vancouver, BC (*Abstract Co-Author*) Speaker, Siemens AG
Faisal Khosa, FFR(RCSI), FRCPC, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Mohammed F. Mohammed, MBBS, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Luck J. Louis, MD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Savvas Nicolaou, MD, Vancouver, BC (*Abstract Co-Author*) Institutional research agreement, Siemens AG

PURPOSE

Gallstone disease affects 10-15% of the population, and is a frequent cause of presentation to the ER for abdominal pain. Unfortunately, up to 80% of gallstones are radiolucent, making their diagnosis on x-ray or CT very difficult, and requiring an ultrasound or MRI for diagnosis. In this study, we hypothesized that radiolucent calculi not visible on standard CT could be diagnosed using dual-energy CT with post processing using a virtual noncalcium (VNC) technique.

METHOD AND MATERIALS

40 dual-energy CT scans in unique patients without evidence of cholelithiasis were obtained, in 20 patients with cholelithiasis and 20 without as proven on a recent ultrasound. CT scans were performed on a dual-tube, dual-energy multidetector CT scanner (either a Siemens Definition Flash or Force). Post processing was performed with Siemens Syngo.Via software using VNC with a threshold set at 0 HU, and these images were reviewed alongside the standard blended-energy greyscale images. Three reviewers (two staff and one fellow), all with abdominal radiology fellowships, reviewed all 40 cases in a blinded and randomized fashion, and scored whether cholelithiasis was present or absent, along with a confidence rating (0-10).

RESULTS

Of the 20 cases with radiolucent cholelithiasis, 15 were identified correctly by all readers. Of the 20 cases without cholelithiasis, 19 were identified correctly by all readers. Across all readers, diagnostic performance (95% CI) was: Sensitivity 85% (72.9-92.5%), Specificity 98.3% (89.8-99.9%), PPV 98.1%(88.4-99.8%), NPV 86.8% (75.8%-93.4%). Average reader confidence was 9.6/10. If only cases with calculi > 5mm are included, performance improves to: Sensitivity 91.1% (79.6-96.7%), Specificity 98.1% (88.8-99.9%), PPV 98.1% (88.4-99.9%), NPV 91.3% (80.3-96.8%).

CONCLUSION

We have demonstrated that dual-energy CT can be used to diagnose cholelithiasis in cases of radiolucent calculi. It is suggested

that sensitivity may be better in cases where calculi are larger. Limitations of this study include the small sample size, and a lack of post-surgical correlation for calculus type. Future study will expand the sample size, include ex-vivo calculus evaluation, and also evaluate for cases of choledocholithiasis.

CLINICAL RELEVANCE/APPLICATION

Diagnosing cholelithiasis at CT will reduce costs of US and MRI usage and will help patients through diagnosis of biliary colic and may improve diagnostic accuracy for cholecystitis.

RC208-07 Imaging of Bowel Obstruction

Monday, Nov. 28 10:10AM - 10:40AM Room: S102AB

Participants
Vincent M. Mellnick, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Utilize CT to identify and characterize bowel obstruction and to correlate these findings with plain film and fluoroscopy. 2) Identify patients for whom MRI would be a reasonable alternative diagnostic imaging choice when radiation dose is a primary concern. 3) Compare the underlying causes and imaging findings of bowel obstruction, including common causes such as adhesions, malignancy, and hernias, emphasizing the differences in epidemiology between small and large bowel obstruction. 4) Assist referring clinicians in identifying the cause and severity of bowel obstruction, including cases complicated by or at risk for ischemia, to guide operative versus nonoperative management.

ABSTRACT

Bowel obstruction is a common cause for abdominal pain in emergency department patients. A timely diagnosis is critical – when left untreated, bowel obstruction can lead to vascular compromise and potentially necrosis and perforation. CT has become the diagnostic mainstay for evaluating bowel obstruction, and is typically preferred over plain film and fluoroscopy due to its superior performance in identifying an underlying cause as well as patients who have or are at risk for intestinal ischemia. In young patients, particularly those with chronic bowel obstruction and/or who are pregnant, MRI can be a reasonable alternative imaging exam choice, however. Causes of bowel obstruction vary based on anatomic location, but broadly include adhesions, tumors, and hernias. These common causes as well as more rare diagnoses will be discussed in this case-based review.

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Vincent M. Mellnick, MD - 2016 Honored Educator

RC208-08 New Trends in the Management of Acute Diverticulitis: Predicting Outcomes with MDCT and Clinical Parameters

Monday, Nov. 28 10:40AM - 10:50AM Room: S102AB

Awards
Student Travel Stipend Award

Participants
David D. Bates, MD, Boston, MA (*Presenter*) Nothing to Disclose
Marina C. Bernal Fernandez, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Cecilia Ponchiardi, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Michael von Plato, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Joshua Teich, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Chaitan Narsule, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Stephan W. Anderson, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Avneesh Gupta, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Christina A. LeBedis, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine whether MDCT imaging features and clinical findings can predict outcomes in patients with acute diverticulitis in the Emergency Department (ED).

METHOD AND MATERIALS

This retrospective study was IRB approved; informed consent was waived. All adult patients (>18 years old) diagnosed with acute diverticulitis in the ED via contrast-enhanced abdominopelvic MDCT from 1/1/2015-12/31/2015 were included. 169 patients met inclusion criteria (males n=69, female n=100, mean age 54.7 years, range 23-90 years). The CT studies were blind reviewed by an abdominal radiologist for the presence of bowel wall thickening, inflamed diverticulum, pericolonic inflammation, pericolonic fluid collection, free fluid, free air or fistula. A Hinchey classification was also determined. Clinical data was acquired via medical chart review. Clinical parameters and CT imaging findings were compared with the clinical outcomes. Statistical analysis was performed using Fisher's exact test and Student's t-test.

RESULTS

Statistically significant imaging features on MDCT for patients requiring surgical management at any point during the study period included the presence of a pericolonic fluid collection ($p = 0.0011$), a Hinchey classification of 1b or greater ($p = 0.0002$) and the presence of a colonic fistula ($p = 0.0007$). There was no significant difference for the presence of bowel wall thickening, an inflamed diverticulum, pericolonic inflammation, free fluid, or free air. No laboratory values or vital sign parameters were significantly different.

CONCLUSION

Imaging features demonstrating a significant association with the need for surgery when compared with diverticulitis patients who were successfully managed non-operatively include the presence of a pericolonic collection, a colonic fistula, or a Hinchey classification of 1b or higher. In addition, increased hospital length of stay was associated with the need for surgical management.

CLINICAL RELEVANCE/APPLICATION

In light of a trend in surgical management away from colonic resection, CT imaging and clinical parameters may predict which patients will require operative management in acute diverticulitis.

RC208-09 Inter-Reader Agreement of CT Features of Acute Mesenteric Ischemia

Monday, Nov. 28 10:50AM - 11:00AM Room: S102AB

Participants
Pauline Copin, MD, Clichy, France (*Presenter*) Nothing to Disclose
Maxime Ronot, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Matthieu Lagadec, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Julie Benzimra, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Anne Kerbaol, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Magaly Zappa, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Valerie Vilgrain, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the inter-reader agreement of CT features of acute mesenteric ischemia (AMI)

METHOD AND MATERIALS

This study was approved by the IRB and informed consents were waived. Between 2006 and 2014, all patients admitted in our institution with the diagnosis of acute mesenteric ischemia were included. CT scans were retrospectively reviewed by two abdominal radiologists. Inter-observer agreement of imaging features of vascular insufficiency, bowel ischemia, and complication was assessed with the percentage of agreement and the kappa statistics.

RESULTS

The final population included 109 patients (57 men, 52%, mean age 50 years [17-83]), including 42% initially managed in our institution. AMI was occlusive in 102 patients (94%), including 72 (66%), 30 (28%), and 10 (9%) patients with an arterial, venous, and combined cause of AMI. respectively. The median time delay between symptoms onset and CT scan acquisition was 1 day, and 71% were performed during the first 48-hours. CT protocol included unenhanced images in 77 (71%) patients, arterial phase images in 73 (67%) patients, and oral contrast media ingestion in 11 (10%) patients. The image quality was rated as excellent for the majority of the patients (65% for reader 1 and 75% for reader 2). Inter-observer agreement was highly variable (k=0.25-0.98). Decreased/absent bowel wall enhancement showed moderate inter-observer agreement (k=0.52), but rose to excellent (k=0.82) in the 47 patients (43%) with both unenhanced and arterial phase images, no oral contrast medium, and excellent image quality ("optimal" CT protocol). It was also improved in patients with serum lactate level >2mmol/L and when CT scan was performed during the first 24-hours after the symptoms onset. Inter-observer agreement for thickened wall (k = 0.56 vs. k = 0.61), and bowel loop dilatation (k = 0.63 vs. k = 0.65) were not improved in patients with an optimal CT protocol, but that for the small bowel feces sign was significantly higher (k = 0.65 vs. k = 0.44).

CONCLUSION

Most imaging features of AMI show moderate to substantial inter-reader agreement. An optimal CT protocol acquisition leads to an improved inter-observer agreement of imaging features of AMI, especially for the decreased/absent bowel wall enhancement.

CLINICAL RELEVANCE/APPLICATION

An optimal CT scan protocol acquisition should be performed to improved inter-observer agreement of imaging features of AMI, and better identify patients with bowel necrosis.

RC208-10 MRI of Acute Right Lower Quadrant Pain

Monday, Nov. 28 11:00AM - 11:30AM Room: S102AB

Participants
Jennifer W. Uyeda, MD, Boston, MA, (juyeda@bwh.harvard.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the current utilization of MR imaging in acute right lower quadrant pain in the emergency setting. 2) To describe potential pitfalls in interpretation of MR in acute right lower quadrant pain. 3) To illustrate cases of various etiologies for acute right lower quadrant pain and their imaging manifestations on MR imaging.

ABSTRACT

RC208-11 Magnetic Resonance Imaging of Pregnant Appendicitis: Sensitivity, Specificity and Inter-reader Reliability

Monday, Nov. 28 11:30AM - 11:40AM Room: S102AB

Participants
Richard Tsai, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Joseph W. Owen, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Vincent M. Mellnick, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Constantine A. Raptis, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Kathryn J. Fowler, MD, Chesterfield, MO (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The literature on MR imaging of suspected appendicitis in pregnancy demonstrates a low negative predictive value which may be the result of a low incidence of disease. Despite this low reported negative predictive value, the MR diagnosis of appendicitis is not binary, with findings such as free fluid and increased appendiceal diameter alone lacking specificity and frequently producing an indeterminate result. A retrospective review was performed of all cases of suspected appendicitis in pregnancy imaged with MR to assess the rate of acute appendicitis after an indeterminate interpretation.

METHOD AND MATERIALS

A retrospective chart review of MR interpretations for pregnant patients with suspected appendicitis presenting to the emergency room was performed from 1/1/2003 to 4/1/2015. MR interpretations that were not read as unequivocally positive or negative were categorized as "indeterminate" for appendicitis. Patient outcomes were categorized as "acute appendicitis," "no acute appendicitis," and "other appendiceal pathology". Reference standard was surgical pathology and clinical outcomes.

RESULTS

There were 240 cases of abdominal MR performed in pregnant women for suspected appendicitis at our institution with 13 cases of acute appendicitis. 206 cases were interpreted as negative with 1 false negative. 19 cases were interpreted as positive, 12 had acute appendicitis, 3 had non acute appendiceal pathology, 3 had a normal appendix, and 1 patient was observed and released without antibiotics (7 false positives). 15 cases were interpreted as indeterminate (e.g. upper limits of normal appendix with adjacent free fluid or dilated appendix but no free fluid or stranding), 4 patients went to surgery and 8 patients were admitted for observation, no patient had acute appendicitis and 1 patient who was observed was a new presentation of Crohn disease which was included in the differential.

CONCLUSION

MR imaging of appendicitis has a low negative predictive value, likely due to the low prevalence, and a high rate of indeterminate interpretations. Equivocal findings of appendicitis including adjacent free fluid and "upper limits of normal appendix" should not be managed surgically, but may warrant admission for observation.

CLINICAL RELEVANCE/APPLICATION

MR imaging of pregnant appendicitis can help triage patients to those that may be managed conservatively, surgically, or may provide an alternative diagnosis.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Vincent M. Mellnick, MD - 2016 Honored Educator

RC208-12 Anatomic Reasons for Failure to Visualize the Appendix with Graded Compression Sonography: Insights from Concurrent CT

Monday, Nov. 28 11:40AM - 11:50AM Room: S102AB

Awards
Trainee Research Prize - Resident

Participants
Wilson Lin, MD, Redwood City, CA (*Presenter*) Nothing to Disclose
Angela Trinh, MD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Eric W. Olcott, MD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
R. Brooke Jeffrey Jr, MD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To identify anatomic reasons from CT for non-visualization of the appendix on graded compression sonography (GCS)

METHOD AND MATERIALS

A searchable database retrospectively yielded 197 consecutive patients with suspected appendicitis, enrolled over 22 months, who met inclusion criteria including: 1) appendiceal GCS was the initial imaging examination, performed in typical fashion at 8-15 MHz, 2) appendix was not visualized on GCS, and 3) appendix was visualized on CT performed within 48 hours after sonography. The following were evaluated on post-sonography CT, defining appendix position as that of the appendiceal tip: depth from the skin surface, position above or below the iliac crest, and axial location in one of four quadrants centered on the ileocecal valve, designated anteromedial (AMQ), posteromedial (PMQ), posterolateral (PLQ), and anterolateral (ALQ). Statistical evaluations with Stata 14.1 software employed the two-sided multinomial test to evaluate appendiceal distribution among quadrants collectively, and the exact binomial test to evaluate appendiceal distribution in quadrants specifically and to determine 95% confidence intervals (CI).

RESULTS

The depth of the appendix from the skin surface ranged 7 to 163 mm (mean 78.9 mm, 95% CI 75.1 - 82.7 mm) overall, and 94 to 163 mm in the deepest quartile of appendices. Of the 197 patients, 39 (19.8%, 95% CI 14.4-26.1%) had appendices lying above the iliac crest. Frequencies of the appendix found in the ALQ, PMQ, PLQ, and AMQ were 18 (9.1%), 123 (62.4%), 43 (21.8%), and 13 (6.6%), respectively, with highly significant non-uniformity among the quadrants collectively ($P < 0.0001$) favoring the PMQ specifically ($P < 0.0001$).

CONCLUSION

Appendices not visualized on sonography are significantly likely to lie in the PMQ, at a depth of 94-163 mm in 25% of patients and above the iliac crest in 19.8% of patients. Because these regions are not typically scanned in GCS, additional scanning for the

nonvisualized appendix is indicated specifically through the PMQ, above the iliac crest, and with atypically low frequency (e.g., 6 MHz or less) sufficient to reach 9-16 cm in depth.

CLINICAL RELEVANCE/APPLICATION

When the appendix is not initially visualized on sonography, further specific scanning should be performed posteromedially to the ileocecal valve as well as above the iliac crest, and with sufficiently low frequency (i.e. 6 MHz or less) to interrogate 9-16 cm from the skin surface.

RC208-13 Are Spectral Doppler Waveforms Useful to Diagnose Acute Appendicitis?

Monday, Nov. 28 11:50AM - 12:00PM Room: S102AB

Participants
Lewis Shin, MD, Stanford, CA (*Presenter*) Nothing to Disclose
Eric W. Olcott, MD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Gerald Berry, MD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
R. Brooke Jeffrey Jr, MD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To test the hypothesis that appendiceal spectral Doppler waveforms distinguish patients with and without acute appendicitis.

METHOD AND MATERIALS

With IRB approval and HIPAA compliance, sonograms performed for suspected appendicitis in 337 consecutive patients over 5 months were retrospectively blindly reviewed. Of the 155 (46%) patients in whom the appendix was visualized, spectral Doppler tracings with peak systolic velocities (PSV) and resistive indices (RI) were successfully acquired in 95 (61%). These 95 patients were categorized as appendicitis-positive [A(+)] by histopathologic examination after appendectomy or by CT confirmation of appendicitis, or as appendicitis-negative [A(-)] when 6-week post-sonography clinical chart review demonstrated no further evidence of appendicitis. Data were compared and confidence intervals (CI) obtained with Stata 14.1 software utilizing the 2-tailed T test for means and the exact binomial test for proportions.

RESULTS

The 95 patients with spectral Doppler tracings included 74 children (age <19 years) and 21 adults (ages 1-56 years, mean 13.3 years), with 54 males and 41 females, of whom 56 were A(-) and 39 were A(+).The mean PSV for A(-) and A(+) subjects were 7.1cm/s (95% CI 6.4-7.8 cm/s) and 19.2cm/s (95% CI 7.1-21.2 cm/s), respectively (P<0.0001). The mean RI for A(-) and A(+) subjects were 0.49 (95% CI 0.47-0.52) and 0.68 (95% CI 0.64-0.73), respectively (P<0.0001).Utilizing PSV >10 cm/s as abnormal, sensitivity and specificity for appendicitis were 87.2% (95% CI 72.6-95.7%) and 94.6% (95% CI 85.1-98.9%), respectively. Utilizing RI >0.60 as abnormal, sensitivity and specificity were 69.2% (95% CI 52.4-83.0%) and 89.3% (95% CI 78.1-96.0%), respectively. Utilizing both PSV >10cm/s and RI >0.60 as abnormal, sensitivity and specificity were 64.1% (95% CI 47.2-78.8%) and 96.4% (95% CI 87.7-99.6%), respectively.

CONCLUSION

Patients with appendicitis exhibit significantly higher PSV and RI than patients without appendicitis, and are distinguishable with high specificity utilizing PSV >10cm/s and RI >0.60 as diagnostic criteria.

CLINICAL RELEVANCE/APPLICATION

Spectral Doppler interrogation appears potentially useful for distinguishing patients with appendicitis from those without appendicitis, providing a high level of specificity utilizing straightforward criteria based on PSV and RI.

RC209

Gastrointestinal Series: Bowel Imaging

Monday, Nov. 28 8:30AM - 12:00PM Room: E350

GI

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 3.50

Participants
Michael S. Gee, MD, PhD, Jamaica Plain, MA, (msgee@partners.org) (*Moderator*) Nothing to Disclose

Sub-Events

RC209-01 Optimizing Diagnostic Accuracy of Crohn Disease

Monday, Nov. 28 8:30AM - 8:50AM Room: E350

Participants
Tracy A. Jaffe, MD, Durham, NC, (tracy.jaffe@duke.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Examine the role of CT Enterography (CTE) and MR enterography (MRE) in Crohn disease. 2) Review consensus guidelines for interpretation and utilization of CTE and MRE in Crohn disease. 3) Assess available imaging-related disease activity indices in Crohn Disease.

ABSTRACT

This lecture will review the indications for and role of CT and MR imaging of Crohn disease (CD) with an exploration of consensus guidelines regarding the interpretation and utilization of CTE and MRE in CD. Assessment of the available imaging-related disease activity indices will allow for better understanding of which imaging findings impact management of CD.

RC209-02 MRE Index for Grading Crohn's Disease: A Comparison

Monday, Nov. 28 8:50AM - 9:00AM Room: E350

Participants
Jordi Rimola, MD, Barcelona, Spain (*Presenter*) Consultant, Robarts Clinical Trials
Almudena Cofino, MD , La Fresneda (Siero), Spain (*Abstract Co-Author*) Nothing to Disclose
Tamara Perez-Jeldres, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Ingrid Ordas, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Sonia Rodriguez, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Julian Panes, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the accuracy of three MRE indices for detecting activity and for detecting severe disease.

METHOD AND MATERIALS

Magnetic Resonance Enterography (MRE) and ileocolonoscopies performed within 1 month from 43 patients with CD were reviewed. MRE images were interpreted with proper blinding. MaRIA, Clermond and London scores for each colonic segment and terminal ileum were calculated. Simplified Endoscopy Score for CD (SES-CD) was considered the gold standard.

RESULTS

224 segments were included in the analysis.
Correlations between MaRIA, Clermond and London indices and SES-CD were 0.68, 0.68 and 0.80 respectively ($p<0.01$). According to the established cut-off points for detecting activity using MaRIA, Clermond and London indices, the sensitivity was 0.88, 0.90, and 0.71, and the specificity was 0.97, 0.78 and 0.98 respectively.The MaRIA (94.6%) and London (92%) indices had the highest overall accuracies, that were significantly superior to Clermont index (81.3%, $p<0.0001$, and $p<0.007$, respectively). Sensitivity for detecting ulcerations was 0.90 and 0.83, and specificity 0.92 and 0.89 for MaRIA and Clermond respectively (London index does not currently have cut-off point for ulcers). When comparing the sensitivities and specificities for detecting ulcers at endoscopy, no statistical significant differences were found between MaRIA and Clermont indices, but the MaRIA showed significantly higher accuracy than Clermont index ($p=0.03$).

CONCLUSION

The three MRE-based indices evaluated in the current study have high diagnostic accuracy for assessment of disease activity. The MaRIA index has the best operational characteristics for detecting not only disease activity but also for grading severity, which supports its use in clinical studies and practice.

CLINICAL RELEVANCE/APPLICATION

Magnetic resonance enterography (MRE) is an accurate technique for assessing activity in Crohn’s disease (CD). Different MRE indices are available for use in research.

RC209-03 Role of Elastosonography and Entero-MRI for the Characterization of Mesentery and Bowel Wall in Patients with Crohn's Disease: Preliminary Results

Monday, Nov. 28 9:00AM - 9:10AM Room: E350

Participants

Dario Picone, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Federica Vernuccio, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Laura Scopelliti, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Ambra di Piazza, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Salvatore Serraino, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Chiara Tudisca, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Sergio Salerno, PhD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Tommaso V. Bartolotta, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Giuseppe Lo Re, MD, Palermo, Italy (*Presenter*) Nothing to Disclose
Massimo Midiri, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Roberto Lagalla, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic role of elastosonography (USE), apparent diffusion coefficient (ADC) and T2 signal in discriminating edematous and fibrotic change of mesentery and of the bowel wall in patients with Crohn's disease (CD).

METHOD AND MATERIALS

From July 2014 to March 2016, thirty-five patients (mean age 35,81 ± 5,15) with CD underwent MR enterography and a real-time USE at the same time. ADC values were calculated in the mesentery and in the bowel wall of pathological ileum (study group) and of normal ileum (control group) and were compared with the USE color-images and the T2 signal in the same location. In cases of patients with multiple pathological sites, the largest lesion was selected as being representative for each patient. These results were statistically analyzed.

RESULTS

In the study group, the USE color-scale coding showed a color variation from blue to red in the fibrotic pattern of mesentery and bowel wall in 15 patients, and blue to green in the edematous pattern in 20 patients. Moreover, the signal of the bowel wall and mesenteric fat was iso/hypointense on T2-weighted sequence in the fibrotic pattern and hyperintense in the edematous pattern. There was a significant diffusion restriction in 18 patients with CD in the active phase (mean ADC values for the fibrotic mesentery: 2,88 ± 0,33 x 10-3, mean ADC values for edematous mesentery: 2,14 ± 0,28 x 10-3). However, there was a significant difference between the control and the study group. In according to the data in the control group there was not a significant diffusion restriction and there were a isointense T2 signal and a predominantly green USE color-scale of the mesentery and bowel wall.

CONCLUSION

USE, ADC and signal intensity on T2-weighted sequences on MR prove to be useful tools for the evaluation of CD. USE allows the evaluation of the fibrotic or edematous changes of the mesentery and bowel wall, thus having an important potential clinical impact, mainly for therapy.

CLINICAL RELEVANCE/APPLICATION

The unique feature of USE is the non-invasive assessment of the bowel wall and mesentery; moreover, USE improves the diagnostic accuracy in the evaluation of CD in both detection and characterization of pattern changes, as well as in the guidance and evaluation of response to therapy.

RC209-04 Combined PET/MR Enterography for the Non-invasive Assessment of Inflammatory Activity in Crohn's Disease

Monday, Nov. 28 9:10AM - 9:20AM Room: E350

Participants
Karsten J. Beiderwellen, MD, Essen, Germany (*Abstract Co-Author*) Speaker, Siemens AG; Speaker, Bracco Group
Yan Li, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose
Johannes Grueneisen, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose
Benedikt Gomez, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Heusch, MD, Duesseldorf, Germany (*Abstract Co-Author*) Nothing to Disclose
Lale Umutlu, MD, Essen, Germany (*Abstract Co-Author*) Consultant, Bayer AG
Jost Langhorst, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas C. Lauenstein, MD, Essen, Germany (*Presenter*) Nothing to Disclose

PURPOSE

To assess the performance of combined PET/MR enterography in the assessment of inflammatory activity in Crohn's disease.

METHOD AND MATERIALS

38 patients with Crohn's disease (female: n=24; mean age: 44 ± 13 years) underwent PET/MR enterography with [18F]Fluorodeoxyglucose (FDG) using an integrated PET/MR scanner. For bowel distension an oral contrast solution (1500 cc of mannitol and locust bean gum) was ingested. The MR protocol comprised: 1) TrueFISP cor; 2) T2w HASTE fs cor and ax.; 3) dyn. T1w VIBE cor post gadolinium; 4) T1w FLASH 2D cor and ax post gadolinium as well as 5) EPI DWI ax (b=0, 500, 1000). PET was acquired for 8 min per bed. The datasets were reviewed by two readers in consensus regarding the presence of active inflammation. For each segment of the lower gastrointestinal tract SUVmax as well as SULmax (SUVmax/SUVmaxLiver) was determined. Ileocolonoscopy with a segment-based analysis served as standard of reference. ROC analysis for SUVmax and SULmax was performed to determine an optimal cutoff value. Furthermore, accuracy, sensitivity and specificity for PET, MRI and combined PET/MR were determined.

RESULTS

219 ileocolonic segments were evaluated. According to the reference standard, active inflammation was present in 33 segments. A cutoff value for SULmax of > 1 was associated with the highest accuracy (SULmax > 1: 0.78; SULmax>1.5 : 0.66; SULmax > 2: 0.74; SULmax > 3: 0.64) for the detection of inflammation. Using a cutoff value of SULmax < 1 sensitivity for PET was 88%, specificity 76%. MRI alone was associated with a higher specificity (sensitivity: 75%, specificity: 96%). Compared to MRI alone the combination of PET and MRI lead to an increase in sensitivity as well as decrease in specificity (sensitivity: 88%, specificity: 87%).

CONCLUSION

In combined PET/MR enterography FDG-PET as well as the MR data provide complementary information for the non-invasive assessment of inflammatory activity. In the present study the combination of PET with MRI lead to an increase in sensitivity.

CLINICAL RELEVANCE/APPLICATION

Combined PET/MR enterography allows for a multimodal and non-invasive assessment of inflammatory activity in Crohn's disease.

RC209-05 Demystifying Obscure GI Bleeding

Monday, Nov. 28 9:20AM - 9:40AM Room: E350

Participants
Jeff L. Fidler, MD, Rochester, MN, (fidler.jeff@mayo.edu) (*Presenter*) Nothing to Disclose

Active Handout:Jeff L. Fidler

http://abstract.rsna.org/uploads/2016/16000486/ACTIVE RC20905 Demystifying GI Bleeding RSNA 2016 handout.pdf

LEARNING OBJECTIVES

1) Define the types of GI bleeding. 2) List the most common causes of GI bleeding. 3) Develop appropriate management algorithms for patients with GI bleeding. 4) Describe the typical appearances of the most common causes of GI bleeding.

ABSTRACT

This lecture will review the current definitions for GI bleeding and the typical appearances of the most common lesions causing GI bleeding. Appropriate management algorithms will be discussed. Tips for optimizing detection will be demonstrated.

RC209-06 Predictive Value of CT for First Esophageal Variceal Bleeding in Patients with Cirrhosis: Value of the Para-umbilical Vein Patency

Monday, Nov. 28 9:40AM - 9:50AM Room: E350

Participants
Paul Calame, Besancob, France (*Abstract Co-Author*) Nothing to Disclose
Maxime Ronot, MD, Clichy, France (*Presenter*) Nothing to Disclose
Jean-Paul Cervoni, Besancon, France (*Abstract Co-Author*) Nothing to Disclose
Sebastien Bouveresse, Besancon, France (*Abstract Co-Author*) Nothing to Disclose
Valerie Vilgrain, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Eric Delabrousse, MD, Besancon, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate if the presence of a patent PUV assessed on contrast-enhanced CT is associated with a lower risk of first esophageal variceal bleeding (EVB) in patients with cirrhosis.

METHOD AND MATERIALS

From January 2010 to June 2012 patients with cirrhosis without preventive treatment for portal hypertension who underwent a contrast-enhanced CT and an upper gastrointestinal (GI) endoscopy within six months were included. Imaging were retrospectively reviewed by two abdominal radiologists to assess 1) presence and diameter of a PUV, 2) spleen size, 3) presence of ascites. PUV were considered large (LPUV) when > 5mm. Factors associated with a first EVB were identified by multivariate analysis, and a predictive score was built. It was validated in another prospectively included cohort of 55 patients with similar inclusion criteria, and followed up during at least 12 months after the initial CT.

RESULTS

172 patients (113 male, 67%, mean 60±12 yo) were included, including 43 (25%) who experienced a first EVB. The mean delay between CT and upper GI endoscopy was 1.6±1.7 months. Overall, 122 patients (71%) had high-risk esophageal varices. The mean PUV diameter was significantly higher in patients with no bleeding (mean 4.0±4.0 vs. 2.3±2.0 mm, p 0.001). A LPUV was more frequent in patients with low-risk varices (43 vs. 21 %, p=0.024). A LPUV was also more frequent in the group without EVB (27% vs. 7%, p=0.005). At multivariate analysis, factors associated with a first EVB were spleen size>135mm (OR=1.32 [95%CI-1.16-1.51], p<0.001), ascites (OR=4.07 [95%CI-1.84-9.01], p=0.001) and small/absent PUV (OR=3.06 [95%CI-1.86-5.05], p<0.001). By combining these factors, an 5-points imaging score was built, and showed significant associated with first EVB in the study cohort. The predictive value of the score was confirmed in the validation cohort (EVB in 0%, 19%, and 33% when score 0-1, 2-3, and 4-5, respectively).

CONCLUSION

The presence of a large PUV (i.e. >5mm) at CT, together with an enlarged spleen and ascites combined in a simple imaging scoring system could help predict first esophageal varice bleeding in cirrhotic patients.

CLINICAL RELEVANCE/APPLICATION

In cirrhotic patients, the presence/absence of a large PUV at CT could help predict the first esophageal variceal bleeding. Such findings may be valuable for patient management (performing upper GI endoscopy or discussing the introduction of preventive medical treatment).

RC209-07 Pearls and Perils of Imaging Bowel Ischemia and Obstruction

Monday, Nov. 28 10:10AM - 10:30AM Room: E350

Participants
Jorge A. Soto, MD, Boston, MA, (Jorge.Soto@bmc.org) (*Presenter*) Royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Identify the signs of bowel obstruction on CT and properly classify obstruction as "high grade" or "low grade". 2) Recognize the characteristic signs of closed loop obstruction. 3) Detect signs of bowel wall ischemia that warrant early surgical therapy.

ABSTRACT

This presentation will review the typical signs of small bowel obstruction on CT, along with potential imaging pitfalls. Findings suggestive of complications that require surgical therapy (mainly ischemia and closed loop) will be emphasized. Various causes of small bowel obstruction will be illustrated.

Honored Educators

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Jorge A. Soto, MD - 2013 Honored Educator
Jorge A. Soto, MD - 2014 Honored Educator
Jorge A. Soto, MD - 2015 Honored Educator

RC209-08 Improved CT-Diagnosis of Bowel Wall Ischemia by using A Novel Frequency Selective Non-linear Blending Algorithm

Monday, Nov. 28 10:30AM - 10:40AM Room: E350

Participants
Sven Schneeweiss, MD, Tubingen, Germany (*Presenter*) Nothing to Disclose
Wolfgang M. Thaiss, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Christopher Kloth, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Malte N. Bongers, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Georg Bier, MD, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Konstantin Nikolaou, MD, Tuebingen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG; Speakers Bureau, Bracco Group; Speakers Bureau, Bayer AG
Marius Horger, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Georg Bier, MD, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine whether the use of a frequency selective non-linear blending algorithm called "best contrast(BC)" complementary to the standard linear blending for portal-venous phase CECT-image data of the GI-tract improves early detection of mesenteric ischemia.

METHOD AND MATERIALS

We retrospectively analysed CECT-image data from 26 consecutive patients with acute mesenteric ischemia. Reference standard was the intraoperative + histologic diagnosis. The appropriate pre-sets of BC algorithm were determined (center 40, delta 20, slope 5) by prior training in 30 patients with GI-tract disorders. Two timely separate reading sessions for CECT and for BC were performed. Bowel wall attenuation was measured for both techniques in both phases (non-enhanced and portal-venous(p.v.)) in the abnormal (ischemic) bowel segments as well as in the non-involved duodenal wall and ratios were calculated. The extent of ischemia was classified: jejunal, ileal, right or left colonic and pancolonic. Diagnostic performance of decreased bowel wall enhancement and confidence in the diagnosis were compared between the two readings by using McNemar and Wilcoxon signed rank tests.

RESULTS

Intra-operative examination + histologic work-up classified the extent of bowel ischemia as jejunal (n= 7), ileal (n=22), right colonic (n=11), left colonic (n=0) and pancolonic (n=3). Sensitivity/specificity/accuracy of CECT and BC diagnosis was 88.8%/ 77.27/ 66.66% and 90.0%/ 67.5%/ 73.77%, respectively. Bowel wall attenuation values in p.v. phase in non-involved bowel segments measured with BC (137.1, SD: 41.6) were significantly higher compared to CECT (69, SD: 18.7, p=0.001). Correspondingly, the ratio between p.v. bowel wall enhancement values and those measured in non-enhanced CT was also significantly higher (4.3 vs. 2.1, p=0.01).Generally, delineation between involved and non-involved bowel segments was more evident using BC blending. In 2 patients CECT could not detect bowel ischemia whereas in 6 patients additional involved bowel segments were diagnosed only by BC.

CONCLUSION

The use of a frequency selective non-linear blending algorithm complementary to standard image windowing significantly increases the portal-venous/non-enhanced bowel wall attenuation ratio and thus detection and delimitation of mesenteric ischemia.

CLINICAL RELEVANCE/APPLICATION

Better and eventually also earlier diagnosis of mesenteric ischemia is imperative for optimal patient management.

RC209-09 Improving Your CT Colonography Interpretation Skills

Monday, Nov. 28 10:40AM - 11:00AM Room: E350

Participants
Judy Yee, MD, Clayton, CA, (judy.yee@ucsf.edu) (*Presenter*) Research Grant, EchoPixel, Inc

LEARNING OBJECTIVES

1) Examine time-efficent methods of interpretation while maintaining high accuracy. 2) Identify common and uncommon causes of false positives on CT colonography. 3) Define accurate methods of polyp measurement. 4) Classify findings using the C-RADS

scheme.

ABSTRACT

This lecture will focus on providing strategies for time-efficent interpretation of CT colonography while maintaining high accuracy. Multiple causes of common and uncommon pitfalls will be demonstrated to help readers improve interpretation skills. Suggested techniques for lesion measurement on 2D and 3D images will be demonstrated for cases with and without tagging. Case review will be performed to show classification of colonic findings using the C-RADS scheme.

RC209-10 Comparative Effectiveness of CT Colonography versus Other Strategies in Colorectal Cancer Screening

Monday, Nov. 28 11:00AM - 11:10AM Room: E350

Participants
Vinay A. Duddalwar, MD, FRCR, Los Angeles, CA (*Presenter*) Nothing to Disclose
Afsaneh Barzi, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Tapas Tejura, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Heinz Lenz, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
David I. Quinn, MD, PhD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Sarmad Sadeghi, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

CT Colonography (CTC) is not recommended by the US Preventive Services Task Force and Centers for Medicare and Medicaid. It is thought that the incidence reduction (IR) and cancer mortality reduction (CMR) associated with screening with optical colonscopy (OC) and flexible sigmoidoscopy (FS) are derived from their role in detection of adenomas as opposed to invasive cancer and down-staging. CTC is able to detect adenomas but data for its efficacy in IR and CMR is unavailable

METHOD AND MATERIALS

A Markov model was built to represent the CRC incidence and its natural history in the US general population. Individual level simulation was used to compare the benefits of CRC screening from a societal perspective. Costs and effects were discounted (Dis) at 3%. 13 screening strategies (ST) were compared to no screening. The sensitivity of CTC for detection of adenomatous polyps > was set at .8 relative to CS. Dis Life Years (LY), IR, CMR, and Dis costs of screening and total costs of care were measured. Incremental cost effectiveness ratios (ICERs) were calculated

RESULTS

OC emerged as the most effective screening strategy. CTC is the second most effective strategy and has an ICER of $1000/LYG.

CONCLUSION

Although CTC was dominated by OC, it would be next most cost effective strategy among the remaining screening strategies. While further research into the efficacy of CTC and its ability to reduce the CRC incidence and mortality is warranted, it can be seen from these results that it has an important role in the screening for colorectal cancer. In this model, the cost effectiveness of CTC was better than strategies such as fecal DNA.

CLINICAL RELEVANCE/APPLICATION

CT colongraphy has an important role in the different possible strategies for screening for colorectal carcinoma

RC209-11 Computer-aided Detection of Colorectal Polyps at CTC: Prospective Evaluation of Clinical Performance and Third-party Reimbursement

Monday, Nov. 28 11:10AM - 11:20AM Room: E350

Participants
Timothy J. Ziemlewicz, MD, Madison, WI (*Presenter*) Consultant, NeuWave Medical, Inc
Vu Lam, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
David H. Kim, MD, Middleton, WI (*Abstract Co-Author*) Consultant, Viatronix, Inc; Co-founder, VirtuoCTC, LLC; Medical Advisory Board, Digital ArtForms, Inc; Stockholder, Cellectar Biosciences, Inc
J. Louis Hinshaw, MD, Middleton, WI (*Abstract Co-Author*) Stockholder, NeuWave Medical Inc; Stockholder, Cellectar Biosciences, Inc
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Jessica B. Robbins, MD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV

PURPOSE

To date, computer-aided detection (CAD) at CT colonography (CTC) has been studied using retrospective case review. We assess the prospective performance and initial third-party reimbursement rates of computer-aided detection (CAD) at CT colonography (CTC) for detecting colorectal polyps ≥6 mm in actual clinical practice.

METHOD AND MATERIALS

An FDA-approved version of CAD (iCAD) is currently employed in our routine CTC clinical practice. We prospectively assessed the performance of this CAD system in second-reader mode in 347 adults (mean age, 57.6 years; 205 women, 142 men) undergoing CTC evaluation over a 5 month period. All individuals underwent cathartic bowel preparation with stool tagging; electronic cleansing was not applied. The reference standard consisted of the prospective interpretation by experienced radiologists combined with subsequent optical colonoscopy (OC), if performed. We also assessed the current rate of third-party reimbursement for CAD for studies performed over a 3-month period, where CPT code 76497 and a $30 charge were applied.

RESULTS

Of 347 total patients in the cohort during the study period, 69 patients (mean age, 59.0 ±7.7 years; 32 men, 37 women) were

called positive for 129 total colorectal polyps ≥6 mm. Overall per-polyp CAD sensitivity was 88.4% (114 of 129), including 88.3% (83 of 94) for 6-9 mm polyps and 88.6% (31 of 35) for polyps ≥10 mm, respectively. Of the 129 detected polyps, 58 were detected by CAD on two views, and 56 on a single view. On retrospective review, there were five additional polyps ≥6 mm seen at OC but not prospectively called at CTC, three of which were marked by CAD, but dismissed as false positives. The mean number of false-positive CAD marks/series was 5.3 ± 2.6. Out of the 144 cases within the 3-month interval for reimbursement assessment, 26.9% of the total charges had been recovered to date from a variety of third-party payors.

CONCLUSION

In our routine clinical practice, CAD demonstrated good sensitivity for detecting colorectal polyps ≥6 mm, with an acceptable number of false-positive marks. Importantly, CAD is already being reimbursed by some third-party payors in our clinical practice.

CLINICAL RELEVANCE/APPLICATION

This is the first study to evaluate CAD in routine clinical practice and demonstrates good sensitivity for polyp detection as well as confirming reimbursement, both of which stand to improve adoption.

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Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
Perry J. Pickhardt, MD - 2014 Honored Educator

RC209-12 Spectral Photon-Counting Computed Tomography: Initial Experience with Dual Contrast Agent K-Edge Colonography

Monday, Nov. 28 11:20AM - 11:30AM Room: E350

Participants
Daniela Muenzel, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Daniel Bar-Ness, Bron, France (*Abstract Co-Author*) Nothing to Disclose
Ewald Roessl, PhD, Hamburg, Germany (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Ira Blevis, Haifa, Israel (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Alexander A. Fingerle, MD, Munchen, Germany (*Presenter*) Nothing to Disclose
Stefan Ruschke, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Philippe Coulon, PhD, Suresnes, France (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Heiner Daerr, DIPLPHYS, Hambrg, Germany (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Matthias Bartels, PhD,DIPLPHYS, Hamburg, Germany (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Bernhard Brendel, Hamburg, Germany (*Abstract Co-Author*) Researcher, Koninklijke Philips NV
Axel Thran, Hamburg, Germany (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Michal Rokni, PhD, Haifa, Israel (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Loic Boussel, MD, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
Franz Pfeiffer, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Roland Proksa, Hamburg, Germany (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Ernst J. Rummeny, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Philippe C. Douek, MD, PhD, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
Peter B. Noel, PhD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the potential of spectral photon-counting computed tomography (SPCCT) to improve CT colonography (CTC) by differentiating between gadolinium and non-ionic iodine based contrast agent in the colon by using the characteristic K-edge of gadolinium.

METHOD AND MATERIALS

A custom-made colon phantom was filled with non-ionic iodine based contrast agent, and a gadolinium-filled capsule, representing an enhanced polyp, was positioned on the colon wall. The colon phantom was scanned with a pre-clinical spectral photon-counting CT system. By fully utilizing the multi-bin spectral information, material decomposition was performed to generate iodine and gadolinium maps. Quantitative measurements were performed, within the lumen and the polyp, to determine quantitatively the absolute concentrations of iodine and gadolinium.

RESULTS

In a conventional CT slice, absorption values of both contrast agents were approximately 110 HU. Contrast material maps clearly differentiate the distributions, with gadolinium solely in the polyp and iodine in the lumen of the colon. Quantitative measurements, in the colon and polyp, of contrast material concentrations matched well with actual prepared mixtures.

CONCLUSION

Dual contrast SPCCT colonography with iodine filled lumen and gadolinium tagged polyps may yield significant improvement of discrimination between polyps and tagged fecal material.

CLINICAL RELEVANCE/APPLICATION

Dual contrast SPCCT with material decomposition offers laxative-free colonography with optimized image quality.

RC209-13 Challenges in Interpretation of MRI in Primary Rectal Cancer

Monday, Nov. 28 11:30AM - 11:50AM Room: E350

Participants
Daniele Marin, MD, Durham, NC, (daniele.marin@duke.edu) (*Presenter*) Research support, Siemens AG

LEARNING OBJECTIVES

1) Clarify the indications and technical considerations for MRI in primary rectal cancer. 2) Recognize the challenges and artifacts associated with MRI of the rectum. 3) Identify specific solutions to the imaging challenges and artifacts with MRI of the rectum.

ABSTRACT

This lecture will review the current indications and technical considerations for MRI in primary rectal cancer. Common challenges and potential artifacts associated with MRI of the rectum will be presented with a discussion of potential solutions and practical tips.

RC209-14 Evaluation of Rectal Cancer Response to Therapy: Role of Magnetic Resonance Tumour Regression Grade (MR-TRG) to Predict Pathological Complete Response

Monday, Nov. 28 11:50AM - 12:00PM Room: E350

Participants
Marco Rengo, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Simona Picchia, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Damiano Caruso, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Davide Bellini, MD, Latina, Italy (*Abstract Co-Author*) Nothing to Disclose
Domenico De Santis, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Andrea Laghi, MD, Rome, Italy (*Abstract Co-Author*) Speaker, Bracco Group Speaker, Bayer AG Speaker, General Electric Company Speaker, Koninklijke Philips NV

PURPOSE

To evaluate if the rectal cancer response to radiochemotherapy (RCT) can be accurately predicted by the tumor regression grade performed with Magnetic Resonance (MR)

METHOD AND MATERIALS

We carried out a multicentric prospective study. 65 patients were examined, with locally advanced rectal adenocarcinoma (Stage II and III), candidated for preoperative radiochemotherapy. All the analysis were performed on a 3 Tesla scanner before, during and after RCT. All patients underwent total mesorectal excision 6-8 weeks after the end of RCT. MR-TRG was performed only on T2-weighted images during and after therapy, by evaluating the percentage of fibrosis with an automatic quantitative assessment. We used the platform Matlab to implement the algorithm K-Means. We divided the examined tumors into four classes, according to the increasing percentage of fibrosis (<25%, >25-50%, >50-75%, >75%) and we organized the results into two groups, unfavorable (MR-TRG class 1-2-3) and favorable group (MR-TRG class 4). Then the MR-TRG was correlated with pathology, with P-TRG and with patient's prognosis

RESULTS

In the MR performed after therapy, all complete responders at histology were included into the favorable group (MR-TRG class 4), while in the MR performed during therapy 5 complete responders were included in the unfavorable group (MR-TRG class 3). The correlation between the percentage of fibrosis obtained with P-TRG and MR-TRG was good during therapy and excellent after therapy. Significant differences in terms of overall survival(OS) and disease free survival(DFS) were found between favorable and unfavorable group.

CONCLUSION

MR-TRG is easy to be performed. MR-TRG has shown to be an important imaging biomarker, that can predict the complete response to therapy, and a significant prognosis' factor. When a MR-TRG class 1-2-3 was observed after therapy, the persistence of disease should be suspected. MR-TRG can offer to multidisciplinary team alternative treatment options.

CLINICAL RELEVANCE/APPLICATION

MR-TRG can be considered a biomarker for the evaluation of the response to CRT and correlates with patient's prognosis

RC229

Rectal Carcinoma: Pre and Post Treatment Evaluation with MRI (An Interactive Session)

Monday, Nov. 28 8:30AM - 10:00AM Room: N228

GI MR OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC229A Rectal Carcinoma Pre-Treatment Staging Standardized Reporting: Have you Checked the 'DISTANCE?'

Participants
Caroline Reinhold, MD, MSc, Montreal, QC (*Presenter*) Consultant, GlaxoSmithKline plc

LEARNING OBJECTIVES

1) To propose a MR imaging protocol for staging newly diagnosed rectal carcinoma. 2) To understand the anatomy of the rectum and mesorectum as pertains to MRI staging. 3) To propose a step-by-step approach for standardized MRI staging of pre-treatment rectal carcinoma using the mnemonic "DISTANCE".

ABSTRACT

In the Western Hemisphere, colorectal cancer is the third most common cancer in men after prostate and lung, and the second most common in women after breast cancer. One-third of colorectal cancers occur in the rectum. Survival rates for rectal cancer have improved in the past decade due to the combined effects of better staging, improved preoperative treatment strategies and total mesorectal excision (TME) surgery. Several studies have been published showing the ability of MRI to accurately stage rectal cancer and predict a negative circumferential resection margin. Moreover, advances in preoperative therapies require accurate preoperative MRI staging to select those patients who may benefit from chemoradiation prior to surgery. To accurately stratify patients according to the risk of local and distant failure, imaging takes on the same importance as tumor type and genetic susceptibility. However, rectal cancer evaluation by MRI continues to pose a challenge in non experts' hands. This presentation will present a mnemonic: "DISTANCE" to enable a systematic and standardized approach to the interpretation of MR imaging in newly diagnosed rectal cancers, thereby enabling all the clinically relevant features to be adequately assessed: DIS: for Distance from the Inferior part of the tumor to the transitional Skin, T: for T staging, A: for Anal complex, N: for Nodal staging, C: for Circumferential Resection Margin, E: for Extramural vascular invasion.

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Caroline Reinhold, MD, MSc - 2013 Honored Educator
Caroline Reinhold, MD, MSc - 2014 Honored Educator

RC229B Rectal Carcinoma Post-Treatment Evaluation: What Criteria and Imaging Protocol Should I Use?

Participants
Stephanie Nougaret, MD, Montpellier, France (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To highlight current management of rectal cancer including sphincter- and organ-sparing treatment options. 2) To describe how pretreatment multi-parametric rectal MRI may serve as a predictive biomarker of subsequent tumor response to chemoradiation (CRT). 3) To propose a step-by-step approach for accurate interpretation of rectal MRI following CRT and to illustrate how the information gleaned from post CRT multi-parametric rectal MRI may influence treatment decisions.

ABSTRACT

Recent changes in the management of patients with locally advanced rectal cancer highlight the need for accurate assessment of tumor response to chemoradiation (CRT). In the past, CRT was followed by surgical resection in nearly all patients, irrespective of response to CRT. However, new data suggest that surgery may not be necessary in patients with complete response. MR imaging has become an essential tool to enable the oncology team to make appropriate treatment decisions. MRI has so far relied on changes in morphology as a measurement for response. However, this evaluation is hampered by the difficulties in differentiating residual tumor from radiation-induced fibrosis. Recent studies have suggested that adding diffusion-weighted imaging (DWI) to conventional MRI can aid this differentiation and thus improve the prediction of response after neoadjuvant therapy.Thus, the learning objectives for this lecture are as follows:1) To learn about the value of multi-parametric rectal MRI prior to and following CRT for the prediction and subsequent assessment of response to CRT. To understand how rectal MR imaging finding are essential to making patient-centered treatment decisions.2) To become familiar with "DISTANCE" mnemonic and diagnostic clues which provide a systematic approach to the interpretation of rectal MRI images in patients with rectal cancer prior to treatment and following CRT.

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educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Stephanie Nougaret, MD - 2013 Honored Educator

MSRO22

BOOST: Gastrointestinal-Science Session with Keynote

Monday, Nov. 28 10:30AM - 12:00PM Room: S103AB

GI RO OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Anna Shapiro, MD, Syracuse, NY (*Moderator*) Nothing to Disclose
Tarita O. Thomas, MD, PhD, Chicago, IL (*Moderator*) Nothing to Disclose

Sub-Events

MSRO22-01 Invited Speaker: Gastrointestinal Radiation Oncology

Monday, Nov. 28 10:30AM - 10:50AM Room: S103AB

Participants
Richard Tuli, MD, PhD, Los Angeles, CA (*Presenter*) Nothing to Disclose

MSRO22-03 Maximum Tumor Area and Reduction Rate May Predict Pathological Complete Response to NeoAdjuvant Chemoradiotherapy for Rectal Cancer

Monday, Nov. 28 10:50AM - 11:00AM Room: S103AB

Participants
Chongda Zhang, Beijing, China (*Presenter*) Nothing to Disclose
Hongmei Zhang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic value of maximum area (MA) evolution in the tumor for predicting the pathological complete response (pCR) to neoadjuvant chemoradiotherapy(CRT) in patients with locally advanced rectal cancer (LARC).

METHOD AND MATERIALS

101 consecutive patients with LARC who received CRT followed by total mesorectal excision (TME) were recruited. . Maximum area before (MApre) and after CRT (MApost) was measured on high-spatial-resolution axial T2-weighted MR images showing the largest tumor area by manually tracing a region of interest. Concurrently, Maximum area reduction ratio(MARR) was calculated as follows: [(MApre−MApost) / MApre]×100%. The correlation between each parameter and pathologic response to CRT was assessed by Kruskal-Wallis Test or Analysis of Variance. In addition, receiver operating characteristic curve (ROC) was also used to determine the diagnostic performance of MApre, MApost and MARR for predicting pCR.

RESULTS

Statistically significant differences beween pathological complete responders and incomplete responders were obtained in the predictors of MApre, MApost and MARR with p value of 0.046, less than 0.000 and 0.002, respectively. Area under the ROC curve (AUC) value were 0.639 for MApre, 0.763 for MApost, 0.707 for MARR. An optimal cutoff value of 155.5 mm2 was obtained for MApost with a sensitivity of 64.6% and a specificity of 86.4% to predict PCR.

CONCLUSION

Quantitative evaluation of maximum tumor area was feasible to differentiate pCR from non-pCR groups to CRT in rectal cancer. MApre, MApost and MARR seem to be potential tools for distinguishing pathological complete responders to aid appropriate individually tailored therapies.

CLINICAL RELEVANCE/APPLICATION

Functional MR can demenstrate maximum areas of tumors in rectal cancer and is recommended as part of a MR study to evaluate rensponses to neoadjuvant chemoradiotherapy.

MSRO22-04 Prediction of Pathological Complete Response to New Adjuvant Chemoradiotherapy by T2 Signal Intensity Evolution for Locally Advanced Rectal Cancer

Monday, Nov. 28 11:00AM - 11:10AM Room: S103AB

Participants
Chongda Zhang, Beijing, China (*Presenter*) Nothing to Disclose
Hongmei Zhang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic value of T2 signal intensity (SI) evolution in the tumor for predicting the pathological complete response (pCR) to neoadjuvant chemoradiotherapy(CRT) in patients with locally advanced rectal cancer (LARC).

METHOD AND MATERIALS

101 consecutive patients with LARC who received CRT followed by total mesorectal excision (TME) were recruited. SI(SIt) and average SI of musculus obturator internus(SIm) were measured before and after CRT on high-spatial-resolution axial T2-weighted MRI images. To reduce the influence of image-specific factors, the SI was normalised by SIm(SI=SIt/SIm), resulting relative values before (SIpre) and after (SIpost) CRT. Concurrently, SI reduction ratio(SIRR) was calculated as follows: [(SIpre −SIpost) / SIpre

]×100%. The correlation between each parameter and pathologic response to CRT was assessed by Kruskal-Wallis Test or Analysis of Variance. In addition, receiver operating characteristic curve (ROC) was also used to determine the diagnostic performance of SIpre, SIpost and SIRR for predicting pCR.

RESULTS

Statistically significant differences beween pathological complete responders and incomplete responders were obtained in the predictors of SIpost and SIRR with p value of 0.003 and 0.001, respectively. While the difference was not considered significant with a p value of 0.783 for SIpre. Area under the ROC curve (AUC) value was 0.705 for SIpost and 0.743 for SIRR. The optimal cutoff values of 1.56 (sensitivity=70.9%, specificity=63.6%) and 0.365(sensitivity=77.3%,specificity=68.4%) were obtained for SIpost and SIRR respectively.

CONCLUSION

Quantitative evaluation of T2 signal intensity was feasible to differentiate between pCR and non-pCR groups to CRT in rectal cancer. SIpost and SIRR seem to be potential tools for distinguishing pathological complete responsers to aid appropriate individually tailored therapies.

CLINICAL RELEVANCE/APPLICATION

Functional MR can demenstrate signal intensity of tumors in rectal cancer and is recommended as part of a MR study to evaluate rensponses to neoadjuvant chemoradiotherapy.

MSRO22-05 Negative FNA of Suspicious Inguinal Nodes is Associated with a Low Risk of Recurrence in Patients with Anal Carcinoma

Monday, Nov. 28 11:10AM - 11:20AM Room: S103AB

Participants
Stephanie Markovina, MD, PhD, Saint Louis, MO (*Presenter*) Nothing to Disclose

ABSTRACT

Purpose/Objective(s): Non-metastatic anal cancer is treated with definitive chemoradiation (CRT). Standard of care includes intensity modulated radiation therapy (IMRT) with dose levels defined by clinical stage and lymph node involvement, as defined by clinical exam and 18F-fluorodeoxyglucose Positron Emission Tomography (FDG-PET), but non-specific uptake in the inguinal lymph regions can complicate staging. Fine needle aspiration (FNA) is often used to evaluate equivocal FDG-PET findings, but the accuracy of the test is not well-known, as surgical dissection is a common part of management. We report our experience with groin FNA as a component of initial work-up for anal carcinoma.Materials/Methods: Patients with non-metastatic anal carcinoma and staging FDG-PET were included and charts were reviewed. Patients were treated with Nigro regimen chemotherapy (5-fluorouracil and mitomycin C) and concurrent radiation using 3 dimensional-conformal radiotherapy (3D-CRT) or IMRT, with low-dose RT to elective regions and boost to the primary tumor and involved lymph node regions. FNA was performed under ultrasound or CT-guidance.Results: 153 patients were identified with anal cancer and staging FDG-PET treated from 2003-2013. Inguinal lymph nodes were interpreted as positive or equivocal for metastatic involvement on staging FDG-PET in 58 patients (38%). Of these, 17 underwent groin FNA (30%). 8 aspirates were positive for carcinoma (47%), 9 were negative and 1 was non-diagnostic. Median dose to inguinal regions was 30Gy (range 30-45Gy) for patients with negative FNA and 54Gy (range 50.4-56Gy) for patients with positive FNA. After a median follow-up of 30.1 months, 42 patients (27%) had died, and 28 (18%) had experienced recurrence. Of patients with negative inguinal FNA, all but one patient was alive and none had experienced recurrence of disease, compared to 5 deaths and 7 recurrences among patients with positive inguinal FNA, including 2 inguinal failures.Conclusion: In a contemporary cohort of patients with anal cancer and staging FDG-PET, FNA was commonly employed for equivocal FDG-PET findings. FNA confirmed suspicion of lymph node involvement half the time. Although accuracy of FNA cannot be determined without subsequent groin dissection, recurrence is low after negative FNA of suspicious or equivocal FDG-avid adenopathy.

MSRO22-07 Multiparametric MRI as A Predictive Response Biomarker in Esophageal Cancer

Monday, Nov. 28 11:30AM - 11:40AM Room: S103AB

Participants
Connie Yip, MBChB, FRCR, London, United Kingdom (*Presenter*) Nothing to Disclose
Musib J. Siddique, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
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Gary Cook, MD, FRCR, London, United Kingdom (*Abstract Co-Author*) Research support, General Electric Company; Research support, Alliance Medical Limited; Research support, Siemens AG; Research Consultant, Blue Earth Diagnostics Ltd; Speakers Bureau, Bayer AG
Gary Cook, MD, FRCR, London, United Kingdom (*Abstract Co-Author*) Research support, General Electric Company; Research support, Alliance Medical Limited; Research support, Siemens AG; Research Consultant, Blue Earth Diagnostics Ltd; Speakers Bureau, Bayer AG
Vicky J. Goh, MBBCh, London, United Kingdom (*Abstract Co-Author*) Research Grant, Siemens AG Speaker, Siemens AG

ABSTRACT

Purpose/Objective(s): We hypothesized that imaging intratumoral angiogenesis/hypoxia may be predictive response biomarkers in esophageal cancer. We evaluated the predictive value of multiparametric MRI in neoadjuvant chemotherapy response assessment in

esophageal cancer.Materials/Methods: Patients treated with neoadjuvant chemotherapy for resectable esophageal adenocarcinoma were recruited for this IRB-approved exploratory prospective study. Patients underwent baseline (TIME0), post-cycle 1 (TIME1) and post-neoadjuvant chemotherapy (TIME2) 1.5T MRI which included high-resolution T2-weighted (T2w parameters: signal intensity histogram), diffusion-weighted (DW parameters: apparent diffusion coefficient (ADC) histogram) and dynamic contrast-enhanced MRI (DCE-MRI parameters: transfer constant (Ktrans), rate constant (kep) extravascular-extracellular volume (ve), and plasma volume (vp) derived using an extended Toft's model). A whole primary tumor volume was defined as a volume-of-interest using an in-house software. Relative change in all MR parameters between TIME1/2 and TIME0 were calculated. Primary end-point was pathological tumor regression grade defined as per the Mandard's criteria with TRG1-3 classified as responders and TRG4-5 as non-responders. Mann-Whitney U test was used to assess for associations between absolute and relative change in MR parameters and pathological tumor response. Mean±SD are presented; pResults: There were 5 responders (36%) and 9 (64%) non-responders. 1/5 (7%) patients had complete response. Baseline TIME0 ADC skewness was associated with pathological response (responders vs. non-responders: -0.2±0.1 vs. -0.5±0.3, p=0.042). The following post-treatment TIME2 parameters were also significant predictive response markers: DCE Ktrans (0.7±0.1 vs. 1.6±0.9, p=0.006), T2w entropy (4.0±0.1 vs. 3.7±0.1, p=0.003), T2w fractal lacunarity (0.006±0.002 vs. 0.004±0.001, p=0.011) and T2w mean fractal dimension (2.9±0.1 vs. 2.8±0.1, p=0.045). However, relative MR changes between TIME1/2 and TIME0 were not predictive of pathological response. A complete responder had the lowest TIME2 Ktrans value (0.54 min-1) indicating that post-treatment Ktrans may be a sensitive imaging response biomarker after neoadjuvant chemotherapy, related to reduced vascular perfusion/permeability.Conclusion: Baseline MRI ADC and post-treatment DCE/T2w parameters, but not relative change over baseline, showed potential as imaging response biomarker in esophageal cancer treated with neoadjuvant chemotherapy. These results coupled with its superior soft tissue definition make MRI an attractive imaging (re)staging modality, and bodes well for future integrated PET/MRI studies in this setting.

MSRO22-09 Proton Therapy Posterior Beam Approach with Pencil Beam Scanning for Esophageal Cancer: Clinical Outcome, Dosimetry, and Feasibility

Monday, Nov. 28 11:50AM - 12:00PM Room: S103AB

Participants
Jing Zeng, MD, Seattle, WA (*Presenter*) Nothing to Disclose

ABSTRACT

Purpose/Objective(s): With increasing availability of proton therapy as well as evolving proton technology, more patients with esophageal cancer have access to proton therapy as a treatment option. We present the feasibility and preliminary clinical results of a novel pencil beam scanning (PBS) posterior beam technique of proton treatment for esophageal cancer in the setting of tri-modality therapy, which could potentially further lower dose to normal organs. Materials/Methods: From February 2014 to June 2015, 13 patients with locally advanced esophageal cancer (T3-4N0-2M0) were treated with trimodality therapy (neoadjuvant chemoradiation, followed by esophagectomy). Eight patients were treated with uniform scanning (US) and five patients were treated with PBS. Comparison planning with PBS was performed using 3 plans: 1) AP/PA beam arrangement; 2) PA plus left posterior oblique (LPO) beams, and 3) single PA beam (treated twice for motion mitigation). Patient outcomes, including pathologic response and toxicity were evaluated. Results: All 13 patients completed chemoradiation to 50.4 Gy (RBE) and all but one patient underwent surgery. Of the 12 evaluable patients, 100% had a R0 resection and pathologic complete response was seen in 25% (3/12). There was no difference in outcome between patients treated with PBS and US. There was one grade 5 post-operative mortality (20(10% vs 17%, PConclusion: Proton therapy with a single PA beam PBS technique for preoperative treatment of esophageal cancer appears safe and feasible. Given the superior dosimetric sparing of normal tissues compared to other proton techniques, this technique should be further explored and validated.

SSC04

Gastrointestinal (Pancreas Cancer)

Monday, Nov. 28 10:30AM - 12:00PM Room: E353A

CT GI MR OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Desiree E. Morgan, MD, Birmingham, AL (*Moderator*) Consultant, General Electric Company; Research Grant, General Electric Company
Eric P. Tamm, MD, Houston, TX (*Moderator*) Institutional Research Grant, General Electric Company
Bhavik N. Patel, MD,MBA, Durham, NC (*Moderator*) Nothing to Disclose

Sub-Events

SSC04-01 Colloid Carcinoma of The Pancreas: Differentiation From Conventional Ductal Adenocarcinoma Associated with Intraductal Papillary Mucinous Neoplasm

Monday, Nov. 28 10:30AM - 10:40AM Room: E353A

Participants
Satomi Kawamoto, MD, Laurel, MD (*Presenter*) Nothing to Disclose
Siva P. Raman, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Ralph H. Hruban, Baltimore, MD (*Abstract Co-Author*) Royalties, Myriad Genetics, Inc
Elliot K. Fishman, MD, Baltimore, MD (*Abstract Co-Author*) Institutional Grant support, Siemens AG; Institutional Grant support, General Electric Company;

PURPOSE

Colloid carcinoma (CC) is a distinct subtype of pancreatic cancer usually arising in association with intraductal papillary mucinous neoplasm (IPMN). CC has specific histopathological and molecular features, and has better prognosis than conventional ductal (tubular) adenocarcinoma (DA). The purpose of this study is to determine CT features of CC compared to DA arising in association with IPMN.

METHOD AND MATERIALS

Eighty-seven consecutive patients with pathological diagnosis of IPMN with invasive carcinoma (CC or DA) who had preoperative contrast enhanced CT were retrospectively evaluated. These included 30 patients with CC (20 male, 10 female, average age: 68.2±9.4) and 57 patients with DA (30 male, 27 female, average age: 71.1±10.6). Following CT features were reviewed by 2 radiologists. (1) main pancreatic duct (MPD) diameter, (2) diameter of the largest cystic mass, (3) and its location (Head/uncinate process vs. body/tail), (4) mural nodule, (5) calcifications in mass, (6) separate extraductal solid mass, (7) morphology of transition of MPD dilatation (abrupt transition vs. communicated with cystic mass), and (8) fistula to duodenum or common bile duct (CBD). These findings are compared between CC and DA.

RESULTS

MPD diameter was larger in CC compared to DA (14.0±10.0mm vs. 8.0±4.4mm; p=0.0002). The largest cystic mass was larger in CC than DA (4.8±3.4cm vs. 2.2±1.6cm, p<0.0001), and more likely located in the head/uncinate process of the pancreas in CC compared to DA (83% vs. 50%) and less likely located in the body/tail (17% vs. 50%) (p=0.0062). Mural nodule was more commonly seen in CC than DA (67% vs. 10%, p<0.0001). Calcifications were seen only in CC in 7 cases (23%, p=0.0001). Fistula to duodenum or CBD was observed or suspected in CC in 6 cases, but none in DA (p=0.0005). DA was more likely associated with separate extraductal solid mass compared to CC (70% vs. 23%, p<0.0001). In CC, dilated MPD tended to communicate with cystic mass (89%), whereas dilated MPD tended to abruptly terminate in DA (86%, p<0.0001).

CONCLUSION

Significant dilatation of MPD, large cystic mass with mural nodules, presence of calcifications, and fistula to duodenum and CBD are suggestive of CC in cases of IPMN.

CLINICAL RELEVANCE/APPLICATION

CCs have better prognosis than DAs, and have unique CT features including markedly dilated MPD, large cystic mass with mural modules, and are predisposed to calcifications and fistulous communication to duodenum or CBD.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Elliot K. Fishman, MD - 2012 Honored Educator
Elliot K. Fishman, MD - 2014 Honored Educator
Elliot K. Fishman, MD - 2016 Honored Educator

SSC04-02 DPC4 gene Status in Primary Pancreatic Ductal Adenocarcinoma: Relationship with CT Characteristics

Monday, Nov. 28 10:40AM - 10:50AM Room: E353A

Participants
Sang Hyun Choi, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose

Hyoung Jung Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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Soyeon An, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung-Mo Hong, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Song Cheol Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myung-Hwan Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Recent advances in pancreatic ductal adenocarcinoma biology have led to the discovery of recurrent genetic mutations in K-ras, p53, and DPC4 and the identification of the core signaling pathways for this disease. However, there have been no studies on the association between DPC4 gene status and the tumor growth patterns of pancreatic ductal adenocarcinoma on imaging modalities. We conducted our present study to To investigate the relationship between CT imaging findings and DPC4 gene status and determine the prognostic value of DPC4 gene status to predict overall survival in patients with pancreatic ductal adenocarcinoma.

METHOD AND MATERIALS

Between January and December 2011, we retrospectively analyzed 163 pancreatic ductal adenocarcinomas in 163 patients who had undergone surgical resection (mean age = 61.8 years; range = 35–81 years). We divided the study patients into 2 groups according to DPC4 gene status: DPC4-intact or DPC4-lost group. The qualitative CT findings were analyzed by two reviewers. The associations between the CT imaging findings and DPC4 gene status were evaluated using univariate anlaysis and multivariate logistic regression analysis. Overall survival was compared between the DPC4-intact and DPC4-lost group using Kaplan-Meier analysis and log-rank testing.

RESULTS

Between DPC4-intact group (n=75) and DPC4-lost group (n=88), three CT findings (i.e., tumor margin, peripancreatic infiltration, and background IPMN) were significantly different in univariate analysis. Of these, the presence of well-defined tumor margin was an independent and significant predictor of DPC4-intact gene mutation status (adjusted odd ratio = 2.06; p = 0.032) in multivariate analysis. The mean overall survival of the DPC4-intact group was significantly longer than the DPC4-lost group (30.0 months vs 22.0 months; p = 0.049).

CONCLUSION

The presence of well-defined tumor margins on CT is an independent predictor of intact DPC4 gene status, which is associated with better overall survival in patients with pancreatic ductal adenocarcinoma.

CLINICAL RELEVANCE/APPLICATION

The radiogenomic features of pancreatic ductal adenocarcinoma can make more tailored treatment plans, exploring the genetic and molecular biology of this tumor.

SSC04-03 Local Staging of Pancreatic Ductal Adenocarcinoma: Analysis of CT Report Adequacy and Impact of Second Opinion Assessment at a Tertiary Referral center

Monday, Nov. 28 10:50AM - 11:00AM Room: E353A

Participants
Kevin P. Murphy, FFR(RCSI),MD, Vancouver, BC (*Presenter*) Nothing to Disclose
Anne Walsh, MBBCh, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Carol Donagh, MBBCh, MRCPI, Ballinasloe, Ireland (*Abstract Co-Author*) Nothing to Disclose
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Charles V. Zwirewich, MD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Alison C. Harris, MBChB, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Society of Abdominal Radiology and American Pancreatic Association consensus guidelines on reporting of staging CT for pancreatic ductal adenocarcinoma (PDA) recommend structured reporting to ensure complete assessment and accurate local staging. We assess adequacy of staging CT reports in this patient cohort for report completeness and adequacy in assessing local staging for potential resection, plus compare reported findings with second read evaluation of the CT studies.

METHOD AND MATERIALS

Patients with biopsy proven PDA that were discussed at pancreatic tumor rounds at a tertiary referral center over a six-month period were included. Staging CT reports and images were reviewed. Reports were assessed for completeness, employment of template reporting and local staging for potential resectability (resectable, borderline resectable, locally advanced) per above consensus guidelines. Images were also reviewed in a blinded fashion in consensus by two radiologists to assess for local stage, metastatic disease and potential for surgical resection.

RESULTS

101 staging CTs were reviewed (55% male, median age 67 years). 67% of studies were performed at outside hospitals. No report overtly utilized a report template. Lesion size, specific location, effects on pancreatic duct and effects on the biliary tree were provided in 89%, 96%, 87% and 82% of reports respectively. Specific reference to the superior mesenteric artery, celiac artery, hepatic artery, superior mesenteric vein and portal vein was absent in 45%, 53%, 59%, 38% and 53% respectively. Internal reports demonstrated complete correlation with the blinded second read with regard to local staging/potential resectability. 28% of external reports were unclear regarding vascular involvement and hence potential for resection. Second review resulted in upgrading of local stage in 36% of external reports, with the remaining 36% of external reports being concordant with second review with regard to potential resectability.

CONCLUSION

Template reporting is not utilized in the examined reports. Many reports remain incomplete, particularly regarding vascular involvement. Studies performed and reported outside of the tertiary referral center were unclear or underestimate local stage in

almost two thirds of cases.

CLINICAL RELEVANCE/APPLICATION

Accurate CT reporting of pancreatic ductal adenocarcinoma is essential in selecting patients that are potentially resectable.

SSC04-04 Additive Value of MRI with Diffusion-Weighted Imaging to MDCT for the Characterization of Focal Liver Lesions in Patients with Potentially Resectable Pancreatic Cancer

Monday, Nov. 28 11:00AM - 11:10AM Room: E353A

Participants
Sunkyung Jeon, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jeong Min Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Grant, Guerbet SA; Support, Siemens AG; Grant, Bayer AG; Grant, General Electric Company; Grant, STARmed Co, Ltd; Grant, RF Medical Co, Ltd; Grant, Toshiba Corporation; Grant, Samsung Medical Healthcare
Ijin Joo, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Su Joa Ahn, Seoul , Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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Joon Koo Han, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the added value of magnetic resonance imaging(MRI) with diffusion weighted imaging(DWI) to preoperative staging MDCT for the characterization of focal liver lesion(FLL) in the staging work-up of patients with potentially resectable pancreatic ductal adenocarcinoma(PDAC)

METHOD AND MATERIALS

This retrospective study was approved by institutional review board; informed consent requirement was waived. We included 215 patients with pathologically proven PDACs who underwent pancreas protocol MDCT and MRI with DWI, with histologic or clinical reference standard confirmation of FLLs. Local resectability of PDACs were evaluated on MDCT (resectable, borderline resectable, unresectable) and characteristics of FLLs were scored as benign(including no FLL), indeterminate, or metastases on the MDCT set and combined MDCT and MRI with DWI set in separate sessions. Per-patient detection rate of hepatic metastasis unsuspected by MDCT and the additional diagnostic yield of MRI with DWI for FLLs were assessed.

RESULTS

Among 159 patients who were assessed to have a potentially resectable PDAC on MDCT(resectable, n=83; borderline resectable, n=76), 14 patients(8.81%, 14/159) were confirmed to have hepatic metastases and the other 145 as having benign-liver. Regarding FLLs, patients were classified as benign, indeterminate, or metastases in 128, 20, and 11 on MDCT and 142, 1, and 16 on the combined set. In MDCT-benign group(n=128), there were three hepatic metastases assessed as combined set-metastases (2.3%, 3/128). In MDCT-indeterminate(n=20), 10%(2/20) were scored as metastases and 90%(18/20) as benign on the combined set, which were finally confirmed. Among MDCT-metastasis(n=11), one case(1/11, 9.1%) was combined set-benign and confirmed as benign. The combined set yielded significantly less indeterminate FLLs(1 vs. 20, p=<.001) and showed significantly greater sensitivity for the diagnosis of hepatic metastases(100%, 14/14 vs. 64.3%, 9/14; P=.008) than the MDCT set.

CONCLUSION

In potentially resectable PDAC patients, addition of MRI with DWI to MDCT would provide a more confident diagnosis for FLLs and increase sensitivity for hepatic metastases than MDCT alone.

CLINICAL RELEVANCE/APPLICATION

The addition of MRI with DWI to MDCT would be useful in the characterization of focal liver lesions as either benign or metastases, especially for MDCT-indeterminate cases, thereby helping to determine operation candidates among patients with PDACs

SSC04-05 Evaluating Qualitative Differences Between Liver Metastasis and Microabscess in Bile Duct and Pancreas Carcinoma With Bile Duct Dilation in EOB-MRI

Monday, Nov. 28 11:10AM - 11:20AM Room: E353A

Participants
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Yu Kawashima, Chiba City, Japan (*Abstract Co-Author*) Nothing to Disclose
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Hiroaki Shimizu, Chiba, Japan (*Abstract Co-Author*) Nothing to Disclose
Takashi Uno, Chiba, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Pancreas head carcinoma or bile duct carcinoma tend to complicate bile duct dilatation, cholangitis and liver microabscess, and it is often difficult to differentiate microabscess and metastasis. We evaluated the qualitative differences between metastasis and microabscess with bile duct dilatation due to bile duct carcinoma and pancreatic carcinoma in diffusion-weighted imaging (DWI), apparent diffusion coefficient (ADC) map and hepatobiliary phase (HBP) of Gd-EOB-DTPA magnetic resonance imaging (MRI).

METHOD AND MATERIALS

We retrospectively analyzed patients with bile duct dilatation due to carcinoma who had liver lesions which were difficult to differentiate microabscess or metastasis in preoperative dynamic CT and Gd-EOB-DTPA MRI. 31 patients were included (21 males, 10 females, mean age 66.7 years, range 46-87). Each nodule was diagnosed as metastasis or microabscess by pathological diagnosis or clinical follow-up for 1 year. Two radiologists retrospectively reviewed in consensus DWI, arterial phase and HBP of MRI. The signal intensity of the nodule on DWI, and ADC map, existence of A-P shunt around lesion, and wedge-shaped low signal intensity around lesion in HBP were evaluated. Pearson's chi-square test was performed in this study.

RESULTS

89 nodules (60 metastases and 29 microabscesses) were included. Metastases were more frequent in pancreas head carcinoma (86%) than in biliary duct carcinoma (58%). Metastases showed significantly lower signal intensity on ADC map ($p<0.01$). Signal intensity on DWI had no significant differences between metastases and microabscesses. Microabscesses had A-P shunt with higher frequency ($p<0.05$), and wedged-shaped low signal intensity around lesions in HBP with high frequency ($p<0.01$).

CONCLUSION

Signal intensity of ADC map, existence of A-P shunt, and wedged-shaped low signal intensity around lesion in HBP demonstrated a significant role in the differentiation of metastasis and microabscess with bile duct dilatation due to bile duct carcinoma and pancreatic carcinoma.

CLINICAL RELEVANCE/APPLICATION

Gd-EOB-DTPA MRI is useful for differentiating microabscess from metastasis.

SSC04-06 Preoperative Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography (FDG-PET/CT) Predicts Better Prognosis after Surgical Resection in Patients with Pancreatic Cancer

Monday, Nov. 28 11:20AM - 11:30AM Room: E353A

Participants
Yoshie Omiya, Chuo-shi, Japan (*Presenter*) Nothing to Disclose
Shintaro Ichikawa, MD, Chuo-Shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Utaroh Motosugi, MD, Yamanashi, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroshi Onishi, MD, Yamanashi, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the prognostic value of preoperative fluorine 18 fluorodeoxyglucose (FDG) positron emission tomography (PET)/computed tomography (CT) in patients with operable pancreatic cancer.

METHOD AND MATERIALS

We included 103 consecutive patients who had resectable pancreatic cancer and had undergone FDG-PET/CT before the surgery. The following factors were analyzed to determine the independent predictive factors for tumor recurrence after surgery: age, sex, blood glucose level, tumor marker level (carcinoembryonic antigen [CEA] and carbohydrate antigen 19-9 [CA19-9]), PET-related parameters (maximum standardized uptake value [SUVmax]), contrast-enhanced CT-related factors (tumor size, location, enhancement pattern, and T and N factors by TNM classification), and pathological findings (tumor differentiation and positive resection margin) were assessed using Cox proportional hazards regression analysis, which was used to assess disease-free survival (DFS). Kaplan-Meier analysis was used to compare the prognosis between the groups with high and low SUVmax.

RESULTS

The median follow-up period was 20 months. The findings of the univariate analyses revealed that SUVmax ($P = 0.0004$), tumor size ($P = 0.0002$), T factor ($P = 0.0102$), N factor ($P = 0.0049$), and CA19-9 levels ($P = 0.0059$) were significantly associated with DFS. Multiple variable analysis showed that SUVmax ($P = 0.0163$) and CA19-9 levels ($P = 0.0364$) were independent predictors of DFS. The results of Kaplan-Meier analysis revealed that patients with pancreatic cancer with low (<2.5) SUVmax had a significantly better prognosis than those with high SUVmax ($P = 0.0006$). Three years after the surgery, the DFS of patients with SUVmax < 2.5 ($n = 23$) and SUVmax ≥ 2.5 ($n = 80$) was 61.9% and 9.7%, respectively.

CONCLUSION

SUVmax has prognostic value to ascertain the DFS in patients with resectable pancreatic cancer. SUVmax < 2.5 is a predictor of better prognosis.

CLINICAL RELEVANCE/APPLICATION

SUVmax determined using preoperative FDG-PET/CT can be used as a biomarker for the prediction of higher DFS in patients with resectable pancreatic cancer.

SSC04-07 CT Texture Parameters are Promising Prognostic Biomarkers in Pancreatic Ductal Adenocarcinoma

Monday, Nov. 28 11:30AM - 11:40AM Room: E353A

Participants
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Sameer Baig, MBBS, Toronto , ON (*Presenter*) Nothing to Disclose
Steven Gallinger, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Paul Karanicolas, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Masoom A. Haider, MD, Toronto, ON (*Abstract Co-Author*) Consultant, Bayer AG; ;

PURPOSE

Little has been published on the potential value of CT texture features in pancreatic ductal adenocarcinoma (PDAC). The purpose of this study was to assess whether CT-derived biomarkers of tumour heterogeneity are prognostic in patients undergoing surgery for PDAC.

METHOD AND MATERIALS

In this retrospective study, 30 consecutive patients, undergoing curative intent surgical resection for PDAC from 2009-2012 with a pre-operative contrast enhanced CT were identified from a surgical database. Whole pancreas gland and tumour regions were manually contoured using in house software (ProCanVAS). Five texture measures of regional heterogeneity namely uniformity, normalized entropy, dissimilarity, course irregularity, and structural deviation were calculated. Tumor size was also measured. Mann-Whitney rank sum test was used for comparing tumour and normal pancreas and Cox regression tests was used for assessing

association of texture features with disease specific survival (DSS).

RESULTS

Tumor tissue showed significantly lower Hounsfield intensity than normal pancreas ($p<0.001$) in all cases. Uniformity ($p<0.001$), normalized entropy ($p=0.007$), course irregularity ($p< 0.001$), and structural deviation ($p<0.001$) were significantly different in tumor regions compared to the rest of the pancreas. Univariate Cox regression analysis showed that tumor normalized entropy ($p=0.025$) and dissimilarity ($p=0.007$) were predictive of DSS. Tumor size was not associated with DSS ($p=0.100$).

CONCLUSION

PDAC texture features of normalized entropy and dissimilarity are promising prognostic imaging biomarkers of DSS for patients undergoing curative intent surgical resection.

CLINICAL RELEVANCE/APPLICATION

The application of CT texture features may guide treatment decisions such as the most appropriate use of neoadjuvant therapy in PDAC. Further validation with another independent PDAC resection dataset and analyses of the association of radiomic variables with genomic and transcriptomic subtypes is ongoing.

SSC04-08 CT Image Biomarker Analysis (Size, Density and Texture) to Predict response of Pancreatic Adenocarcinoma to Neoadjuvant Folfirinox Chemotherapy and ChemoRT

Monday, Nov. 28 11:40AM - 11:50AM Room: E353A

Awards
Student Travel Stipend Award

Participants
Kristine S. Burk, MD, Boston, MA (*Presenter*) Nothing to Disclose
Rodrigo Canellas, MD, Cambridge, MA (*Abstract Co-Author*) Nothing to Disclose
Cristina Ferrone, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Dushyant V. Sahani, MD, Boston, MA (*Abstract Co-Author*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc

PURPOSE

The purpose of this study is to investigate the role of CT image biomarkers (size, HU and texture analysis) in predicting histologic response of pancreatic adenocarcinoma (PDAC) to neoadjuvant FOLFIRINOX (folinic acid, 5-FU, irinotecan, oxaliplatin) based chemotherapy and chemoRT.

METHOD AND MATERIALS

In this IRB approved retrospective study, 39 patients with PDAC treated with neoadjuvant FOLFIRINOX based chemotherapy +/- radiation were identified. Patient charts were reviewed for demographic information and histologic response at surgical pathology [histologic response (CAP grade 0-1 or Evans grade III-IV), no histologic response (CAP Grade 2-3 or Evans grade I-II)]. 35 were treated with combination chemoRT and 4 were treated with neoadjuvant chemotherapy alone. Pre-neoadjuvant treatment and post-neoadjuvant treatment/pre-surgery imaging studies were reviewed for tumor size, density (HU), and CT textural features analyzed with the CTTA TexRAD Ltd software. For CTTA, filtered and unfiltered images were assessed to quantify heterogeneity using a set of predefined histogram-based texture parameters. The Mann-Whitney U test and logistic regression were applied for statistical significance. ROC curves were used to identify accuracy of the predictive models.

RESULTS

19 patients achieved histologic response, and 20 were non-responders. Comparing pre-neoadjuvant therapy and post-neoadjuvant therapy/pre-surgery imaging studies, there was no statistically significant difference in % change in tumor size or % change in tumor density between histologic responders and non-responders. Independently, no texture parameter could predict histologic response. However, a model incorporating multiple texture parameters including: Mean, Entropy, SD and Skewness using a medium texture (filter SSF=3) was able to predict the likelihood of a patient to have histologic response $\chi2(4)= 16.871$, $p=.002$, with an associated ROC= 0.853 ($p<.001$).

CONCLUSION

CT texture analysis can be applied in PDAC to predict histologic response to neoadjuvant FOLFIRINOX-based chemotherapy and combination chemoRT. Tumor size and density measures are insensitive in predicting treatment response.

CLINICAL RELEVANCE/APPLICATION

CT texture analysis of pre-treatment CT scans can be used to predict histologic tumor response of pancreatic adenocarcinoma to neoadjuvant FOLFIRINOX-based chemotherapy and combination chemoRT.

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Dushyant V. Sahani, MD - 2012 Honored Educator
Dushyant V. Sahani, MD - 2015 Honored Educator
Dushyant V. Sahani, MD - 2016 Honored Educator

SSC04-09 Validation of an Imaging-based Classification of Patients with Locally Advanced and Borderline Resectable Pancreatic Cancer

Monday, Nov. 28 11:50AM - 12:00PM Room: E353A

Participants
Ahmed M. Amer, MD, Houston, TX (*Presenter*) Nothing to Disclose
Yeonju Lee, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Shalini Moningi, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Gauri R. Varadhachary, MD, MBBS, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Matthew H. Katz, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Eric P. Tamm, MD, Houston, TX (*Abstract Co-Author*) Institutional Research Grant, General Electric Company
Jason Fleming, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Christopher H. Crane, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Eugene J. Koay, MD, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

We have identified a pre-therapy, multiphasic CT feature of pancreatic ductal adenocarcinoma (PDAC) that stratifies patients (pts) with localized and metastatic disease into groups with different molecular and pathological features, and clinical outcomes. This CT feature describes the gradient of enhancement (delta) across the parenchyma-tumor interface. Here we aimed to validate our imaging-based classification of high (HD) and low delta (LD) PDAC in pts with locally advanced pancreatic cancer (LAPC) and borderline resectable pancreatic cancer (BRPC). We also investigated the differential response to biological therapy in these groups

METHOD AND MATERIALS

The 1st cohort consisted of 100 pts (mean age 63.4 yrs, 38 f & 62 m, 50 LAPC & 50 BRPC) who underwent induction chemotherapy followed by standard dose chemoradiation (CRT) (50.4 Gy, 1.8 per fraction). A 2nd cohort consisted of 42 pts with LAPC who underwent concurrent bevacizumab plus capecitabine CRT (50.4 Gy, 1.8 per fraction; median age 62.5 yrs, 22 f & 20 m). Baseline pancreatic protocol CT scans were reviewed and volumetric delta measurements were calculated. We used the Cox proportional-hazards model for univariate and multivariate survival analyses

RESULTS

In the 1st cohort, the 2 year overall survival (OS) rate was shorter for the HD (25.6%) than for the LD group (59.2%; P =.005). Accounting for age, sex, stage, and surgery, delta classification was associated with OS (P = .001) and distant metastasis free survival (DMFS) (P =.007). Notably, in the 2nd cohort, delta classification was not associated with OS (P =.52) and DMFS (P =.45). On further exploration, pts with HD tumors treated with bevacizumab had better DMFS compared to HD tumors treated with standard CRT (HR, 0.48; 95%CI, 0.24 to .95; P =.03). Conversely, pts with LD tumors who received bevacizumab had worse OS compared to LD tumors treated with standard CRT (HR, 2.71; 95% CI, 1.16 to 6.33; P = .02)

CONCLUSION

Our results validate the prognostic utility of an imaging-based classification for PDAC. This classification may be useful in the selection of pts for anti-angiogenic therapy. Ongoing pathological analysis of microvessel density may provide more insight into differential responses

CLINICAL RELEVANCE/APPLICATION

Stratification of patients with PDAC based on delta score can be accomplished via standard of care CT scans. This imaging biomarker may be used for rational treatment selection in clinical trials

SSC05

Gastrointestinal (Dual-Energy CT)

Monday, Nov. 28 10:30AM - 12:00PM Room: E451A

CT GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Benjamin M. Yeh, MD, San Francisco, CA (*Moderator*) Research Grant, General Electric Company; Author with royalties, Oxford University Press; Shareholder, Nextrast, Inc;
Avinash R. Kambadakone, MD, Boston, MA (*Moderator*) Nothing to Disclose
Laura R. Carucci, MD, Midlothian, VA (*Moderator*) Nothing to Disclose

Sub-Events

SSC05-01 Dual Contrast Liver Imaging with Photon Counting CT: A New Approach for K-edge Imaging

Monday, Nov. 28 10:30AM - 10:40AM Room: E451A

Participants
Daniela Muenzel, MD, Munich, Germany (*Presenter*) Nothing to Disclose
Heiner Daerr, DIPLPHYS, Hambrg, Germany (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Roland Proksa, Hamburg, Germany (*Abstract Co-Author*) Employee, Koninklijke Philips NV
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Franz Pfeiffer, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Ernst J. Rummeny, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Peter B. Noel, PhD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the feasibility of spectral photon-counting computed tomography (SPCCT) with K-edge depending material decomposition for dual contrast enhanced liver imaging.

METHOD AND MATERIALS

SPCCT was simulated with two different contrast agents (CA) at the time point where CA1 is in portal-venous contrast and CA2 is in arterial contrast phase. Material decomposition provided iodine and gadolinium maps which are calculated from the spectral information of SPCCT. Characteristic liver lesions (hemangioma, hepatocellular carcinoma, cyst, metastasis) have been inserted into the simulation.

RESULTS

With SPCCT and an optimized contrast injection protocol, it becomes feasible to provide contrast-enhanced images with arterial distribution of CA2 (gadolinium) and portal-venous phase of CA1 (iodine) in a single CT scan. The four inserted liver lesions were clearly visible, and the characteristic patterns of contrast enhancement was seen in arterial and portal-venous images.

CONCLUSION

Our results reveal the possibilities to improve liver diagnostics by employing the combination of dual contrast protocols with SPCCT imaging. In addition to the potential dose reduction motion artifacts in-between acquisitions are eliminated.

CLINICAL RELEVANCE/APPLICATION

Dual contrast PCCT allows for simultaneous visualization of arterial and portal venous contrast enhancement, with reduced radiation dose, in a single acquisition.

SSC05-02 The Separation of Simultaneously Administered Intravascular and Oral X-ray Contrast Agents Using Spectral CT: Pre-clinical Examples of Pseudo-cloaking with High-Z Materials

Monday, Nov. 28 10:40AM - 10:50AM Room: E451A

Participants
Todd C. Soesbe, PhD, Dallas, TX (*Presenter*) Nothing to Disclose
Matthew A. Lewis, PhD, Dallas, TX (*Abstract Co-Author*) Research collaboration, CMR Naviscan Corporation
Khaled A. Nasr, PhD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Robert E. Lenkinski, PhD, Dallas, TX (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV; Research Consultant, Aspect Imaging;

PURPOSE

To show that the Spectral CT property of pseudo-cloaking (i.e., the masking or hiding of certain high-Z elements) can be used to differentiate iodine-based intravascular (IV) contrast agents from tungsten-based oral contrast agents when administered simultaneously. Unlike iodine and barium, the contrast-enhanced bowel wall and bowel lumen can be imaged independently using iodine and tungsten.

METHOD AND MATERIALS

Four female Fischer rats (n = 4) averaging 150 g mass were fasted for 24 hours. The rats were then given 4 mL of oral contrast based on either barium (12 mg Ba/mL, FDA approved BaSO4) or tungsten (20 mg W/mL). The tungsten contrast was from a tungsten carbide (WC) nanopowder colloidal suspension in methylcellulose. 30 minutes after oral contrast administration the rats

were given a 0.3 mL dose of Isovue-370 (iopamidol) via tail vein injection, euthanized with CO2 within 2 minutes after injection, then immediately imaged on a detection-based Spectral CT scanner (IQon, Philips Healthcare). The axial scans used 120 kVp with a 0.2 mm in-plane resolution. The spectrally derived images or SDIs (e.g., virtual non-contrast and iodine map) were analyzed using the thin-client Spectral Diagnostic Suite (SpDS, Philips Healthcare).

RESULTS

Both the IV (iodine) and oral (barium or tungsten) contrast agents appear in the conventional images as highly attenuating materials. The IV contrast is most noticeable in the kidneys (nephrographic/late phase) and the oral contrast is most noticeable in the stomach and small intestine. In the virtual non-contrast (VNC) images both the iodine and the barium are removed, but the tungsten is not affected. Conversely, in the iodine maps both the iodine and barium appear while the tungsten disappears (i.e., is pseudo-cloaked). We obtained similar results with phantoms on the Siemens dual-source scanners (SOMATOM Flash and Force).

CONCLUSION

Certain high-Z elements appear pseudo-cloaked in Spectral CT iodine maps, meaning they have negative pixel values and can be differentiated from iodine. This K-edge based phenomena includes ytterbium (Z=70) through platinum (Z=78) and provides a rich palette for the potential development of future Spectral CT contrast agents.

CLINICAL RELEVANCE/APPLICATION

Unlike barium, tungsten-based oral contrast agents can be differentiated from iodine, and provide complete segmentation between the bowel wall and lumen (useful for bowel ischemia and Crohn's disease).

SSC05-03 Which Dual Energy CT Virtual Monochromatic keV Reconstruction is best to Simulate Typical kVp Settings at Standard CT?

Monday, Nov. 28 10:50AM - 11:00AM Room: E451A

Participants
Yuxin Sun, BS,MSc, San Francisco, CA (*Presenter*) Nothing to Disclose
Jack Lambert, PhD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Zhen J. Wang, MD, Hillsborough, CA (*Abstract Co-Author*) Stockholder, Nextrast, Inc
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Benjamin M. Yeh, MD, San Francisco, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Author with royalties, Oxford University Press; Shareholder, Nextrast, Inc;

PURPOSE

To determine which virtual monochromatic (VMC) keV reconstruction of a rapid kV switching dual energy CT (rsDECT) scan gives the closest CT numbers (HU) to standard kVp settings.

METHOD AND MATERIALS

We euthanized 10 rabbits 5 minutes after intravenous injection of 600 mg iodine/kg intravenous iohexol, then rapidly serially imaged them on a rsDECT scanner with dual energy technique and again at single energy with 80, 100, 120, and 140 kVp tube potentials. Axial 1.25 mm images were then viewed on an Advantage Windows workstation to place 10 regions of interest (ROIs) on each of the following tissues: fat, muscle, vertebral body bone, liver, and aorta. ROIs were copied to all image sets to record the CT number (HU) at each kVp (2000 ROIs), and for each kVp we then recorded the VMC keV that gave the closest matching HU value. After determining the overall closest matching VMC keV for each kVp setting, ROIs were then obtained from each tissue at each kVp and the corresponding "best" VMC keV.

RESULTS

For fat, muscle, bone, liver, and aorta, the keV that provided the closest HU values to 80 kVp images were 56, 55, 56, 54 and 56, respectively; for 100 kVp, the keV were 62, 60, 62, 60, and 61; for 120 kVp the keV were 67, 65, 67, 65, and 65; and for 140 kVp the keV were 70, 70, 72, 69, and 70, respectively. Overall, the closest matches for 80, 100, 120, and 140 kVp CT numbers were 55, 61, 66, and 70 keV, respectively. At these closest keVs, CT number standard deviations of 2.7, 2.5, 1.7, 18, and 11 HU for fat, muscle, bone, liver, and aorta, respectively, were seen compared to the corresponding kVp HU value.

CONCLUSION

For rsDECT, VMC reconstructions at 55, 61, 66, and 70 keV most closely approximate 80, 100, 120, or 140 kVp single energy CT images, respectively, across a range of tissues in an intravenous contrast-enhanced body CT scan. Nevertheless, standard deviations of up to 2.7 and 18 HU difference may be seen for soft tissues and bone, respectively, between a given kVp setting and its corresponding keV reconstruction.

CLINICAL RELEVANCE/APPLICATION

Our data provides the necessary bridge to allow rsDECT to provide quantitative comparisons between rsDECT and prior single kVp CT scans, and may allow rsDECT access to previously established conventional CT thresholds for the diagnosis various disease entities.

SSC05-04 Determining the Origin of Periampullary Carcinoma Using Spectral Curves in Dual-energy Spectral CT Imaging

Monday, Nov. 28 11:00AM - 11:10AM Room: E451A

Participants
Chenglong Ren, Shanxi, China (*Presenter*) Nothing to Disclose
Ma Guangming, MMed, Xianyang City, China (*Abstract Co-Author*) Nothing to Disclose
Rongqiang Zhang, Xianyang, China (*Abstract Co-Author*) Nothing to Disclose
Xirong Zhang, Xianyang, China (*Abstract Co-Author*) Nothing to Disclose
Qi Yang, Xianyang, China (*Abstract Co-Author*) Nothing to Disclose
Fabao Gao, MD, PhD, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the value of using the spectral curve in dual-energy Spectral CT imaging for differentiating periampullary cancers originated from distal cholangiocarcinoma (DCA), duodenal adenocarcinoma (DA) and pancreatic adenocarcinoma (PA).

METHOD AND MATERIALS

In total, 55 patients with obstructive jaundice were imaged in the portal venous phase using dual-energy Spectral CT imaging mode with fast kVp switching. These patients were confirmed by surgical operation to have periampullary cancers that were originated from distal cholangiocarcinoma (DCA, n=14), duodenal adenocarcinomas (DA, n=17) and pancreatic adenocarcinomas (PA, n=24). Virtual monochromatic images with energies from 40keV to 140keV were generated and analyzed on an Advanced Workstation 4.6. A circular region of interest (ROI) was place at the center of the lesion on the portal phase images to measure the CT value, avoiding the dilated common bile duct. To ensure the consistency, all measurements were performed 3 times in consecutive slices to calculate the average values. The ROI measurements were propagated to all energy levels to generate the spectral HU curve: CT number as function of energy. The spectral HU curve slopes were calculated using the CT values from 40 to 80 keV: slope = [CTnumber (40keV) - CTnumber (80kev)]/40. The slopes for lesions of different origins were compared using the one-way ANOVA test ($p<0.05$ was considered to have significant difference).

RESULTS

The slopes of the spectral curves were 3.54±0.89 for distal cholangiocarcinomas, 1.52±0.62 for duodenal adenocarcinomas and 1.04±0.67 for pancreatic adenocarcinomas in portal phase. There were significant differences in the slope of the spectral HU curves of periampullary lesions between any two groups ($p<0.05$): DCA vs DA ($P < 0.001$) ; DCA vs PA ($P < 0.001$) ; DA vs PA ($P = 0.04$) .

CONCLUSION

The slopes of the spectral HU curve in Spectral CT imaging are different for periampullary carcinoma originated from DCA, DA or PA. Quantitative analysis of the spectral HU curve in Spectral CT in the portal venous phase may be used to determine the origins of periampullary carcinoma.

CLINICAL RELEVANCE/APPLICATION

For the obstructive jaundice patients, spectral CT imaging was a promising method to differentiate the origin of periampullary carcinoma.

SSC05-05 The Study of Quantitation of Hepatic Iron Deposition with Dual-energy CT on a Rabbit Model

Monday, Nov. 28 11:10AM - 11:20AM Room: E451A

Participants
Tao Li, nanning, China (*Abstract Co-Author*) Nothing to Disclose
Bingfeng Lu, Nanning, China (*Presenter*) Nothing to Disclose

PURPOSE

To explore the feasibility and accuracy of liver iron quantification with virtual iron concentration(VIC)imaging based on dual energy CT(DECT)

METHOD AND MATERIALS

Ninety-six rabbits were randomly divided into liver iron overload experiment group, validation group, iron overload and fatty liver experiment group, validation group. All rabbits underwent intramuscular injection of iron dextran 15 mg / kg from 1 to 16 week;the last two groups were fed with high fat diet additionally. DECT and MR were used for all rabbits. Liver iron concentration (LIC), liver fat concentration (LFC) , HE and Prussian blue staining were examed.

RESULTS

CT numbers of 80kVp, 120kVp, 140kVp, VIC imaging and R2* in liver iron overload group positively linearly correlated with LIC(r =0.900, 0.837, 0.719, 0.895 and 0.935, respectively); linear regression equation for LIC calculated from VIC was y=0.31x-0.48(F=129.7, P<0.01). CT numbers of VIC in the validation group were substituted into the equation to predicte LIC. Mean difference between predicted LIC and actual LIC was 0.21 mg/g. CT numbers of 80kVp, 120kVp, 140kVp, VIC imaging and R2* in the iron overload and fatty liver group positively linearly correlated with LIC(r = -0.376, -0.531, -0.618, 0.924 and 0.942, respectively); linear regression equation for LIC calculated from VIC was y=0.30x+0.23(F=265.4, P<0.001). Mean difference between predicted LIC and actual LIC was 0.19 mg/g. The difference of slope and intercept of two equations has no statistical significance(F=0.020, P>0.05;F=0.203, P>0.05).Therefore, the data of two experiment groups were merged for ROC analysis. At a LIC threshold of 3.2 mg/g, the corresponding optimal threshold of VIC was 13.7 HU, and diagnostic sensitivity, specificity and AUC were 80.43%, 100% and 0.961. At a LIC threshold of 7.0 mg/g, the optimal threshold of VIC was 22.0 HU, and diagnostic sensitivity, specificity and AUC were 95.65%, 90.24% and 0.968.

CONCLUSION

Virtual iron concentration imaging on DECT shows potential ability to accurately quantify liver iron accumulation in the iron overload rabbit model, without being affected by fatty liver.

CLINICAL RELEVANCE/APPLICATION

DECT is using for non-invasive quantitation of hepatic iron deposition

SSC05-06 Can Non-enhanced Dual-energy Spectral CT Scans Be Used to Differentiate Small Liver Cysts from Small Metastatic Tumors?

Monday, Nov. 28 11:20AM - 11:30AM Room: E451A

Participants
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Tian Xin, MMed, Xianyang City, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the clinical value of the non-enhanced dual-energy spectral CT scans in differentiating small hepatic cysts from small metastatic tumors.

METHOD AND MATERIALS

43 patients with small liver lesions (27 cases with liver cysts; 16 cases with metastases) who underwent the non-enhanced spectral CT scans were included. In total, there were 104 lesions (≤1.5cm), including 71 small liver cysts and 33 small liver metastases, were identified. The gemstone spectral imaging (GSI) Viewer software on the AW4.6 workstation was used to measure the CT number on the 40 keV virtual monochromatic images and the water concentration on the water (fat) material decomposition images. The curve slope for the spectral curve and the effective-Z values of lesions were also calculated. The above parameters for the two types of lesions were analyzed using independent sample t test, and ROC curve analysis was used to evaluate the diagnostic efficiency.

RESULTS

The CT values at 40 keV, water concentration, curve slope and Effective-Z for liver cyst were -14.77±18.24HU, 897.51±118.68g/L,-1.14±0.47 and 7.24±0.19, respectively; while the corresponding values for small metastases were 15.39±24.87HU, 1101.53±129.11g/L, -0.33±0.46 and7.43±0.18, respectively. The differences for these parameters between the two lesion types were statistically significant (all $p<0.05$). The sensitivity and specificity for differentiating small liver cyst from small metastasis with the CT number of images at 40keV was 75.8% and 76.1.1%, respectively. These values were improved to 84.8% and 95.8%, respectively using water concentration in the lesions.

CONCLUSION

The parameters obtained in the non-enhanced dual-energy spectral CT scans demonstrated appreciable clinical values for differentiating small liver cysts from small metastases, with the water concentration on the water and fat-based material decomposition images providing the highest diagnostic performance.

CLINICAL RELEVANCE/APPLICATION

The non-enhanced dual-energy spectral CT scans may be used to differentiating small liver cysts from small metastases with high diagnostic performance.

SSC05-07 Clinical Value of Spectral CT Imaging in Preoparative Evaluation on Histo-Differentiation of Rectal Adenocarcinoma

Monday, Nov. 28 11:30AM - 11:40AM Room: E451A

Participants
Chuan-bin Wang, Hefei, China (*Presenter*) Nothing to Disclose
Fei Gao, Hefei, China (*Abstract Co-Author*) Nothing to Disclose
Dong Jiangning, Hefei, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To discuss the value of the spectral CT parameters in the preoperative evaluation on histo-differentiation of rectal adenocarcinoma.

METHOD AND MATERIALS

Totally 90 patients with rectal adenocarcinoma confirmed by pathology underwent dual-phase enhanced spectral CT scan. Monochromatic images with energy levels from 40 to 140 keV was generated and the slope Kvalues were computed. And Iodine concentrations were derived from iodine-based material-decomposition CT images and normalized to the iodine concentration in the aorta(NIC). According to the results of pathology, the 90 patients were divided into poorly, moderately and well differentiated adenocarcinoma groups. Using the ROC curve to evaluate the differentiation diagnosis efficiency of NIC and slope K in rectal adenocarcinoma respectively.

RESULTS

The cases in well differentiated adenocarcinoma, moderately differentiated adenocarcinoma and poorly differentiated adenocarcinoma were 22, 50 and 18, respectively. The iodine concentration, NIC and slope K value were statistically difference both in the arterial and venous phase ($P<0.05$). According to the ROC curve, the diagnostic value of NIC was close to the slope K, in the arterial phase. The sensitivity and specificity of slope K were 77% and 79%, respectively, which were similar to that of NIC(76% and 74%, respectively). In the venous phase, slope K was associated with higher sensitivity(86%) compared to that of NIC(77%), but similar specificity(72% vs 70%).

CONCLUSION

The spectral CT can provide a new imaging method for evaluating the histo-differentiation of rectal adenocarcinoma in preoperative.

CLINICAL RELEVANCE/APPLICATION

The spectral CT can provide a new imaging method for evaluating the histo-differentiation of rectal adenocarcinoma in preoperative.

SSC05-08 Prototype Detection-based Spectral CT Scanner Derived Virtual Non-Contrast Attenuation Values Compare Favorably to Attenuation Values on Unenhanced Images

Monday, Nov. 28 11:40AM - 11:50AM Room: E451A

Participants
Lakshmi Ananthakrishnan, MD, Dallas, TX (*Presenter*) Nothing to Disclose
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Prabhakar Rajiah, MD, FRCR, Dallas, TX (*Abstract Co-Author*) Institutional Research Grant, Koninklijke Philips NV; Speaker, Koninklijke Philips NV
Negin Rassouli, MD, Cleveland, OH (*Abstract Co-Author*) Institutional Grant support, Koninklijke Philips NV
Yin Xi, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Suhny Abbara, MD, Dallas, TX (*Abstract Co-Author*) Author, Reed Elsevier; Editor, Reed Elsevier; Institutional research agreement, Koninklijke Philips NV; Institutional research agreement, Siemens AG
Todd C. Soesbe, PhD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
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Robert E. Lenkinski, PhD, Dallas, TX (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV; Research Consultant, Aspect Imaging;

PURPOSE

A prototype detection-based spectral CT scanner allows generation of virtual non-contrast (VNC) images from contrast enhanced acquisitions, but it is unknown if the resulting HU correspond to those on unenhanced images. We aim to correlate the HU resulting from detection-based spectral CT VNC to those from unenhanced images.

METHOD AND MATERIALS

This multi-institutional prospective study is IRB approved. 84 pairs of unenhanced and virtual non contrast (VNC) datasets were reconstructed in patients scanned on a prototype detection-based spectral CT scanner (IQon, Philips Healthcare). Regions of interest (ROI) were drawn on identical locations of unenhanced and VNC images in the liver, spleen, renal cortex, abdominal aorta, right psoas muscle, and subcutaneous fat, and HU values were recorded. Descriptive statistics for mean HU per ROI were calculated for different positions and phases. Equivalence testing was performed to determine if unenhanced and VNC HU were "equivalent", defined as <5/10/15 HU difference. Interobserver variability was determined.

RESULTS

1476 ROIs were evaluated. The mean attenuation difference between unenhanced and VNC was less than 15 HU in 92.7%, less than 10 HU in 75.2%, and less than 5 HU in 44.4% of all measurements. When using a threshold of 10 HU difference, equivalence testing demonstrated the unenhanced and VNC HU values to be equivalent in most tissues except fat. When divided by organ, difference in unenhanced and VNC was less than 10 HU in 81.7% of liver, 85.4% of psoas, and 81.8% of renal cortex measurements. HU in subcutaneous fat was overestimated by approximately 10 HU on all phases.

CONCLUSION

VNC data derived from contrast enhanced acquisitions on a prototype detection-based spectral CT scanner provide HU values similar to unenhanced scans in most tissues except fat. Further study is needed to determine if attenuation thresholds currently used clinically for common pathology should be adjusted for spectral derived VNC images, particularly when fat/lipid is likely to be present.

CLINICAL RELEVANCE/APPLICATION

Reconstructed VNC images on a prototype detection-based spectral CT scanner have the potential to allow retrospective characterization of incidental findings.

Honored Educators

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Suhny Abbara, MD - 2014 Honored Educator
Prabhakar Rajiah, MD, FRCR - 2014 Honored Educator

SSC05-09 Comparison of Single-source Split-filter Dual-energy Abdominal CT with Single-energy Abdominal CT using Automatic Tube Voltage Modulation: Assessment of Image Quality and Radiation Dose

Monday, Nov. 28 11:50AM - 12:00PM Room: E451A

Participants
Andre Euler, MD, Basel, Switzerland (*Presenter*) Nothing to Disclose
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Sebastian T. Schindera, MD, Basel, Switzerland (*Abstract Co-Author*) Research Grant, Siemens AG; Research Grant, Ulrich GmbH & Co KG; Research Grant, Bayer AG; Speakers Bureau, Bayer AG

PURPOSE

To assess the radiation dose and image quality of single-source split-filter dual-energy abdominal CT compared with single-energy CT using automatic tube voltage modulation (ATVM).

METHOD AND MATERIALS

In a retrospective study, 200 portal-venous phase abdominal CT scans were reviewed which were acquired on a single-source CT scanner (SOMATOM AS+, Siemens) either with single-energy mode with ATVM (CarekV, Siemens) and 130 ref. mAs or with dual-energy split-filter technology (TwinBeam, Siemens) at AuSn120 kVp and 420 ref. mAs. CT numbers (HU) were obtained in varying organs. Image noise and contrast-to-noise ratio (CNR) for parenchymal and vascular structures were assessed. Subjective image quality was evaluated by three radiologists independently. Radiation dose was estimated by size-specific dose estimate (SSDE). Descriptive statistics and Mann-Whitney-U-test were used.

RESULTS

The two patient groups showed no significant difference in water equivalent diameter (29.2 cm vs. 29.0 cm, respectively; P=0.79). In the single-energy group, ATVM selected 100 kVp in 78 patients and 120 kVp in 22 patients. Image noise was 18% lower with dual-energy compared with single-energy (8.4 HU vs. 10.2 HU, respectively; P<.0001). Parenchymal CNR was significantly higher with dual-energy (24.9 vs 22.0, respectively; P=.007), whereas vascular CNR was significantly lower with dual-energy compared with single-energy (3.5 vs 5.2, respectively; P<.0001). Subjective image noise was graded superior and image contrast inferior in the dual-energy group (P<.0001). However, there was no significant difference in diagnostic confidence between the two groups (P=.78). SSDE was 11% lower using dual-energy technique (12.6 mGy vs. 11.2 mGy, respectively; P=.02).

CONCLUSION

Single-source dual-energy CT with split-filter technology enables abdominal dual-energy scans at significantly lower image noise and radiation dose compared with ATVM without impairing subjective diagnostic confidence.

CLINICAL RELEVANCE/APPLICATION

Dual-energy CT with split-filter technology has the potential to add information such as material decomposition without additional radiation penalty compared with single-energy CT with ATVM.

SSC10

Nuclear Medicine (Gastrointestinal Imaging)

Monday, Nov. 28 10:30AM - 12:00PM Room: S505AB

GI CT NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Amir H. Khandani, MD, Chapel Hill, NC (*Moderator*) Consultant, Progenics Pharmaceuticals, Inc; Consultant, WorldCare International, Inc
Don C. Yoo, MD, E Greenwich, RI (*Moderator*) Consultant, Endocyte, Inc

Sub-Events

SSC10-01 Heterodimer of Tissue Factor and CD105 F9ab)s for Preclinical PET Imaging of Pancreatic Cancer

Monday, Nov. 28 10:30AM - 10:40AM Room: S505AB

Awards
Student Travel Stipend Award

Participants
Dawei Jiang, PhD, Madison, WI (*Presenter*) Nothing to Disclose
Haiming Luo, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Christopher England, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Hector Valdovinos, MS, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Robert J. Nickles, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Weibo Cai, PhD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Pancreatic adenocarcinoma is currently causing great health concern and treated with limited outcomes. Thus, the development of non-invasive imaging tracers with high specificity for pancreatic cancer is crucial to improving the accuracy of diagnosis as well as the monitoring of therapy.

METHOD AND MATERIALS

A bi-specific heterodimer was synthesized by conjugating an anti-tissue factor (TF) Fab (ALT-836-Fab) with an anti-CD105 Fab (TRC105-Fab), via the biorthogonal "click" reaction between tetrazine (Tz) and trans-cyclooctene (TCO). The heterodimer was labeled with 64Cu for positron emission tomography (PET) imaging of nude mice bearing BXPC-3 xenograft and orthotopic pancreatic tumors.

RESULTS

PET imaging of BXPC-3 (TF/CD105+/+) xenograft tumors with 64Cu-labeled heterodimer displayed significantly enhanced tumor uptake (28.8 ± 3.2 %ID/g) at 30 h post-injection (p.i.), while compared with each of their single Fab tracers (12.5 ± 1.4 %ID/g for anti-TF Fab and 7.1 ± 2.6 %ID/g for anti-CD105 Fab). Also, the activity-concentration ratio in term of tumor/muscle ratio is 75.2 ± 9.4 at 30 h p.i., which could allow effective visualization of tumors. Furthermore, 64Cu-NOTA-heterodimer enabled sensitive detection of orthotopic pancreatic tumor lesions with an uptake of 17.1 ± 4.9 %ID/g and tumor/muscle ratio of 72.3 ± 46.7 at 30 h p.i.

CONCLUSION

Dual-targeting of TF and CD105 with heterodimer F(ab)s offered a broad-spectral strategy and efficient method to improve the imaging of pancreatic tumors or other possible cancers. We hope this approach could help with the diagnosis, monitor, and therapy of pancreatic malignancies.

CLINICAL RELEVANCE/APPLICATION

Dual-targeting of TF and CD105 with heterodimer F(ab)s offered a broad-spectral strategy and efficient method to improve the imaging of pancreatic tumors. We hope this approach could help with the diagnosis, monitor, and therapy of pancreatic malignancies.

SSC10-02 Evaluation of a Fast 68Ga-DOTATOC PET/MRI Protocol for Whole-Body Staging of Neuroendocrine Tumors: A comparison with 68Ga-DOTATOC PET/CT

Monday, Nov. 28 10:40AM - 10:50AM Room: S505AB

Participants
Lino Sawicki, MD, Dusseldorf, Germany (*Presenter*) Nothing to Disclose
Cornelius Deuschl, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose
Karsten J. Beiderwellen, MD, Essen, Germany (*Abstract Co-Author*) Speaker, Siemens AG; Speaker, Bracco Group
Thorsten D. Poeppel, Essen, Germany (*Abstract Co-Author*) Nothing to Disclose
Gerald Antoch, MD, Duesseldorf, Germany (*Abstract Co-Author*) Nothing to Disclose
Lale Umutlu, MD, Essen, Germany (*Abstract Co-Author*) Consultant, Bayer AG

PURPOSE

To compare the diagnostic performance of a fast 68Ga-DOTA-Phe1-Tyr3-octreotide (68Ga-DOTATOC) positron emission

tomography/magnetic resonance imaging (PET/MRI) protocol with 68Ga-DOTATOC PET/computed tomography (PET/CT) in whole-body staging of neuroendocrine tumors (NETs).

METHOD AND MATERIALS

30 patients with histologically proven NET underwent 68Ga-DOTATOC PET/CT and subsequently a 68Ga-DOTATOC PET/MRI in a single injection protocol. For PET/MRI, a fast and comprehensive sequence protocol was applied. Each PET/MRI and PET/CT was independently evaluated by two readers concerning lesion count, lesion localization, lesion nature (benign/indeterminate/malignant), and lesion conspicuity (4-point Likert scale). The reference standard was based on histopathology and/or follow-up imaging. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy of PET/MRI and PET/CT were compared using McNemar's chi2 test. Wilcoxon tests assessed differences in SUVmax and lesion conspicuity. Correlation analysis of SUVmax was performed using Pearson's correlation coefficient (r). Interobserver agreement on lesion nature was calculated using Cohen's kappa (k).

RESULTS

25 patients had at least one malignant NET lesion. 68Ga-DOTATOC PET/MRI and 68Ga-DOTATOC PET/CT each correctly identified 96% of these patients. On a per-lesion basis the sensitivity, specificity, PPV, NPV, and diagnostic accuracy of 68Ga-DOTATOC PET/MRI was 90.0%, 100%, 100%, 80%, and 92.9%, respectively. Corresponding values for 68Ga-DOTATOC PET/CT were 86.6%, 98.2%, 99.2%, 74.0%, and 89.8%. The differences between both modalities in terms of diagnostic performance were not statistically significant ($p=0.38$). Moreover, SUVmax was strongly correlated ($r=0.86$; $p<0.001$) and did not differ significantly ($p=0.35$). Lesion conspicuity was better with 68Ga-DOTATOC PET/MRI ($p<0.01$). Interobserver agreement on lesion nature was substantial with 68Ga-DOTATOC PET/CT ($k=0.87$; $p<0.001$) and with 68Ga-DOTATOC PET/MRI ($k=0.90$; $p<0.001$).

CONCLUSION

68Ga-DOTATOC PET/MRI provides an equivalently high diagnostic performance in whole-body staging of NETs as compared with 68Ga-DOTATOC PET/CT.

CLINICAL RELEVANCE/APPLICATION

Bearing in mind the lower radiation exposure and improved scan duration 68Ga-DOTATOC PET/MRI applying a fast imaging protocol seems to be a viable alternative to 68Ga-DOTATOC PET/CT for whole-body staging of NETs.

SSC10-03 Prediction of Posthepatectomy Liver Failure Proposed by The International Study Group of Liver Surgery Using Residual Liver Function Estimation with 99mTc-GSA Scintigraphy

Monday, Nov. 28 10:50AM - 11:00AM Room: S505AB

Participants
Youichi Mizutani, Miyazaki, Japan (*Presenter*) Nothing to Disclose
Shigeki Nagamachi, MD, PhD, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Tamasa Terada, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Mei Shimomura, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Youhei Hattori, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Masatsugu Kawano, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Toshinori Hirai, MD, PhD, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The International Study Group of Liver Surgery (ISGLS) proposed a definition and grading system based on the severity of posthepatectomy liver failure (PHLF). We aimed to evaluate the usefulness of residual liver function estimation with Tc-99m-galactosyl human serum albumin (99mTc-GSA) for the prediction of PHLF proposed by ISGLS (PHLF-ISGLS).

METHOD AND MATERIALS

136 patients scheduled hepatectomy for liver tumors underwent 99mTc-GSA scintigraphy. From the acquired image data, maximal removal rate of GSA(GSA R-max)was calculated using multi-compartmental analysis. We also calculated the GSA R-max in the predicted residual liver (GSA-RL). Residual liver volume was calculated by conventional CT. PHLF-ISGLS was defined by an increased PT-INR (≧1.2) and concomitant hyperbilirubinemia (≧1.2mg/dl) on postoperative day 5. In PHLF and non-PHLF groups, we compared the following parameters: age, gender, ICG R15, albumin, bilirubin, hyaluronic acid, type4 collagen, Child-Pugh classification, Residual liver volume, residual liver percentage, GSA R-max and GSA-RL. Univariate and multivariate logistic analyses were used for the statistical assessment.

RESULTS

Of 136 patients, 17 met the criteria of PHLF-ISGLS. With regard to age, albumin, Child-Pugh classification, residual liver volume, residual liver percentage, GSA R-max and GSA-RL, there were statistically significant differences between PHLF and non-PHLF groups. Multivariate analysis revealed that GSA-RL and residual liver volume were significant independent predictors of PHLF ($P = 0.004$ and $P = 0.038$, respectively). The odd ratio was 149423 for GSA-RL and 1.003 for residual liver volume.

CONCLUSION

GSA-RL calculated by 99mTc-GSA scintigraphy was the most useful independent predictor of PHLF-ISGLS.

CLINICAL RELEVANCE/APPLICATION

In patients scheduled hepatectomy for liver tumors, GSA-RL is useful for the prediction of residual liver function.

SSC10-04 Added Value of SPECT-CT to Standard Dynamic Imaging in Abdominal Emergencies

Monday, Nov. 28 11:00AM - 11:10AM Room: S505AB

Participants
Elham Safaie, MD, Stony Brook, NY (*Presenter*) Nothing to Disclose
Kavitha Yaddanapudi, DMRD, MBBS, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose

George C. Angelos, MD, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose
Robert Matthews, MD, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the added value of SPECT-CT acquisition to traditional nuclear medicine blood flow and dynamic images in gastrointestinal (GI) and genitourinary (GU) emergencies.

METHOD AND MATERIALS

We retrospectively evaluated 23 consecutive abdominal emergency studies wit SPECT CT between July 2013-March 2016. Studies included RBC bleeding, hepatobiliary scan, Meckel's study, and DTPA renal scan. All patients had initial dynamic imaging followed by SPECT-CT. Six patients with equivocal bleeding studies had SPECT-CT obtained to localize bleeding. Of these one study was performed to confirm a suspect Meckel's diverticulum. There were 14 hepatobiliary studies for bile leak evaluation (n=9), biliary atresia (n=3), and cholecystitis (n=2). One SPECT-CT was performed for determining urinary leak in a renal transplant patient.

RESULTS

All 23 patients had inconclusive standard dynamic studies. SPECT/CT was performed at the end of dynamic imaging being helpful in 95.6 % of the studies. We were able to accurately identify the regional anatomy and source of GI bleed in all 6 cases using SPECT-CT with 2 large bowel and 4 small bowel. One study the patient had both small bowel and peritoneal bleed at surgery. Three of these patients had multiple prior inconclusive dynamic studies before SPECT-CT. Meckel's diverticulum study remained inconclusive after SPECT-CT. In the 14 hepatobiliary studies, SPECT-CT localized 9 biliary leaks, confirmed biliary atresia in 3, and excluded cholecystitis in 2 by identifying the gall bladder. For the renal transplant patient, SPECT/CT was able to identify precise localization of urinary leak. The average added scan time ranged between 20-30 minutes.

CONCLUSION

Our findings demonstrated that adding SPECT-CT to standard GI and GU dynamic imaging supplements conventional imaging in equivocal patients for anatomic localization and subsequent intervention. In RBC studies, accurate anatomical localization of small bowel versus large bowel bleeding significantly alters patient management. The added scan time is reasonable even in emergency setting.

CLINICAL RELEVANCE/APPLICATION

SPECT-CT added to traditional dynamic imaging emergency studies can lead to accurate diagnosis in a reasonable time frame.

SSC10-05 A Novel Technique to Measure Strength of Abnormality on GI Bleeding Scans: Development, Initial Implementation, and Correlation with Conventional Angiography

Monday, Nov. 28 11:10AM - 11:20AM Room: S505AB

Participants
Rami Farhat, DO, Secaucus, NJ (*Presenter*) Nothing to Disclose
Travis French, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Esther E. Coronel, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Dov Bechhofer, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Anca Kranz, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Jason C. Hoffmann, MD, Mineola, NY (*Abstract Co-Author*) Consultant, Merit Medical Systems, Inc; Speakers Bureau, Merit Medical Systems, Inc

PURPOSE

To develop a tool to measure the relative strength of bleeding on nuclear medicine GI bleeding scans, correlate this with conventional angiographic findings, and determine the predictive value of this tool.

METHOD AND MATERIALS

A single institution nuclear medicine database query of GI bleeding scans performed between January 1, 2013 and December 31, 2015 was performed. The reports from all studies were reviewed, and the imaging from all positive studies was reviewed. A novel technique was developed and utilized to analyze the scans, which allowed for calculation of percent increase of activity in the region of interest/ROI (area of positive bleeding) while also calculating activity in ROI in the aorta and liver (controls). Interventional radiology database was then queried to determine which patients with positive findings on scintigraphy underwent angiography, and which cases had positive angiographic findings. Data analysis was performed by two radiology attendings and two residents, to determine median percent increases in ROI in patients with positive scintigraphy and positive angiography, versus those who had positive scintigraphy and negative angiography.

RESULTS

Out of 194 nuclear medicine GI bleeding scans performed during the study period, 71 were positive for active lower GI hemorrhage. Out of these cases, 37 patients were then sent for conventional angiography. Nine patients had positive angiographic findings of active contrast extravasation that correlated with the site of bleeding on scintigraphy. The median ROI percent increase for patients with positive scintigraphy and positive angiography was 50%, while for patients with positive scintigraphy but negative angiography it was 26.8%. Data analysis suggests that a positive bleeding scan with ROI percent increase of less than 20% has predictive value that conventional angiography will be negative.

CONCLUSION

Utilizing software to determine percent increase in activity within the region of interest of active GI bleeding on scintigraphy can have predictive value in determining which patients likely will not benefit from diagnostic conventional angiography.

CLINICAL RELEVANCE/APPLICATION

Positive GI bleeding nuclear medicine scans that have percent increase in radiotracer uptake of less than 20% have predictive value in that these patients are unlikely to have positive findings on angiography, thus cannot be embolized.

SSC10-06 A Simple Ratiometric Method Allows Discriminating Benign From Malignant In-111 Pentetreotide

(OctreoScan) Uptake in the Pancreatic Head

Monday, Nov. 28 11:20AM - 11:30AM Room: S505AB

Awards
Student Travel Stipend Award

Participants
Jamal J. Derakhshan, MD, PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Michael D. Farwell, MD, MA, New York, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

High-throughput immunohistochemistry has shown large variation in expression of somatostatin receptors in the normal human pancreas. Recent gallium-labeled PET studies have shown a high prevalence of "pathologic" octreotide uptake, which is usually benign. The costs and morbidity of mistaken Whipple procedures are inordinate. The study was conducted to determine the prevalence of In-111 pentetreotide (OctreoScan) uptake in SPECT scans of the pancreas and determine whether a simple ratiometric method could differentiate benign from malignant uptake.

METHOD AND MATERIALS

A retrospective review of all In-111 pentetreotide studies performed at a large academic medical center was performed over 1 year time interval. The uptake of octreotide (abdominal SPECT 4 hrs and chest 24 hrs post injection of 222 MBq) was visually graded as absent, mild or definite. In the cases of uptake, a ratio between the maximal uptake in the pancreas versus mean in the liver was obtained. A two-sided Student's T-test was performed between uptake in patients with and without known pancreatic head masses. The sensitivity and specificity of a threshold was determined.

RESULTS

There were a total of 359 pentetreotide studies interpreted. 147 studies were excluded, most since they did not include the pancreatic head. 138 patients were included (ages 22-94). No pancreatic head uptake was observed in 79% of studies (168/212). 12 (6%) studies had faint visual uptake while 32 (15%) had definite uptake. 11 studies were performed in 7 patients with known pancreatic masses, all of which demonstrated definite uptake. The average uptake ratio in known masses was 7.5±6.2 and 0.9±0.3 in patients without a known mass (p=0.005). Using a threshold ratio of 1.8, 100% sensitivity and specificity was achieved for determining the presence of a pancreatic head mass.

CONCLUSION

Pentetreotide uptake in the pancreatic head is common (21% of studies) and usually benign (75% of cases with uptake). All patients with known pancreatic head mass had definite uptake visually. Using a lesion to liver ratio of ≥ 1.8, 100% accuracy was obtained for determining the presence of a pancreatic head mass.

CLINICAL RELEVANCE/APPLICATION

A simple ratiometric method can differentiate malignant and benign pancreatic head pentetreotide uptake, alleviating unnecessary work-up and surgeries of patients with visual pancreatic head uptake.

SSC10-08 Prognostic Value of F-18 Fluorodeoxyglucose Positron Emissiontomography/computed Tomography in Patients with Barcelona Clinic Liver Cancer Stages C Hepatocellular Carcinomas: A Multicenter Retrospective Cohort Study

Monday, Nov. 28 11:40AM - 11:50AM Room: S505AB

Participants
Jin Kyoung Oh, Incheon, Korea, Republic Of (*Presenter*) Nothing to Disclose
Sae Jung Na, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jeong Won Lee, Incheon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yong An Chung, Incheon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Mijin Yun, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung-Hyup Hyun, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Il Ki Hong, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

We evaluated the prognostic value of pretreatment F-18 flurodeoxyglucose positron emission tomography/computed tomography (F-18 FDG PET/CT) in Barcelona Clinic Liver Cancer (BCLC) stage C hepatocellular carcinoma (HCC) patients according to distant metastasis.

METHOD AND MATERIALS

A total of 293 patients with BCLC stage C HCC between 2009 and 2010 who underwent staging F-18 FDG PET/CT before treatments were retrospectively enrolled from 7 university hospitals. Tumor-to-normal liver standardized uptake value ratio (TNR) of the primary tumor was measured by pretreatment F-18 FDG PET/CT. TLR and clinical variables were analyzed with respect to overall survival (OS).

RESULTS

In BCLC stage C HCC patients, higher TLR was associated with extrahepatic metastasis (p=0.023). On multivariate analysis, Child-Pugh classification, PIVKA- II, and TLR were independent prognostic factors in no distant metastasis group (p<0.05). In contrast, TLR was the only independent prognostic factor in metastasis group (<0.001). Patients with high F-18 FDG uptake (TLR≥ 3.5) showed significantly worse prognosis than those with low F-18 FDG uptake (p<0.05).

CONCLUSION

BCLC stage C is a heterogeneous group with different prognostic factors according to distant metastasis. TLR is an independent prognostic factor regardless of distant metastasis.

CLINICAL RELEVANCE/APPLICATION

F-18 FDG PET/CT can predict survival of patients with Barcelona Clinic Liver Cancer stages C hepatocellular carcinomas

SSC10-09 18F-FDG PET-CT in Detection of Malignancy in Cases Paraneoplastic Syndrome

Monday, Nov. 28 11:50AM - 12:00PM Room: S505AB

Participants
Khushboo Gupta, MD, Mumbai, India (*Presenter*) Nothing to Disclose
Rahul B. Jadhav, MD, Mumbai, India (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Paraneoplastic syndrome (PNS) is a group of rare disorders that are caused by altered immune system response to a neoplasm (mostly neurological). In such cases early identification of underlying malignancy is targeted to arrest the immune mediated neurological manifestation and install early treatment. With advent of 18F-FDG PET-CT, the detection efficiency of primary malignant lesions have improved. We therefore studied the role of FDG PET-CT in investigation of PNS.

METHOD AND MATERIALS

44 patients (19 females and 25 males) with suspected PNS underwent FDG PET-CT scan at our institution. Scan was performed 1 hr after administration of 10 mCi of 18F-FDG along with 16 slice CECT. Based on the scan results, biopsy was performed in cases with suspected lesions, while other cases were followed up clinically.

RESULTS

FDG PET-CT scan was positive for metabolically active lesions in 36/44 patients. Suspicious malignant lesions were noted in 12/36 patients. Biopsy was performed and primary malignancy was detected in 8/12 patients (commonest was SCLC, followed by lymphoma). Infective etiology was indicated in 16/36 patients, of which 11 patients were biopsied; results revealed granulomatous disease in 9 patients and reactive nodes in 2 patients. In other 3/36 patients, PET-CT demonstrated reactive nodes. Remaining 5/36 patients were equivocal for malignancy and/or infection, biopsy of 2 of these 5 patients revealed infective etiology. Overall no biopsy was performed in 19/44 cases, which were followed up clinically (for 410 to 518 days). No malignancy was found in this group in due course.

CONCLUSION

In present study, FDG PET-CT detected primary malignancy in 22.2% cases. In other suspected cases of paraneoplastic syndromes it showed a high efficiency in ruling out the possibility of malignancy.

CLINICAL RELEVANCE/APPLICATION

PET/CT scan has proven its efficiency over other imaging modalities in detection of primary malignancies. Hence its use is justified in ruling out malignancies in suspected cases of paraneoplastic syndromes.

GIS-MOA

Gastrointestinal Monday Poster Discussions

Monday, Nov. 28 12:15PM - 12:45PM Room: GI Community, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

Participants
Bryan R. Foster, MD, Portland, OR (*Moderator*) Nothing to Disclose

Sub-Events

GI355-SD-MOA1 Usefulness of Double Frequency MR Elastography for Assessment of the Necroinflammation on Liver Stiffness Measurements

Station #1

Participants
Minori Onoda, PhD,RT, Kanazawa, Japan (*Presenter*) Nothing to Disclose
Tomoko Hyodo, MD, Osaka-Sayama, Japan (*Abstract Co-Author*) Nothing to Disclose
Takamichi Murakami, MD, PhD, Osakasayama, Japan (*Abstract Co-Author*) Nothing to Disclose
Masakatsu Tsurusaki, MD, PhD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Takahiro Sakamoto, Osakasayama, Japan (*Abstract Co-Author*) Nothing to Disclose
Tosiaki Miyati, PhD, Kanazawa, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The measurement of liver stiffness with magnetic resonance elastography (MRE) is affected by the liver viscosity which can be found by testing different vibration frequency settings. We aimed to evaluate the utility of double vibration frequency MRE method in estimation of liver fibrosis and necroinflammation.

METHOD AND MATERIALS

Thirty patients underwent MRE with a 1.5-T MR system and liver biopsy for liver investigation. We performed MRE with two different driver frequencies of 60 and 80 Hz to measure the liver stiffness. The frequencies of motion encoding gradient were set as the same as driver frequencies (60, 80 Hz) to optimize MR pulse sequences for MRE. We defined the difference of liver stiffness values as ⊿G (G80Hz - G60Hz) to compare with pathological findings of liver fibrosis (stages F0-4) and necroinflammation (grades A0-3). Statistical analysis included Spearman's rank correlation test, followed by ROC analysis and AUC calculation when significant correlation exists. A P value <.05 was considered statistical significant.

RESULTS

The mean liver stiffness values with both 60 Hz and 80 Hz increased as fibrosis stages and necroinflammation grades progressed. For all patients, the measurements of liver stiffness by using vibration frequency of 80 Hz showed higher values than those of 60 Hz. ⊿G showed moderate positive correlation with liver necroinflammation grades (r=0.68, P<0.01). No significant correlation was observed between ⊿G and pathological fibrosis stages (r=0.30, P=0.11). In ROC analyses, the optimal cutoff values of ⊿G were 0.36 for ≧A1 (AUC 0.80, sensitivity 79%, specificity 100%), 0.90 for ≧A2 (AUC 0.81, sensitivity 55%, specificity 100%), and 1.58 for ≧A3 (AUC 0.96, sensitivity 100%, specificity 83 %).

CONCLUSION

⊿G increased as necroinflammation grades progressed, but not as fibrosis stages. ⊿G may be useful index for evaluating the liver necroinflammation on liver stiffness measurements by MRE.

CLINICAL RELEVANCE/APPLICATION

The double vibration frequency MRE method has a potential to evaluate the liver necroinflammation without biopsy, and may be useful to avoid the overestimation of liver fibrosis using MRE.

GI356-SD-MOA2 Amide Proton Transfer Imaging to Predict Tumor Response after Preoperative Chemotherapy in Locally Advanced Rectal Cancer

Station #2

Participants
Akihiro Nishie, MD, Fukuoka, Japan (*Presenter*) Nothing to Disclose
Yoshiki Asayama, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Kousei Ishigami, MD, Iowa City, IA (*Abstract Co-Author*) Nothing to Disclose
Yasuhiro Ushijima, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Yukihisa Takayama, MD, Fukuoka, Japan (*Abstract Co-Author*) Research Grant, FUJIFILM Holdings Corporation
Hiroshi Honda, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Daisuke Okamoto, MD, Fukuoka City, Japan (*Abstract Co-Author*) Nothing to Disclose
Nobuhiro Fujita, MD, PhD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Osamu Togao, MD, PhD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Koji Sagiyama, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Daisuke Tsurumaru, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuichiro Kubo, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Eiji Oki, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Tatsuya Manabe, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Jochen Keupp, PhD, Hamburg, Germany (*Abstract Co-Author*) Employee, Koninklijke Philips NV

PURPOSE

To elucidate if amide proton transfer (APT) imaging can predict tumor response after preoperative chemotherapy in locally advanced rectal cancer

METHOD AND MATERIALS

A total of 17 patients with locally advanced rectal cancer who underwent MR examination including APT imaging and preoperative chemotherapy (at least two courses) were enrolled. APT imaging was scanned with single-shot 2D TSE-DRIVE on a 3T clinical scanner using a 32-channel coil and 2-channel parallel transmission. APT signal was defined as MTR asymmetry (MTRasym) at the offset of 3.5 ppm: {Ssat(−3.5 ppm)−Ssat(+3.5 ppm)}/S0(control). APT map was generated and a region-of-interest was carefully placed in each rectal cancer to measure APT signal (%). Each tumor resected was histologically evaluated for the degree of degeneration and necrosis and was divided into the five Grades (0, none; 1a, less than 1/3; 1b, 1/3 to 2/3; 2, more than 2/3; 3, all). The mean APT signal was compared between Grade 0/1a (Low response group) and Grade 1b/2/3 (High response group) using a Student's t-test. Diagnostic performance of APT signal, as well as apparent diffusion coefficient (ADC) obtained in diffusion-weighted imaging, for predicting tumor response was evaluated using receiver operating characteristics curve.

RESULTS

The mean APT signal of Low response group (n=12; 3.05+/-1.61%) was significantly higher than that of High response group (n=5; 1.14+/-1.13%)(p=0.029). There was no significant difference in ADC between Low and High response groups. The area under curve for predicting tumor response using APT signal was 0.867. When 2.75% or less was an indicator of high tumor response, sensitivity, specificity and accuracy of APT signal were 100%, 75% and 82.4%, respectively.

CONCLUSION

APT imaging can predict tumor response after preoperative chemotherapy in locally advanced rectal cancer. For predicting tumor response APT signal is superior to ADC.

CLINICAL RELEVANCE/APPLICATION

APT imaging contributes to the selection of a therapeutic strategy in locally advanced rectal cancer.

GI358-SD-MOA4 Comparison Study on the Accuracy of Detecting Colorectal Cancer Lymph Nodes Metastasis with Arterial Phase Dual-energy CT Spectral Curve and the Morphological Findings

Station #4

Participants
Xuejun Yang, kunming, China (*Abstract Co-Author*) Nothing to Disclose
Wei Zhao, Kunming, China (*Abstract Co-Author*) Nothing to Disclose
Jing Lei, Kunming, China (*Abstract Co-Author*) Nothing to Disclose
Han Dan, PhD, MD, Kunming, China (*Abstract Co-Author*) Nothing to Disclose
Yaying Yang, Kunming, China (*Presenter*) Nothing to Disclose

PURPOSE

To explore the accuracy of arterial phase dual-energy CT spectral curve and the morphological findings in detecting the metastatic lymph nodes in colorectal cancer .

METHOD AND MATERIALS

22 patients with pathologically confirmed colorectal cancer had a total of 40 enlarged lymph nodes in the pelvic region underwent dual energy CT scan, We measured the size of the lymph nodes on CT images, and the CT value in non-enhanced and arterial phase CT scan; We also computed short-long diameter ratio and enhancement value of lymph node (lymph node CT value in arterial phase - CT value in plain scan). We observed the change trend of the spectrum curve and compared the diagnostic accuracy in detecting colorectal cancer lymph nodes metastasis.

RESULTS

In the 40 lymph nodes, 17 lymph nodes were metastatic, while reactive hyperplasia was seen in 23 lymph nodes. Short-long diameter ratio and the enhancement CT value in the diagnosis of lymph node metastasis had weak consistency with the pathological results (Kappa value=0.100 and 0.016, repsectively). The sensitivity of 64.7%, 35.3%, the specificity of 64.7%, 68.2%, the area under the ROC curve were 0.434, 0.501 for short-long diameter ratio and the enhancement CT value in the diagnosis of lymph node metastasis, respectively. Dual-energy CT spectral curve had strong consistency with the pathological results (Kappa value=0.899) and higher sensitivity of 94.1%, the specificity of 95.5%, and area under the ROC curve (0.949) compared with morphological findings.

CONCLUSION

The spectrum curve of dual-energy CT had higher sensitivity and specificity than the conventional morphology findings in diagnosis of colorectal cancer lymph nodes metastasis.

CLINICAL RELEVANCE/APPLICATION

The arterial phase dual-energy CT spectral curve had higher accuracy than the morphological findings in detecting the metastatic lymph nodes in colorectal cancer .

GI359-SD-MOA5 Imaging Evaluation of Common Duct Size: Comparison between CT and US Measurements

Station #5

Participants
Tatum A. Mcarthur, MD, Aurora, CO (*Presenter*) Nothing to Disclose
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Argha Chatterjee, MBBS, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Bradford Jackson, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose

Mark E. Lockhart, MD, Birmingham, AL (*Abstract Co-Author*) Author, Oxford University Press

PURPOSE

To compare the common duct (CD) diameter by CT and ultrasound (US) in patients undergoing both studies within 48 hours of each other.

METHOD AND MATERIALS

This IRB-approved, HIPAA-compliant retrospective study compared the CD diameter measured by both CT and US performed within a 48-hour period in 342 patients (ages 24 - 88) from 1/1/2004 - 4/1/2015. 132 patients were excluded secondary to complex biliary surgery, acute cholecystectomy, liver transplant, CD stent, hepatobiliary malignancy, interval papillotomy, irretrievable images, and/or nonvisualization of the CD. In the remaining 210 patients, the CD was measured at the porta hepatis on US and CT in randomized order by a blinded board-certified radiologist. CT readings were performed 6 months after US readings to limit recall bias. Presence of CD wall thickening was also recorded. 79% (n=166) of the CT exams were contrast-enhanced. Distributional characteristics are presented as mean and standard deviation (SD). Bland-Altman analysis was used to estimate the bias and 95% limits of agreement between modalities. Paired T-tests were used to assess the statistical significance of the difference between modalities.

RESULTS

The study population consisted of 113 women and 97 men with a mean age of 53.8 (+/-15.3) years. Mean CD diameter by CT measures 1.01±2.2mm more than US [p<0.0001]. The 95% confidence limit of agreement between the two modalities suggests CT measurements were 3.39 mm less to 5.42 mm more than that of US.

CONCLUSION

In our study, CT overestimated the CD diameter compared to US, and we observed a fixed bias of 1.01 mm.

CLINICAL RELEVANCE/APPLICATION

US is considered the reference standard to evaluate CD size. In our study, CT does overestimate the CD diameter when compared to US, but not enough to typically change management, and US is not necessary to confirm duct size.

GI360-SD-MOA6 Texture based Classification and Correlation of Non-alcoholic Fatty Liver Disease Activity Score (NAS) using Gabor Wavelet Filters

Station #6

Participants
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Alvin C. Silva, MD, Scottsdale, AZ (*Presenter*) Nothing to Disclose

PURPOSE

Our main objective was to analyze texture features extracted from CT images of NAFLD patients and correlate with NAS score. Current non-invasive methods have limitations and cannot replace/assist liver biopsy for classifying Non-Alcoholic SteatoHepatitis (NASH) from fatty liver not diagnostic of NASH (steatosis). NAS scores of 0-3 occurred in cases largely considered not diagnostic of NASH, whereas scores of 5-8 were largely considered diagnostic of NASH (PMID:15915461).

METHOD AND MATERIALS

37 histologically diagnosed patients with NAFLD and their respective NAS scores were considered for the study (20 patients with NAS 5-8 and 17 with NAS 0-3). For extracting and analyzing textures, venous phase slices of contrast enhanced CT images with the largest cross-sectional areas were selected followed by manual segmentation of region of interest (ROI). A MATLAB-based tool was developed and utilized for extracting ROI, specifically avoiding larger blood vessels. This was followed by applying Gabor wavelet filters for feature extraction. Support Vector Machine was used to classify the extracted Gabor features and receiver operating characteristics curve (AUROC) was used to calculate the performance of the classifier along with k-fold cross validation.

RESULTS

An AUC (Area under curve) of 0.88 was obtained for separating NASH versus fatty liver without NASH. A 5-fold cross validation on 37 images (single ROI per patient) yielded a misclassification rate of 0.25 indicating excellent performance of the classifier.

CONCLUSION

Currently, there is no robustly validated CT technique for discriminating the spectrum of NAFLD. However, our results indicate that Gabor filters have the ability to classify fatty liver texture patterns for replacing/assisting NAS score. This also demonstrates that texture features can be correlated to NAS score interpretation of NASH disease for a score of 5-8 and fatty liver without NASH for a score of 0-3.

CLINICAL RELEVANCE/APPLICATION

A noninvasive application applied to routine CT images that can differentiate steatosis from NASH in lieu or as a complement to biopsy can have meaningful impact on the screening & management of this increasingly prevalent disease.

GI361-SD-MOA7 Quantitative Prediction of Treatment Effect of Transarterial Chemoembolization using Drug-eluting Bead for Hepatocellular Carcinoma with use of Preoperative Dual-phase Contrast-enhanced CT

Station #7

Participants
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Fumihito Ichinohe, Matsumoto, Japan (*Abstract Co-Author*) Nothing to Disclose

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Masumi Kadoya, MD, Matsumoto, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To clarify the possibility predicting treatment effect of transarterial chemoembolization using drug-eluting bead (DEB-TACE) for hepatocellular carcinoma (HCC) with use of quantitative perfusion parameters obtained from preoperative dual-phase contrast-enhanced CT (DPCE-CT).

METHOD AND MATERIALS

Consecutive 16 patients with radiologically diagnosed HCC by DPCE-CT who underwent DEB-TACE were included in this retrospective study. Arterial and portal venous input functions were estimated from CT values of 7 vessels (left atrium, abdominal aorta, right renal vein, superior mesenteric vein, inferior vena cava, splenic vein, and portal vein) using newly proposed dynamic phase index (DPI) technique. Perfusion parameters of the liver and HCC such as arterial and portal venous inflow velocity constant [K1a and K1p], arterial flow fraction [AF = K1a/(K1a + K1p)] were determined by compartment model analysis. Treatment effect was evaluated within 8 weeks after DEB-TACE using contrast-enhanced CT or MRI. Predictive performance to classify complete necrosis group and the others using these perfusion parameters and Naïve Bayes classifier was statistically analyzed.

RESULTS

In univariate analysis, significant differences between complete necrosis group and the others were seen in AF (P = 0.032) and K1p (P = 0.036) of the liver, difference of K1p (P = 0.045) and AF (P = 0.046) of HCC against the liver. The area under the receiver operating characteristic curve (AUROC) and its 95% confidence interval (95%CI) to classify complete necrosis group and the others using variable number of perfusion parameters and NBA were 0.850 (0.831, 0.868) using 1 parameter (AF of the liver), 0.931 (0.919, 0.943) using 2 features (K1a of the liver and difference of AF of HCC against the liver), respectively. No significant increase in AUROC was observed even if more than 2 parameters were used.

CONCLUSION

Treatment effect of DEB-TACE for HCC can be predicted with use of quantitative perfusion parameters obtained from preoperative DPCE-CT using DPI technique and compartment model analysis.

CLINICAL RELEVANCE/APPLICATION

Quantitative perfusion analysis of DPCE-CT using DPI technique will help determine the management of patients with HCC.

GI362-SD-MOA8 Diagnostic Value of Preoperative Abdominal CT Examination in Assessment of Quantitative Body Composition Analysis to Predict and Stratify Risk of Severe Pancreatic Fistula after Pancreatoduodenectomy

Station #8

Participants
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Davide Fior, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Marta Sandini, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Luca V. Gianotti, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Sandro Sironi, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess whether measures of abdominal fat distribution, visceral density, and antropometric parameters obtained from computed tomography (CT) may predict postoperative pancreatic fistula (POPF) occurrence in patient who undergo to pancreatodudenectomy surgery.

METHOD AND MATERIALS

We analyzed 117 patients who underwent pancreatoduodenectomy (PD) and had a preoperative CT scan staging. CT images were obtained either with 16- or 256- MDCT (Brilliance iCT; Philips), applying a multiphase acquisition protocol (unenhanced, arterial, portal venous and equilibrium phase). CT reconstruction of unenhanced upper abdomen were used to obtain measures of total fat volume (TFV), visceral fat volume (VFV), thickness of retro-renal fat, diameter of pancreatic duct and the density ratio of spleen and pancreas. The predictive ability of each parameter was investigated by receiver-operating characteristic (ROC) curves methodology and assessing optimal cutoff thresholds.

RESULTS

The overall rate of clinically relevant (grades B and C of ISGPF classification) POPF was 20.5% (24/117 patients). Areas under ROC-curves showed that none of the parameters was per se significantly predictive. Patient with grade A or no POPF had lower median value of each CT parameters analyzed than the patients with grades B-C (i.e. VFV median value of 1800 cm3 vs 2702 cm3; TFV 4100 cm3 vs 5432 cm3; Wirsung diameter 4 mm vs 2 mm). Moreover the multivariate analysis revealed that a VFV>2334 cm3, TFV>4408 cm3, pancreas/spleen density ratio <0.707, and pancreatic duct diameter <5 mm were predictive of POPF. The risk of POPF progressively increased with the number of the CT paramters involved and age.

CONCLUSION

The risk of occurrence of clinically relevant POPF may be predicted with relative accuracy by combining specific information obtained from preoperative CT such as TFV and VFV, pancreas/spleen density, pancreatic duct diameter, in combination with patient age. Even if it has been already suggested that obesity might be a handy predictor of complications after PD, the distribution of fat is more important than obesity and probably the amount and specific organ deposition of visceral fat plays a central role in this process.

CLINICAL RELEVANCE/APPLICATION

The organ fat distribution analysis, obtained at preoperative abdominal CT scan examination, may offer important information on the risk of post-surgical pancreatic fistula occurrence.

GI108-ED-MOA9 Cross-Sectional Imaging in Celiac Disease: Uncomplicated, Refractory, Enteropathy-Associated Lymphoma and Adenocarcinoma

Station #9

Awards
Identified for RadioGraphics

Participants
Badr Al-Bawardy, MD, Rochester, MN (*Presenter*) Nothing to Disclose
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David Bruining, MD, Rochester, MN (*Abstract Co-Author*) Research Grant, Given Imaging Ltd Consultant, Bracco Group
Stephanie Hansel, MD, Rochester, MN (*Abstract Co-Author*) Research support, Given Imaging Ltd Advisory Board, Medtronic, Inc
Shannon P. Sheedy, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Jeff L. Fidler, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Joel G. Fletcher, MD, Rochester, MN (*Abstract Co-Author*) Grant, Siemens AG; ;

TEACHING POINTS

1.Celiac disease (CD) affects 1% of the US population, and diagnosis is often delayed.2.CT/MR enterography (CT/MRE) of CD show distinctive intestinal and extra-intestinal features that facilitate diagnosis.3.CT/MRE are used to detect complications such as type I/type II refractory celiac disease (RCD), ulcerative jejunitis, enteropathy-associated lymphoma (EATL) and small bowel adenocarcinoma (SBA).

TABLE OF CONTENTS/OUTLINE

Diagnosis: Non-specific sx: GI (diarrhea, bloating, weight loss) and extraintestinal (neuropsychiatric sx, arthritis, Fe deficiency, metabolic bone dz, infertility) Implications/limitations of TTG IgA and permissive genes (HLA DQ2/DQ8) Endoscopy - fold flattening, fissuring, scalloping and mosaic appearance. Histology: partial-total villous atrophy, intraepithelial lymphocytosis, and crypt hyperplasia.CT/MRE findings (examples): Intestinal - decreased number of duodenal and jejunal folds, duodenal edema, increased number of ileal folds, excessive fluid, intussusception Extraintestinal - Hyposplenism, mesenteric vascular engorgement, and lymph node enlargement.CD complications on CTE/MRE: Ulcerative jejunitis; small bowel dilation and increased small bowel thickness in RCD Refractory CD: EATL > SBA, but rare EATL patterns – aneurysmal, infiltrative, annular, gastricCase study quiz

GI216-ED-MOA10 Pseudocirrhosis: Pathogenesis and Imaging Features

Station #10

Participants
Christopher Czaplicki, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
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Abimbola Adike, MD, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
Elizabeth Carey, MD, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) Discuss the pathophysiology of Pseudocirrhosis- Due to the regression and response to chemotherapy of hepatic metastasis and as the progression with fibrosis surrounding the infiltrating hepatic tumorsA) Response of hepatic tumors to chemotherapy resulting in scarring and capsular retractionB) Fibrosis surrounding infiltrating hepatic metastatic massesC) Nodular regenerative hyperplasia in response to ischemia from chemotherapy-induced hepatic injuryD) Sinusoidal obstruction with venous obstruction as a result of chemotherapy 2) Review the imaging Features of Pseudocirrhosis on CT and MR

TABLE OF CONTENTS/OUTLINE

Pseudocirrhosis is an imaging diagnosis used to describe the development of diffuse hepatic nodularity in the setting of hepatic metastases successfully treated with chemotherapy. While it has been described in multiple types of cancer, it is most common in patients with breast cancer. It is important to recognize pseudocirrhosis early as it can be associated with complications of portal hypertension, rapid progression to liver failure and increased morbidity in patients with metastatic cancer. This review will discuss the imaging features of this important but under recognized entity on CT and MR.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Venkata S. Katabathina, MD - 2012 Honored Educator

Khaled M. Elsayes, MD - 2014 Honored Educator
Akram M. Shaaban, MBBCh - 2015 Honored Educator
Akram M. Shaaban, MBBCh - 2016 Honored Educator

Lunch & Learn: Transitioning to DR, Clinical and Financial Benefits Beyond Preventing Reimbursement Penalties: Supported by Fujifilm (invite-only)

Monday, Nov. 28 12:30PM - 1:30PM Room: S403B

Participants

PARTICIPANTS

Jerry Thomas, MS, FAAPM, DABR, CHP, DABSNM Wichita, KS
William Tobin BS, Tyler, TX

PROGRAM INFORMATION

This course does not offer CME credit.

GIS-MOB

Gastrointestinal Monday Poster Discussions

Monday, Nov. 28 12:45PM - 1:15PM Room: GI Community, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
Bryan R. Foster, MD, Portland, OR (*Moderator*) Nothing to Disclose

Sub-Events

GI363-SD-MOB1 The Assessment of Radiation Dose and Image Quality by using Different Scan Parameter Selection Methods with for Fast Kilo Voltage Switching Dual-energy CT (ssDECT) with Different Scan Parameter Selection Methods

Station #1

Participants
Tsuyoshi Kagimoto, hiroshima, Japan (*Presenter*) Nothing to Disclose
Chisato Yoritaka, RT, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Satoshi Inada, hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Masashi Takahashi, RT, hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Xiao Zhu Lin, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The comparison of scan dose and image quality between DECT and 120kV helical scan mode (SECT) is important for DECT clinical application. The purpose of this study iwas to assess radiation dose and image quality by using different scan parameter selection methods with for the fast kV switching dual-energy CT (DECT) with different scan parameter selection methods.

METHOD AND MATERIALS

50th abdomen dynamic scans were performed on 64detector DECT scanner (Revolution GSI, GE) using combination of 120kV helical and fast kV (80/140kV) switching DECT techniques with in different scanning phases using different scan parameters:Plain scan with 120kV and noise index (NI) of 12@5mm slice thickness,Arterial phase:GSI Assist by using automatically DECT scan parameter selection method (NI of 12@5mm), Portal vein phase:manual parameter selection using Max mA of mA table of SECT scan (NI of 12@5mm).The CTDI (mGy),DLP (mGy-cm),ED (mSv) and Noise (SD) of three different scans compared between SECT and two parameter selection methods of DECT.

RESULTS

The averages of CTDI with different scan mode and DECT parameter selection method were 12.2±4.8mGy at in Plain phase (120kV), 12.8±4.2mGy at in Arterial phase (GSI assist) , 14.5±4.8mGy at in Portal vein phase (Max mA GSI). GSI assist produced similar CTDI as the 120kV scan, while the Max mA GSI had statistically higher CTDI than the 120kV scan there was a significant difference between 120kV and two GSI parameter selector methods. The averages of DLP were 374.0±164.2mGy-cm at 120kV, 391.8±149.1mGy-cm at with GSI assist and, 443.6±169.0mGy-cm at with Max mA GSI, there was a no significant difference between 120kV and two GSI parameter selector methods. The averages of ED were 5.6±2.5mSv at 120kV, 5.9±2.2mSv at GSI assist and, 6.7±2.5mSv at Max mA GSI. The averages of Noise (SD) were 18.6±3.9HU at 120kV, 14.5±4.2HU at GSI assist and 14.2±4.6HU at with Max mAs GSI there was a significant difference between 120kV and GSI assist and, between 120kV and Max mA GSI.

CONCLUSION

From this study, we can conclude that the automatically DECT scan parameter selection method (GSI Assist) has similar scan dose and image quality with as the 120kV helical and manual parameter selection methodscans.

CLINICAL RELEVANCE/APPLICATION

The automatically DECT scan parameter selection method (GSI assist) has similar scan DOSE and image quality with helical scan (SECT) and is very useful for clinicial application and clinical research of DECT.

GI364-SD-MOB2 The Diagnostic Performance of Shear-wave Elastography in Patients with Autoimmune Liver Disease

Station #2

Participants
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Manish Dhyani, MBBS, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Stephan D. Pratt, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Atul K. Bhan, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anthony E. Samir, MD, Boston, MA (*Abstract Co-Author*) Consultant, Pfizer Inc Consultant, General Electric Company Consultant, PAREXEL International Corporation Research Grant, Koninklijke Philips NV Research Grant, Siemens AG Research Grant, Toshiba Corporation Research Grant, General Electric Company Research Grant, Samsung Electronics Co, Ltd Research Grant, Analogic Corporation Research support, SuperSonic Imagine Research support, Hitachi, Ltd

PURPOSE

(1) To assess shear wave elastography (SWE) performance for liver fibrosis staging in patients with autoimmune liver disease (ALD) (2) to validate a previously established Young's modulus cut-off value in this new cohort.

METHOD AND MATERIALS

Patients with known or suspected ALD scheduled for ultrasound guided non-focal liver biopsy were included. SWE imaging was performed with the Aixplorer US system quipped with a convex broadband probe. Eight elastograms were obtained intercostally in the right upper liver and the median value of the best 8 measurements was calculated. A single blinded pathologist staged liver fibrosis and calculated steatosis and necroinflammation scores using the METAVIR system. The Spearman correlation test was performed to assess correlation between estimated tissue Young's modulus (eYM) and fibrosis, steatosis, necroinflammatory score, PBC stage and clinical data. The diagnostic performance of SWE for differentiating higher grades of fibrosis (F≥2) from lower grades(F0, F1) was evaluated using ROC curve analysis.

RESULTS

51 subjects were enrolled. Fibrosis stage, necroinflammation score and PBC stage had moderate correlations with eYM, but steatosis did not correlate with eYM. For all patients, AST, ALT and total bilirubin levels were positively correlated with eYM while serum albumin was negatively correlated with eYM; for patients with PBC, AST and ALT had positive correlations with eYM; for patients with AIH, AST, ALT, Alk Phos and total bilirubin had positive correlations with eYM. The AUROC for differentiating F≥2 from F0 and F1 was 0.781. Our previously established cut-off value of 7.29 kPa for a heterogenous population of subjects with diffuse liver disease had sensitivity and specificity of 88.9% and 39.4% in this cohort. A cut-off value of 9.15kPa provided a sensitivity of 83.3% and specificity of 72.7%,which also provided a sensitivity of 84.6% and specificity of 75% in the follow-up subgroup and a sensitivity of 80% and specificity of 69.2% in the diagnostic subgroup.

CONCLUSION

Shear wave elastography is a novel, supplementary adjunct to liver biopsy in the evaluation of histological staging in patients with ALD. A higher cutoff value for diagnosis of advanced fibrosis may yield superior diagnostic performance in these patients.

CLINICAL RELEVANCE/APPLICATION

Shear wave elastography is a supplementary adjunct to liver biopsy in the evaluation of histological staging in patients with ALD.

GI365-SD-MOB3 Prediction of the Gastrointestinal Stromal Tumor Response to Second-line Sunitinib Therapy with Apparent Diffusion Coefficient

Station #3

Participants
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Lei Tang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Muge Karaman, PhD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Yi Sui, PhD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Yingshi Sun, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xiaohong J. Zhou, PhD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To demonstrate the use of apparent diffusion coefficient (ADC) for early prediction of gastrointestinal stromal tumor (GIST) response to second-line sunitinib treatment.

METHOD AND MATERIALS

With the approval of the institutional review board, a total of 43 patients were enrolled in the study. All the patients underwent sunitinib treatment after imatinib resistance. MRI scans with multi-b-value diffusion-weighted imaging (DWI) were performed prior to treatment (baseline) and two weeks (for prediction of response) after initiating sunitinib treatment. Conventional MRI images at twelve weeks were used to determine the good (GoodR) and poor (PoorR) responders according to the established criteria. The regions of interest (ROIs) were drawn on the b=1000 sec/mm² images in the solid tumor regions. Up to two ROIs (the largest ones) were selected from each patient, resulting in 36 GoodR and 27 PoorR ROIs. The ADC values were then calculated for each ROI by using the mono-exponential diffusion model. The changes in the ADC values (ΔD) and the longest diameter of the lesion (ΔLD) before and after two weeks of treatment were compared between the two groups. A receiver operating characteristic (ROC) analysis was also performed to evaluate the response to sunitinib treatment.

RESULTS

Significant differences were detected in the change of ADC values (ΔD) (62.2% vs. 11.7%, p<0.001) between the two groups. ΔD provided a significantly higher predictive power than ΔLD, producing higher AUC in the ROC analysis (80% vs. 69%).This performance was further improved (AUC value of 82%) when ΔD was combined with ΔLD.

CONCLUSION

The change in ADC values two weeks into the treatment provides a better prediction of GIST response to sunitinib therapy than the change of tumor size.

CLINICAL RELEVANCE/APPLICATION

The change in ADC values after two weeks of therapy can be a useful marker to predict early response of GIST to sunitinib treatment.

GI366-SD-MOB4 Can the Detection of Peritoneal Metastatic Disease be Improved using Virtual Monenergetic Reconstructions of Contrast-enhanced Dual-energy CT Scans?

Station #4

Participants
Kathryn Darras, MD, Vancouver, BC (*Presenter*) Nothing to Disclose
Sheldon J. Clark, MD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Sarah A. Barrett, MBBCh, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
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Heejun Kang, MD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
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Mohammed F. Mohammed, MBBS, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Savvas Nicolaou, MD, Vancouver, BC (*Abstract Co-Author*) Institutional research agreement, Siemens AG
Patrick D. McLaughlin, FFRRCSI, Vancouver, BC (*Abstract Co-Author*) Speaker, Siemens AG

PURPOSE

To evaluate the role of virtual monochromatic imaging (VMI) in the detection of peritoneal metastatic disease in contrast-enhanced computed tomography (CT) of the abdomen and pelvis and to compare this technique to conventional polychromatic imaging (PCI).

METHOD AND MATERIALS

Institutional review board approval was obtained, with no informed consent required, for this retrospective analysis. 43 consecutive patients with confirmed peritoneal disease were scanned using a standard protocol on a 128-section dual source, dual energy CT system (100/140 keV). Scans were retrospectively reconstructed at VMI energy levels from 40 – 110 keV in 1 keV increments and were analyzed both quantitatively and qualitatively. CNR values for peritoneal metastatic deposits were recorded using region of interest (ROI) analysis at each energy level for all VMI datasets. Subjective analysis was performed by two independent, blinded fellowship-trained readers with greater than 15 years combined experience. Qualitative parameters included diagnostic acceptability, subjective noise, spatial resolution, contrast resolution.

RESULTS

The contrast-to-noise ratios (CNRs) for peritoneal metastatic deposits at the different VMI energy levels were compared using a one-way ANOVA with Tukey Post Test and the optimal CNR was observed at 40 keV ($p < 0.0001$). Qualitative parameters were compared using a Paired T Test. Subjective noise and spatial resolution was significantly better on PCI but contrast resolution was significantly better on VMI at 40 keV ($p < 0.0001$). Readers reported increased confidence on VMI at 40 keV compared to PCI.

CONCLUSION

VMI reconstruction of contrast enhanced dual energy CT scans of the abdomen and pelvis at 40 keV maximizes the conspicuity of metastatic peritoneal deposits when compared with PCI.

CLINICAL RELEVANCE/APPLICATION

Improved detection of peritoneal metastases will enable surgeons and oncologists to make more informed decisions regarding operative intervention and chemotherapeutic regimens.

GI367-SD-MOB5 Hepatocellular Carcinoma treated with 90Yttrium Radioembolization: Value of Tumor Stiffness Measured with MR Elastography for Assessment of Treatment Response

Station #5

Participants
Sonja Gordic, MD, New York, NY (*Presenter*) Nothing to Disclose
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Edward Kim, MD, New York, NY (*Abstract Co-Author*) Consultant, Koninklijke Philips NV; Advisory Board, Onyx Pharmaceuticals, Inc; Advisory Board, Sterigenics International LLC
Bachir Taouli, MD, New York, NY (*Abstract Co-Author*) Consultant, MEDIAN Technologies ; Grant, Guerbet SA

PURPOSE

To correlate tumor stiffness (TS) measured with MR elastography (MRE) to degree of tumor enhancement and necrosis on contrast-enhanced T1-weighted imaging (CE-T1WI) in hepatocellular carcinomas (HCC) treated with 90Yttrium radioembolization (RE).

METHOD AND MATERIALS

This retrospective study was IRB-approved and the requirement for informed consent was waived. 22 patients (M/F 14/8, mean age 64 y) with HCC who underwent RE and 11 patients (M/F 8/3, mean age 63 y) with newly diagnosed untreated HCC were included. Liver MRI included 2D GRE MRE sequence. Mean TS values were obtained by placing regions of interest (ROIs) over HCCs on stiffness maps. Visual assessment of tumor necrosis and calculation of enhancement ratio by placing ROIs over tumors on CE-T1WI including subtracted images was performed. Data were analyzed using an independent-samples t-test and Pearson correlation.

RESULTS

33 HCCs (mean size 3.1 cm) were evaluated. Mean TS in treated HCCs was significantly lower compared to untreated tumors (3.8±1.9 vs. 6.9±3.4 kPa, $p < 0.05$). TS showed a significant negative correlation with percentage of tumor necrosis (r -0.72, $p < 0.001$) and a positive correlation with the enhancement ratio (r 0.64, $p < 0.001$).

CONCLUSION

TS measured with MRE may potentially be used as a marker of HCC response to RE. These results need to be verified in a prospective study.

CLINICAL RELEVANCE/APPLICATION

In patients with HCC, tumor stiffness measured with MRE may potentially be used as a marker of tumor necrosis after RE.

Honored Educators

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educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Richard L. Ehman, MD - 2016 Honored Educator

GI368-SD-MOB6 Differentiation of Neoplastic Polyp of Gallbladder from Cholesterol Polyp with High Resolution Gallbladder Ultrasound

Station #6

Participants
Song-Ee Baek, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Yong Eun Chung, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sungwon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ho Kyoung Hwang, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Chang Moo Kang, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Moon Jae Chung, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myeong-Jin Kim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Bayer AG

PURPOSE

To evaluate the diagnostic performance of high resolution ultrasound (HRUS) of gallbladder (GB) for differentiation of neoplastic polyps from cholesterol polyps

METHOD AND MATERIALS

Between Nov 2012 and Feb 2016, pathologically confirmed GB polyps (n=108) with HRUS were included (86 cholesterol polyps and 22 neoplastic polyps including 10 adenomas and 12 carcinomas). HRUS is performed with a convex probe (1-6MHz) at first and followed with a linear probe (2-8 MHz). Two radiologists retrospectively determined image findings: multiplicity, size, layer disruption, shape (sessile, polypoid), surface contour (lobulated, smooth), echogenicity of GB wall, echotexture (homogenous, heterogeneous), presence of echogenic foci, hypoechoic internal echo and Doppler flow. To find imaging features suggesting neoplastic polyps, logistic regression and receiver operating characteristic curve analysis were used.

RESULTS

Mean size of polyp was 12.1±7.4 mm and there was a significant difference in size between benign (9.8±4.2 mm) and neoplastic polyps (21.0±10.3 mm, P<0.001). On univariate logistic regression, single, large size polyp, layer disruption, sessile shape, presence of echogenic internal echo and presence of Doppler flow were significantly associated with neoplastic polyp (P<0.05, respectively). On multivariate logistic regression, only singularity (P=0.014) and size (P=0.005) were significantly associated with neoplastic polyp. On ROC analysis neoplastic polyp could be diagnosed with sensitivity 81.8%, specificity 84.9%, accuracy 84.3%, PPV 58.1% and NPV 94.8%, using cutoff value of 13.4mm. In subgroup analysis which excluded single polyps with more than 13.4mm (n=27, including 4 neoplastic polyps), presence of hypoechoic internal echo showed statistically significance higher in neoplastic polyps at multivariate analysis (p=0.045, sensitivity 75%, specificity 82.6%, accuracy 81.5%, PPV 42.9% and NPV 95%).

CONCLUSION

Single, large polyps (>13.4mm) have higher malignancy potential. In the small polyps, presence of hypoechoic internal echo is the feature suggesting possibility of malignancy.

CLINICAL RELEVANCE/APPLICATION

Even at the small GB polyp, if you find sessile shape, layer disruption and presence of hypoechoic internal echo in the polyp, you need to consider cholecystectomy.

GI369-SD-MOB7 Reliability and Intra-observer Reproducibility of Liver Surface Nodularity Software for the Assessment of Cirrhosis with CT and MRI

Station #7

Awards
Student Travel Stipend Award

Participants
Grace C. Lo, MD, New York, NY (*Presenter*) Nothing to Disclose
Cecilia Besa, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Martin Kang, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Mathilde Wagner, MD, PhD, Paris, France (*Abstract Co-Author*) Consultant Olea Medical
Ashley Stueck, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Andrew D. Smith, MD, PhD, Jackson, MS (*Abstract Co-Author*) Research Grant, Pfizer Inc; President, Radiostics LLC; President, Liver Nodularity LLC; President, Color Enhanced Detection LLC; President, eMASS LLC; Pending patent, Liver Nodularity LLC; Pending patent, Color Enhanced Detection LLC; Pending patent, eMASS LLC;
Bachir Taouli, MD, New York, NY (*Abstract Co-Author*) Consultant, MEDIAN Technologies ; Grant, Guerbet SA

PURPOSE

To assess the repeatability and reproducibility of liver surface nodularity (LSN) measurement using custom software with CT vs. MRI and to evaluate the accuracy of LSN score in diagnosing liver cirrhosis.

METHOD AND MATERIALS

This IRB-approved retrospective study included adult patients with liver MRI and CT within 6 months of biopsy. Custom software was used to measure LSN on noncontrast CT (NCT), contrast-enhanced CT (CECT), T2-weighted HASTE images (T2 HASTE), and post-contrast T1-weighted delayed hepatobiliary phase images (T1w HBP). Measurements were made along the anterior left lobe on 2D axial images on NCT, CECT, T2 HASTE, and HBP and along the right lobe on 2D coronal images on HBP. Ten unique slices were measured for each series and averaged to generate a LSN score. Technical failure was defined as inability to measure LSN on 10

slices. Intra- and inter-observer agreement were assessed using intraclass correlation coefficient (ICC). For intra-observer assessment, one reader repeated measurements two weeks after the first session. A second independent reader was used to assess inter-observer agreement. Accuracy of LSN score for detection of cirrhosis was assessed using receiver operating characteristic analysis.

RESULTS

A total of 27 patients (M/F 20/7, mean age 57y) with 30 MRIs, 25 NCTs, 27 CECTs, and pathology were included. 37% (10/27) had cirrhosis on histopathology. Technical failure occurred only on NCT (4%, 1/25) and T2 HASTE (30%, 9/30). Intra-observer agreement was excellent for NCT, CECT, axial T1w HBP, and coronal T1w HBP (ICC=0.982, 0.946, 0.929, 0.914) but moderate for T2W HASTE (ICC=0.451). Inter-observer agreement was good for NCT and axial and coronal T1w HBP (ICC=0.669, 0.73, 0.683), moderate for CECT (ICC=0.517), poor for T2 HASTE (ICC=0.361). On NCT and coronal T1w HBP, there was a significant difference between F0-3 versus F4 (2.9 vs. 3.82, 3.73 vs 4.56; $p<0.05$) with AUCs of 0.758 (NCT) and 0.804 (T1 HBP) for identifying cirrhosis.

CONCLUSION

Liver surface nodularity measurement is reliable with NCT and post-contrast T1w HBP on MRI, with very good intra-observer and good inter-observer reproducibility, and may be helpful in evaluating for liver cirrhosis.

CLINICAL RELEVANCE/APPLICATION

Liver surface nodularity quantified with software is a potential non-invasive marker of cirrhosis.

GI370-SD-MOB8 Role of Magnetic Resonance Imaging (MRI) in Fistula-in-ano-A MRI-Operation Correlation in 229 Consecutive Patients: Can We Decide the Indications of getting MRI in Fistula-In-Ano Patients?

Station #8

Participants
Pankaj Garg, MBBS,MS, Mohali, India (*Abstract Co-Author*) Nothing to Disclose
Pratiksha Singh, Fort Worth, TX (*Presenter*) Nothing to Disclose
Prof Mohinder Kumar Garg, Khanpur Kalan, India (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To corroborate MRI findings with operative findings in fistula-in-ano patients and quantify the information added by MRI.

METHOD AND MATERIALS

All consecutive fistula-in-ano patients operated between July 2013- May 2015 were prospectively enrolled. Preoperative MRI was done in every patient. The details of tracts, internal opening and the presence of 'complexing features'- additional tract or internal opening, horseshoe tract, associated abscess and supralevator extension -were correlated in MRI and operative notes.

RESULTS

229 patients (424 tracts) were included. Mean age- 49.0 ± 11.3 years. M/F- 198/31. James hospital classification: Type I-58,II-20,III-49,IV-86,V-16. The sensitivity and specificity of MRI in diagnosing fistula tracts was 98.8% and 99.7% respectively and in identifying internal opening was 97.7% and 98.6% respectively. MRI added significant information in 107 (46.7%) patients which was presence of additional tracts in 71 (66.3%), horseshoe tract in 63 (58.8%), supralevator extension in 16 (14.9 %), unsuspected abscess in 11 (10.3%) and multiple internal openings in one patient (1%)[categorized as 'complexing features']. The proportion of simple/complex fistula (based on history and clinical examination alone) was 32.8/67.2% which changed to 21.4/78.6% after the MRI scan. MRI added significant information about unsuspecting 'complexing features' which were missed on history and clinical examination in more than one-third (26/75-34.6%) of simple fistulae and more than half (81/154 -52.5%) of already known complex fistulae.

CONCLUSION

MRI is highly sensitive and specific. It adds significant information in about one-third of simple and half of complex fistula-in-ano. It should perhaps be done in all fistula-in-ano cases

CLINICAL RELEVANCE/APPLICATION

This is the largest study correlating MRI findings and operation in 229 patients of fistula-in-ano. MRI added significant information (to the information already obtained on history and clinical examination) about unsuspecting 'complexing features' (additional tracts, horseshoe tracts, abscess and supralevator extension) in 46.7% patients [34.6%-simple and 52.5%-complex fistula].

GI269-ED-MOB10 Imaging Appearance and Surgical Management of Anovaginal and Rectovaginal Fistulas

Station #10

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
Wendaline M. VanBuren, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Shannon P. Sheedy, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Amy L. Lightner, Rochester, IA (*Abstract Co-Author*) Nothing to Disclose
Sarasa T. Kim, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Madeline Miller, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Joel G. Fletcher, MD, Rochester, MN (*Abstract Co-Author*) Grant, Siemens AG; ;
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Anovaginal and rectovaginal fistulas (AVF/RVF's) represent a challenging subset of pelvic fistulas for radiologists and surgeons, and have a wide range of imaging appearances on CT, MR, and fluoroscopy. AVF/RVF may arise from obstetrical trauma, Crohn's

disease, malignancy, pelvic radiation/iatrogenic, infection/diverticulitis. The surgical management of AVR/RVF's will change based on size, anatomic classification, etiology, and other factors.

TABLE OF CONTENTS/OUTLINE

Background of RV/AV fistulas Clinical presentation & non-imaging assessment Normal anatomic appearance Classification: RVF vs. AVF, low/middle/highETIOLOGY-based imaging of AVF/RVF's (protocol, findings) Obstetric Inflammatory: Crohn's disease, diverticulitis Malignancy Radiation IPAA IatrogenicCritical features across etiologies Relationship to dentate line and location within vagina Sphincter involvement Previous sphincter damage or child birth Proctitis and condition of surrounding tissues Associated abscess or undrained fluid collectionIllustrative review of surgical techniques and when/why they are chosen Surgical management prior to definitive repair Fistulotomy Mucosal advancement flap +/- sphincteroplasty Transvaginal repair Tissue transfer procedures (gracilis/sartorius flaps, fad pad) Proctectomy, diversion

Honored Educators

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Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

SPSP21

Imagen Cuantitativa (Biomarcadores) En La Práctica Clínica: Sesión del Colegio Interamericano de Radiología (CIR) en Espanol/Quantitative Imaging and Biomarkers in Clinical Practice: Session of the Interamerican College of Radiology (CIR) in Spanish

Monday, Nov. 28 1:30PM - 4:30PM Room: E451A

BR CA GI MK NR BQ MR

AMA PRA Category 1 Credits ™: 3.00
ARRT Category A+ Credits: 3.50

FDA Discussions may include off-label uses.

Participants
Pablo R. Ros, MD, PhD, Cleveland, OH (*Moderator*) Nothing to Disclose
Jose L. Criales, MD, Mexico City, Mexico (*Moderator*) Nothing to Disclose
Miguel E. Stoopen, MD, Mexico City, Mexico (*Moderator*) Nothing to Disclose

Sub-Events

SPSP21A Bienvenida/Welcome

Participants
Pablo R. Ros, MD, PhD, Cleveland, OH (*Presenter*) Nothing to Disclose
Miguel E. Stoopen, MD, Mexico City, Mexico, (mstoopen@ctscanner.mx) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Coordinator

ABSTRACT

Coordinator no abstract

URL

Coordinator

SPSP21B La Imagen Medica Personalizada y Precisa/Precise and Personalized Medical Imaging

Participants
Luis Marti-Bonmati, MD, PhD, Godella, Spain, (Luis.Marti@uv.es) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand what imaging biomarkers are and how they can improve diagnosis and treatment follow-up. 2) To describe the different types of biomarkers. 3) To analyze the process of biomarkers development, including validation, qualification and standardization.

ABSTRACT

Imaging seems ideally suited to flourish as a quantitative science. Quantitative imaging biomarkers extract and measure objective biological characteristics from any type of medical images, being resolved in space, through parametric images, and in time, as response maps. As medical imaging does not destroy the evaluated samples, test-retest evaluations are feasible, allowing the repetition of experiments and measurements as frequently as desired. Each voxel in a computer derived image represents both the location and the value of a specific calculated parameter (morphological, biological, response) obtained by the application of mathematical or simulation models to the source images. These synthetic parametric maps represent the new paradigm in clinical radiology and should be considered as virtual biopsies, showing different morphological and biopathological abnormalities. Biomarkers can be classified as prognostic, if accuracy of patient diagnosis or prognosis is improved; predictive, if the most beneficial treatment can be defined; response, when the beneficial outcomes can be shown after treatment; and monitoring, to detect relapse or toxicity.

URL

SPSP21C Esclerosis Múltiple : Seguimiento Cuantitativo/Multiple Sclerosis: Quantitative Follow Up

Participants
Leonardo Vedolin, MD, PhD, Sao Paulo, Brazil, (leonardovedolin@hotmail.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To describe basic background about quantitative MRI techniques applied to multiple sclerosis. 2) To discuss how quantitative MRI techniques contribute to monitoring of MS progression.

ABSTRACT

Multiple sclerosis (MS) is a chronic demyelinating and neurodegenerative disease that affects the central nervous system (CNS). Brain and spine MRI are most important paraclinical tool for the diagnosis of MS as conventional MRI techniques, such as T2/FLAIR weighted and gadolinium-enhanced T1-weighted sequences are highly sensitive for detecting focal active white matter lesions. However, these techniques are not specific enough to detect diffuse injuries in both grey and white matter. Pathological and imaging data indicated that lesion pattern and timely detection of tissue damage could help identify patients with an increased risk

of developing severe disability and cognitive impairment. In this context, advanced quantitative MR tools have been used to access brain and spinal cord lesions in MS. Proton magnetic resonance spectroscopy (MRS) has been used in patients with CIS to identify tissue damage apart from the visible T2 lesions. Diffusion tensor imaging and magnetization transfer imaging have also revealed differences in normal-appearing brain tissue between patients with CIS and controls. Additionally, double inversion recovery (DIR) sequence, quantitative susceptibility mapping and phase sensitive inversion recovery (PSIR) are promising technique to monitor cortical damage and disease progression in patients with MS. The purpose of this lecture are (1) to describe basic background regarding quantitative MRI techniques applied to multiple sclerosis and (2) to discuss how quantitative MRI techniques contribute to monitoring of MS progression.

URL

SPSP21D **Preguntas/Q & A**

Participants

SPSP21E **Resonancia Magnética en las Cardiopatias/Non-invasive Evaluation of Cardiac Disease by MRI**

Participants
Aloha Meave, MD, Mexico City, Mexico (*Presenter*) Nothing to Disclose

SPSP21F **Enfermedad Hepática por Depósito (Esteatosis, Fibrosis, Cirrosis y Hemocromatosis)/Liver Storage Disease (Steatosis, Fibrosis, Cirrhosis, and Hemochromatosis)**

Participants
Manuela Franca, MD, Porto, Portugal, (mariamanuela.franca@gmail.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the most common imaging features related to different liver storage diseases. 2) Understand that fat, iron and fibrosis commonly co-exist in different diffuse liver diseases. 3) Apply the best MR imaging techniques to assess and to quantify liver steatosis and iron overload, and to stage liver fibrosis/cirrhosis. 4) Discuss the clinical relevance of MR imaging biomarkers in different clinical scenarios of liver diseases, emphasizing the role of MR biomarkers on follow up of patients and treatment monitoring, taking hemochromatosis as a clinical example.

ABSTRACT

Different amounts of fat, iron deposits and fibrosis can be found in different diffuse liver diseases. Because liver biopsy has several limitations, MR imaging biomarkers have been developed for fat and iron quantification, and to stage liver fibrosis.Quantification of proton density fat fraction (PDFF) can be accurately performed with multi-echo chemical shift encoded (MECSE) gradient echo MR sequences, which must be corrected for T1 relaxation, T2* decay effect, noise and fat spectral complexity. Quantification of liver iron content is needed to detect and stage iron overload, and also to monitor iron-reducing treatments. Iron MR quantification may be performed with R2/R2* relaxometry techniques. Also, MECSE-MR sequences allow to simultaneously quantifying PDFF and R2* of liver parenchyma. MR elastography can detect and stage significant or advanced fibrosis and cirrhosis, with high accuracy.All of these MR measurements are increasingly being used as non-invasive biomarkers of hepatic steatosis, siderosis and fibrosis.

URL

SPSP21G **Preguntas/Q & A**

Participants

SPSP21H **Presentación del CIR/CIR Update**

Participants
Miguel A. Pinochet, MD, Santiago, Chile (*Presenter*) Nothing to Disclose
Dante R. Casale Menier, MD, Ciudad Juarez, Mexico (*Presenter*) Nothing to Disclose

SPSP21I **Cáncer de Próstata: Marcadores en Diagnóstico y Seguimiento/Prostate Cancer: Biomarkers in Diagnosis and Follow Up**

Participants
Ivan Pedrosa, MD, Dallas, TX (*Presenter*) Nothing to Disclose

SPSP21J **Osteoartrosis: Evaluación Cuantitativa del Cartílago Articular/Osteoarthritis: Cartilage Quantitative Evaluation**

Participants
Nicolas Zilleruelo, MD, Santiago, Chile, (nzilleruelo@alemana.cl) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Assess the potential of technological innovations and advances to enhance clinical practice and problem-solving. 2) Identify the different quantitative techniques in the study of articular cartilage. 3) Practical applications of these quantitative techniques and discuss their clinical relevance.

SPSP21K **Preguntas/Q & A**

Participants

SPSP21L **Evaluación de la Respuesta Precoz a la Terapia Neoadyuvante en el Cáncer de Mama con Biomarcadores de Imagen/Early Response Evaluation to Neoadjuvant Chemotherapy in Breast Cancer with Imaging Biomarkers**

Participants
Julia Camps Herrero, DIPLPHYS, Alzira, Spain, (juliacamps@gmail.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To know the diagnostic accuracy of Diffusion MRI in the evaluation of early response to Neoadjuvant Chemotherapy (NAC). 2) To learn the proof of principle and proof of mechanism of Diffusion Tensor MRI (DTI) as an Imaging Biomarker. 3) To learn about the results of early response evaluation to NAC with DTI.

ABSTRACT

Dynamic contrast-enhanced (DCE) Breast MRI is the standard imaging modality in the response evaluation to neoadjuvant chemotherapy (NAC). Diagnostic accuracy of DCE-MRI in response evaluation to NAC is limited to around 70% in published meta-analysis with very few studies dealing with early response evaluation and DCE-MRI.Diffusion MRI has been show to be a solid imaging biomarker in the evaluation of response to neoadjuvant chemotherapy (NAC) and a recent meta-analysis (Wu, Breast Cancer Res Treat, 2012) showed that it adds sensitivity to the high specificity provided by DCE-MRI. Pickles et al showed in 2006 that diffusion changes precede size reduction in neoadjuvant treatment of breast cancer (Magnetic Resonance Imaging, 2006).Diffusion Tensor imaging (DTI) is a three-dimensional technique, one must apply diffusion gradients along at least 6 non co-linear, non coplanar directions in order to provide enough information. The mammary ducts are anisotropic structures which need non-scalar or multiple ADC measurements in order to characterize the orientation-dependent water mobility in this tissues. These multiple ADC measurements are provided by DTI. We show our preliminary results in more than 30 patients treated with NAC in which we performed an early evaluation after the first two cycles of treatment with DTI, proving that the prediction of response to NAC is earlier and more accurate than the response evaluation with DCE-MRI.

URL

SPSP21M **Respuesta Oncológica: Imagen Híbrida/Oncologic Response: Hybrid Imaging**

Participants
Andres Kohan, MD, Capital Federal, Argentina, (andres.a.kohan@gmail.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List current hybrid imaging methods for assessing tumor response. 2) Identify which method is best to be used in specific clinical scenarios. 3) Assess oncologic response through hybrid imaging.

ABSTRACT

URL

SPSP21N **Preguntas/Q & A**

Participants

SPSP21O **Clausura/Closing**

Participants
Jose L. Criales, MD, Mexico City, Mexico (*Presenter*) Nothing to Disclose
Jorge A. Soto, MD, Boston, MA (*Presenter*) Royalties, Reed Elsevier
Pablo R. Ros, MD, PhD, Cleveland, OH (*Presenter*) Nothing to Disclose

Honored Educators

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Jorge A. Soto, MD - 2013 Honored Educator
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Jorge A. Soto, MD - 2015 Honored Educator

VSIO21

Interventional Oncology Series: Hepatocellular Carcinoma and Cholangiocarcinoma

Monday, Nov. 28 1:30PM - 6:00PM Room: S406B

GI IR

AMA PRA Category 1 Credits ™: 4.50
ARRT Category A+ Credits: 5.00

FDA Discussions may include off-label uses.

Participants
Riccardo A. Lencioni, MD, Pisa, Italy, (rlencioni@med.miami.edu) (*Moderator*) Research Consultant, BTG International Ltd; Research Consultant, Guerbet SA; Research Consultant, Bayer AG

LEARNING OBJECTIVES

1) To understand the spectrum of interventional oncology treatments currently available for liver cancer patients. 2) To discuss the results of recent clinical studies investigating interventional oncology treatments for liver cancer. 3) To describe the role of interventional oncology in the multidisciplinary management of patients with liver cancer.

ABSTRACT

Sub-Events

VSIO21-01 HCC: Medical Oncologist's Perspective

Monday, Nov. 28 1:30PM - 1:50PM Room: S406B

Participants
Ghassan K. Abou-Alfa, MD, New York, NY, (abou-alg@mskcc.org) (*Presenter*) Research Grant, Abbott Laboratories; Research Grant, Amgen Inc; Research Grant, AstraZeneca PLC; Research Grant, Bayer AG; Research Grant, Eli Lilly and Company; Research Grant, Exelixis, Inc; Research Grant, F. Hoffmann-La Roche Ltd; Research Grant, Immunomedics, Inc; Research Grant, Incyte Corporation; Research Grant, Momenta Pharmaceuticals; Research Grant, Myriad Genetics, Inc; Research Grant, Novartis AG; Research Grant, OncoMed Pharmaceuticals, Inc; Research Grant, Polaris Group; Research Grant, Vicus Therapeutics, LLC; Consultant, Aduro BioTech, Inc; Consultant, Astellas Group; Consultant, Onxeo SA; Consultant, Boston Scientific Corporation; Consultant, Boston Therapeutics, Inc; Consultant, Bristol-Myers Squibb Company; Consultant, CASI Pharmaceuticals Inc; Consultant, Celgene Corporation; Consultant, Cipla Ltd; Consultant, Eli Lilly and Company; Consultant, Gilead Sciences, Inc; Consultant, IntegraGen SA; Consultant, AstraZeneca PLC; Consultant, Merrimack Pharmaceuticals, Inc; Consultant, Momenta Pharmaceuticals; Consultant, Novartis AG; Consultant, Onxeo SA; Consultant, AbbVie Inc; Consultant, sanofi-aventis Group; Consultant, Silenseed Ltd; Consultant, SillaJen, Inc; Consultant, Vicus Therapeutics, LLC

LEARNING OBJECTIVES

1) Recognize the two disease state, the cancer itself and the generally associated cirrhosis of hepatocellular carcinoma (HCC). 2) Recognize the current standards of care used for advanced and metastatic HCC. 3) Learn about the current clinical trials combining local plus systemic therapy for locally advanced and metastatic HCC.

ABSTRACT

As the understanding of the science of advanced hepatocellular carcinoma (HCC) deepens, and with the therapeutic advances we are living, the perspectives of the different disciplines onto the management of HCC seem to converge. An understanding of the two diseases in one that inflict patients with HCC is critical. Recognizing the cirrhosis is a must to help guide therapy and assess outcome. The advent of sorafenib has been followed by a whole armamentarium of clinical trials that so far has not yielded any positive outcome that moves the needle of improved survival further to the right. This is at least the case until the time of writing this abstract on the first of March 2016. While specialists wait to see the impact if any of immunotherapy in HCC, another novel approach continues to be underway: Combining local and systemic therapy. While has yielded so far discouraging results with the combination of TACE sorafenib, the study of this approach is not over yet, as investigators are visiting this approach with novel therapeutics including checkpoint inhibitors and extending it to other stages of disease, especially the metastatic setting. It won't be long time before interventional radiologists and medical oncology may need to sit with the patient and deliver therapy at the same time.

VSIO21-02 RFA Plus Lyso Thermosensitive Liposomal Doxorubicin Improves Survival Using Metric of RFA Duration per Tumor Volume: Retrospective Analysis of Prospective Randomized Controlled Trial

Monday, Nov. 28 1:50PM - 2:00PM Room: S406B

Participants
Haydar Celik, PhD, Bethesda, MD (*Presenter*) Nothing to Disclose
Paul Wakim, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
John W. Karanian, PhD, Laurel, MD (*Abstract Co-Author*) Nothing to Disclose
William F. Pritchard JR, MD, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Meryll Castro, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, W. L. Gore & Associates, Inc ; Researcher, Cook Group Incorporated; Patent agreement, VitalDyne, Inc; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; ; ; ;
Shelby Leonard, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Won Y. Tak, Daegu, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Nicholas Borys, Lawrenceville, NJ (*Abstract Co-Author*) Sr. Vice President, Celsion Corporation; Officer, Celsion Corporation
Riccardo A. Lencioni, MD, Pisa, Italy (*Abstract Co-Author*) Research Consultant, BTG International Ltd; Research Consultant, Guerbet SA; Research Consultant, Bayer AG

PURPOSE

Lyso-thermosensitive liposomal doxorubicin (LTLD) releases cytotoxic doxorubicin locally in the region of mild hyperthermia (40–42 °C). The purpose of this study is to evaluate a novel treatment parameter, burn time per tumor volume (min/ml), for correlation with clinical outcomes of RFA with LTLD.

METHOD AND MATERIALS

HEAT study is a double-blind, randomized controlled phase III trial of RFA-only vs RFA+LTLD. Patients with 3-7 cm diameter hepatocellular carcinoma (HCC) were included in the HEAT study, but only single lesions were used for this analysis (RFA only n=210 vs. RFA+LTLD n=227). The effect of burn time per tumor (pre-treatment) volume on progression free survival (PFS) and overall survival (OS) was analyzed using multiple covariate Cox proportional hazard model.

RESULTS

Average burn time per volume for RFA+LTLD patients was 22.7% less than RFA-only patients. Furthermore, Cox multiple covariate analysis was utilized to test the interaction of two different parameters: treatment groups (RFA-only vs. RFA+LTLD) and burn time per tumor volume. OS was found to be significant (p=0.038, Hazard Ratio=0.85): increase in the burn time per tumor volume improves survival in the RFA+LTLD patients compared to RFA only patients. On the other hand, a similar result was not observed for PFS (p=0.389, HR=1.059). Each group (RFA only and RFA+LTLD) was also individually analyzed for effects of burn time per tumor volume. For RFA+LTLD patients, one unit increase in RFA duration per tumor volume improved OS of RFA+LTLD patients by 19.6% (p=0.017, Hazard Ratio=0.836, CI=0.722-0.968, n=227). Conversely, burn time per tumor volume did not significantly affect RFA-only patients (p=0.57, Hazard Ratio=0.99, n=210).Kaplan-Meier analysis showed even more dramatic differences in a subgroup of patients (147/437) with the burn times per tumor volume larger than 2.5 min/ml (Fig).

CONCLUSION

LTLD may improve overall survival as RFA duration per unit tumor volume increases. This is a post hoc study, therefore should be confirmed with prospective studies. Defining optimal device use to maximize drug deposition may require correlating the drug pharmacokinetics with duration of RFA.

CLINICAL RELEVANCE/APPLICATION

Longer burn times may optimize LTLD drug effects. Burn time per tumor volume may be a better measure for RFA+LTLD assessment.

VSIO21-03 HCC: Interventional Oncologist's Perspective

Monday, Nov. 28 2:00PM - 2:20PM Room: S406B

Participants
Riccardo A. Lencioni, MD, Pisa, Italy, (rlencioni@med.miami.edu) (*Presenter*) Research Consultant, BTG International Ltd; Research Consultant, Guerbet SA; Research Consultant, Bayer AG

LEARNING OBJECTIVES

1) To understand the spectrum of interventional oncology treatments currently available for liver cancer patients. 2) To discuss the results of recent clinical studies investigating interventional oncology treatments for liver cancer. 3) To describe the role of interventional oncology in the multidisciplinary management of patients with liver cancer.

ABSTRACT

VSIO21-04 Sorafenib-loaded Theranostic Microspheres for the Transarterial Chemoembolization of a Liver

Monday, Nov. 28 2:20PM - 2:30PM Room: S406B

Participants
Hyo-Cheol Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Kyu Ri Son, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Woo Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyun-Jong Cho, Chuncheon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To develop poly(lactic-co-glycolic acid) (PLGA) microspheres that can co-encapsulated sorafenib and triiodobenzoic acid (TIBA) for simultaneous transarterial embolization (TAE) and local delivery of sorafenib.

METHOD AND MATERIALS

Sorafenib and TIBA-loaded PLGA microspheres (SOF/TIBA/PLGA) were fabricated using a modified oil-in-water method. After fabrication, the microspheres were characterized for size, biodegradability, drug release profiles, CT imaging properties in vitro. After these initial in vitro characterization, a rat hepatoma model was employed to enable in vivo studies investigating pharmacokinetics, tumor responses after TAE, and CT-monitoring capability.

RESULTS

The mean diameter of developed MSs was 28.5 ± 2.1 μm and the average of sorafenib encapsulation efficiency was 58.20% in this study. The mean contents of sorafenib and iodine in MSs were 5.11% and 23.15%, respectively. In vitro drug release study demonstrated that sorafenib release on day 1, 4, and 28 were 35.07 ± 0.59%, 46.64 ± 1.32%, and 67.41 ± 5.00%, respectively. According to the in vivo studies, PLGA MSs were detectable on post-procedural CT images. Both tumor concentration of sorafenib and tumor-to-liver drug concentration ratio were significantly higher in the SOF/TIBA/PLGA group compared with the sorafenib oral administration group ($p < .05$). Tumor growth rate, addressed one week after the procedure, was significantly lower in the SOF/TIBA/PLGA group compared with the blank PLGA MSs group and control group (no treatment) ($p < .05$).

CONCLUSION

SOF/TIBA/PLGA was promising materials for TAE of liver tumors, as providing sufficient anticancer effect, angiogenesis inhibition, and imageability.

CLINICAL RELEVANCE/APPLICATION

Sorafenib-loaded PLGA microsphere can be used for chemoembolization of HCC patients.

VSIO21-05 TACE in 2016: Techniques, Results, Practice Patterns

Monday, Nov. 28 2:30PM - 2:50PM Room: S406B

Participants
Jean-Francois H. Geschwind, MD, Westport, CT, (jeff.geschwind@yale.edu) (*Presenter*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC

LEARNING OBJECTIVES

1. Understand the indications for TACE for HCC2. Know the side effects, toxicities, and expected results of TACE for HCC patients3. Understand the potential for combining TACE with systemic therapies

ABSTRACT

VSIO21-06 Spectral Photon-counting CT: Spatial Differentiation of Static Contrast versus Radiopaque Image-able Drug Eluting Microspheres

Monday, Nov. 28 2:50PM - 3:00PM Room: S406B

Participants
Amir Pourmorteza, PhD, Bethesda, MD (*Presenter*) Researcher, Siemens AG
Ayele Negussie, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Rolf Symons, MD, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
William F. Pritchard JR, MD, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Elliot B. Levy, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, W. L. Gore & Associates, Inc ; Researcher, Cook Group Incorporated; Patent agreement, VitalDyne, Inc; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; ; ; ;
David A. Bluemke, MD, PhD, Bethesda, MD (*Abstract Co-Author*) Research support, Siemens AG

PURPOSE

Spectral CT makes it possible to differentiate two or more high atomic number contrast agents (CA) or drug delivery vectors that otherwise cannot be separately resolved using single energy CT or fluoroscopy. Here we demonstrate the feasibility of using a single spectral photon-counting CT (PCCT) scan to image and localize both custom and FDA-cleared microspheres mixed in one of two FDA-cleared CA's to assess the spatial heterogeneity of microspheres vs CA, which would be desirable after transarterial embolization (TAE).

METHOD AND MATERIALS

Two combinations of microspheres and vascular CAs were studied: I+Gd (LC Bead LUMI iodinated microspheres and gadolinium-based CA (Magnevist, Bayer)) and Bi+I (custom fabricated bismuth-engineered microspheres and iodinated CA (Isovue 300, Bracco)). Vascular phantoms were fabricated with beads inside 4-mm plastic tubes (resembling small vessels) with vascular CA diluted to approximate clinical concentrations. A prototype whole-body PCCT scanner (Siemens Healthcare) was used. Using test tubes with calibrated dilutions of CAs, we searched for energy thresholds that maximized the separation between the CA inside the bead and the vascular CA, while minimizing image noise. The lower threshold was set at 22 keV and the higher threshold was swept around the k-edge energies of Gd and Bi (50, 90 keV). Images were reconstructed with color maps correlating to these different PCCT detections.

RESULTS

The high energy threshold was incremented by 3keV steps at 80 and 140 kVp tube voltage settings. The following threshold and tube voltage settings provided optimized material separation and image noise tradeoff (I+Gd: 52 keV at 80 kVp and Bi+I: 75 keV at 140 kVp). Linear material decomposition of the PCCT images showed clear differentiation between beads and vascular CA.

CONCLUSION

The results show the feasibility of tuning the spectra thresholds of a PCCT scanner in order to differentiate radiopaque microspheres from adjacent static columns of contrast following embolization. Such differentiation may optimally inform endpoints in embolization or locations of tumor at risk for under-dosing or under-treatment. Future work will include in vivo experiments in a large animal model.

CLINICAL RELEVANCE/APPLICATION

Photon-counting CT may be used to characterize the outcome of TAE by localization and differentiation of microspheres and vascular columns of contrast between microspheres in a single scan.

VSIO21-07 Y90 Radioembolization: Current Indications and Protocols

Monday, Nov. 28 3:00PM - 3:20PM Room: S406B

Participants
Riad Salem, MD, MBA, Chicago, IL (*Presenter*) Research Consultant, BTG International Ltd Research Grant, BTG International Ltd

VSIO21-08 Prospective Trial using Internal Pair-production Positron-emission Tomography (PET) after Radioembolization to Determine the Effects of Yttrium-90 (90Y) Dose on Liver Toxicity

Monday, Nov. 28 3:20PM - 3:30PM Room: S406B

Participants
Keith T. Chan, MD, MS, Seattle, WA (*Presenter*) Spouse, Employee, Health Advocacy Strategies, LLC
Adam M. Alessio, PhD, Seattle, WA (*Abstract Co-Author*) Research Grant, General Electric Company
Sandeep Vaidya, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
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David H. Lewis, MD, Seattle, WA (*Abstract Co-Author*) Research funded, Eli Lilly and Company
Siddharth A. Padia, MD, Seattle, WA (*Abstract Co-Author*) Consultant, BTG International Ltd; Research Grant, Koninklijke Philips NV

PURPOSE

90Y internal pair-production PET can quantify the radiation dose delivered to non-tumoral hepatic parenchyma after radioembolization. This study prospectively correlates radiation dose in normal liver to treatment-related toxicity.

METHOD AND MATERIALS

A single-arm prospective trial was performed at a single institution under IRB approval. 35 patients with unresectable intrahepatic malignancies were enrolled. Inclusion criteria were: ECOG performance status 0–2, Child-Pugh A or B, and first 90Y radioembolization treatment. Time-of-flight PET imaging without additional tracer administration was performed the same day after 90Y treatment. Volumetric analysis of the non-tumor liver parenchyma was performed using a proprietary software and 90Y dose calculated. Patients were evaluated at 30 and 90 days post-treatment. Hypoalbuminemia, hyperbilirubinemia, elevation of AST and ALT, and leukopenia were assessed using multivariate models as indices of liver toxicity, with CTCAE Grade ≤1 change in laboratory values compared to Grade ≥2.

RESULTS

34 patients (median age 60, range 42–79) were included. 79% had HCC, 3% had cholangiocarcinoma, and 18% had liver metastases. One patient was excluded for poor image registration. 27 patients had underlying cirrhosis (81% HBV/HCV, 30% alcohol-related). 29 and 5 patients were Child-Pugh A and B, respectively. Most treatments (76%) were performed via lobar artery infusions with average delivered activity of 3.1GBq. No liver failure, abscess, biloma, or death occurred within 90 days. 15 patients had Grade ≤1 toxicity. 12 patients had Grade 2, 7 had Grade 3, and none had Grade 4 or higher toxicity. The median dose delivered to the normal liver in the treated lobe was 49Gy [range 5–133]. Patients with a Grade ≥2 change in albumin, bilirubin, and AST had a significantly higher parenchymal dose than those with Grade ≤1 (62±34Gy vs 39±21Gy, p=0.01). Multivariate models of each toxicity index showed that parenchymal dose is the most common factor associated with Grade ≥2 toxicity.

CONCLUSION

90Y delivered dose to normal liver parenchyma can be measured by internal pair-production PET after radioembolization and predicts post-treatment liver toxicity.

CLINICAL RELEVANCE/APPLICATION

90Y-PET tumor dosimetry permits immediate assessment of the dose received by normal liver after radioembolization and may predict treatment-related liver toxicity.

VSIO21-09 Panel Discussion: Management of Intermediate-Advanced HCC

Monday, Nov. 28 3:30PM - 3:45PM Room: S406B

Participants

VSIO21-10 Identification of Novel Angiogenesis Biomarkers Showing Transient and Sustained Changes in Circulating Levels after Hepatic Arterial Embolization for Hepatocellular Carcinoma

Monday, Nov. 28 3:45PM - 3:55PM Room: S406B

Awards
Student Travel Stipend Award

Participants
James S. Ronald, MD, PhD, Durham, NC (*Presenter*) Nothing to Disclose
Gemini L. Janas, RT, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Willa Chen, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Paul V. Suhocki, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Waleska M. Pabon-Ramos, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
David R. Sopko, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Andrew Nixon, PhD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Charles Y. Kim, MD, Durham, NC (*Abstract Co-Author*) Consultant, Halyard Health, Inc; Consultant, Cryolife, Inc; Consultant, Merit Medical Systems, Inc

PURPOSE

Prior studies of angiogenesis biomarker response after hepatic embolotherapy for hepatocellular carcinoma (HCC) in humans have been restricted to chemoembolization and radioembolization, which may confound biomarker response to ischemia. Furthermore, while many studies have focused on a limited number of biomarkers, numerous molecular pathways are implicated in angiogenesis. The purpose of this study was to characterize serum biomarker responses related to ischemia after bland transarterial embolization (TAE) of HCC using a robust and modern panel of circulating angiogenesis and associated biomarkers.

METHOD AND MATERIALS

This prospective study enrolled 25 patients with untreated HCC (LI-RADS 5 or biopsy proven) undergoing TAE as the sole method of oncologic treatment. A panel of 19 angiogenesis biomarkers were measured immediately prior to treatment and at 1 day, 2 weeks, and 4 weeks after treatment using multiplex enzyme-linked immunosorbent assays. Paired Wilcoxon rank sum tests were used to identify changes in biomarker levels compared with pre-TAE levels. Multiple testing corrections were performed.

RESULTS

Ten of 19 biomarkers showed statistically significant transient changes on the day following TAE, 10 biomarkers showed significant elevations at 2 weeks, and 2 biomarkers remained elevated as late as 4 weeks following TAE. IL-6 expression was initially increased but quickly returned to baseline levels. PDGF-AA, and PDGF-BB were transiently downregulated on the day following TAE. TGFß-2 was initially downregulated followed later by an increase in TGFß-1. TSP-2 also showed delayed upregulation at 2 weeks. Interestingly VEGF-D was upregulated for at least 2 weeks following TAE whereas VEGF-A showed only transient change. TIMP-1, ICAM-1, PlGF, and VEGFR-2 and 3 showed early and sustained upregulation persisting at least 2 weeks following TAE whereas VEGFR-1 showed little change. OPN and VCAM-1 showed the most sustained upregulation, extending at least 4 weeks following TAE.

CONCLUSION

Using a current panel of angiogenesis biomarkers, multiple biomarkers demonstrated significant changes after TAE, including several novel factors demonstrating sustained upregulation.

CLINICAL RELEVANCE/APPLICATION

Identification of specific pro-angiogenesis pathways after TAE may guide therapeutic targets for blocking the angiogenic response, which has been implicated in residual/recurrent tumorigenesis.

VSIO21-11 Characterizing Alterations in BCAA Metabolism in HCC in Vitro under TAE-like Ischemia Using Carbon-13 NMRS

Monday, Nov. 28 3:55PM - 4:05PM Room: S406B

Awards
Student Travel Stipend Award

Participants
Mike Sheng, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Santiago Pulido, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Michael Noji, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Gregory J. Nadolski II, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Stephen J. Hunt, MD,PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Terence P. Gade, MD, PhD, New York, NY (*Abstract Co-Author*) Research Grant, Guerbet SA

PURPOSE

Transarterial embolization (TAE) is the gold standard treatment for unresectable hepatocellular carcinoma (HCC). Under TAE ischemic environments, HCC cells undergo metabolic reprogramming that enables survival by facilitating reduction oxidation chemistry (redox) homeostasis. Specifically, we have focused on the redox regulation of protein function through the role of branched chain aminotransferase (BCAT1 and BCAT2), enzymes that are epigenetically re-expressed in HCC and play a central role in the metabolism of branched-chain amino acids (BCAAs), especially leucine and its α-keto acid (α-ketoisocaproic acid [KIC]) precursor. Utilizing carbon-13 NMR spectroscopy, we characterize alterations of BCAA metabolism in HCC cells surviving severe, TAE-like ischemia.

METHOD AND MATERIALS

13C-NMR spectroscopy of [1-13C] KIC and [1-13C] leucine metabolism was performed on previously established diethylnitrosamine (DEN)-induced rat HCC cell lines to assess alterations in BCAA metabolism *in vitro* under TAE-like ischemia compared to standard conditions. Western blot and qPCR was applied to elucidate changes in BCAT1/BCAT2 protein and RNA under stressed conditions.

RESULTS

HCC cells incubated with [1-13C] KIC under ischemia demonstrated metabolism of [1-13C] KIC to [1-13C] CO2 and nearly absent metabolism to [1-13C] leucine, in keeping with reductive stress induced inactivation of BCAT and activation of branched chain ketoacid dehydrogenase (BCKDH). These findings were corroborated by Western blot analysis which showed decreased BCAT1/BCAT2 and increased BCKDH protein expression under ischemic conditions.

CONCLUSION

HCC cells in TAE-like ischemic conditions undergo inactivation of BCAT and increased expression of BCKDH, leading to increased BCAA catabolism.

CLINICAL RELEVANCE/APPLICATION

Characterization of alterations in protein metabolism in HCC cells under TAE-like ischemic conditions could provide an effective biomarker of surviving cancer cells.

VSIO21-12 Radiofrequency Hyperthermia-Enhanced Direct Intratumoral Chemotherapy of Hepatocellular Carcinoma via an Interventional Molecular Imaging-Guided Approach

Monday, Nov. 28 4:05PM - 4:15PM Room: S406B

Participants
Jun Gao, MD, PhD, Seattle, WA (*Presenter*) Nothing to Disclose
Feng Zhang, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Yin Jin, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose

Yaoping Shi, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Jianfeng Wang, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Xiaoming Yang, MD, PhD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Recurrence often occurs in the margin of radiofrequency (RF) ablated hepatocellular carcinoma (HCC), due to residual tumor cells in the peritumoral zone. One potential strategy to overcome this clinical problem is combining RF ablation with adjuvant treatments. In this study, we investigated the opportunity of using RFH to enhance interventional molecular imaging-guided, direct intratumoral chemotherapy of HCC.

METHOD AND MATERIALS

For both in-vitro confirmation and in-vivo validation, different groups of Luciferase/mCherry-labeled human HCC cells (Lu/mC-HepG2) and mice with subcutaneous Lu/mC-HepG2 xenografts were treated by: (i) combination therapy with liposomal doxorubicin plus RFH at 42 **I**; (ii) liposomal doxorubicin alone; (iii) RFH alone; and (iv) saline. For in-vitro confirmation, MTS assay, confocal microscopy and flow cytometry were used to compare cell viabilities and apoptosis among different treatment groups. For in vivo validation, liposomal doxorubicin was directly injected into the tumor under ultrasound imaging guidance, followed by intratumoral RFH for 30 min. Changes on bioluminescent signals and sizes of tumors were followed up by quantitative molecular optical and ultrasound imaging overtime, which were correlated with subsequent histology confirmation.

RESULTS

Of in vitro experiments, MTS assay demonstrated the lowest cell proliferation in combination therapy compared with other three treatments (25.0±5.6% vs 49.7±5.2% vs 94.2±3.9% vs 100%, $p<0.001$). Flow cytometry showed the highest apoptotic index in combination therapy compared to other treatments (37.9±3.2% vs 32.2±1.7% vs 2.9±1.7% vs 1.8±0.7%, $p<0.001$). Of in vivo experiments, optical imaging demonstrated a significant decrease of bioluminescence intensities in combination therapy compared with other treatments (0.53±0.10 vs 1.4±0.5 vs 2.8±0.8 vs 3.0±0.3, $p<0.05$). Ultrasound images further showed the smallest tumor volume for combination therapy compared to other treatments (0.7±0.1 vs 1.8±0.4 vs 3.0±0.8 vs 3.3±0.3, $p<0.05$). Both imaging findings were confirmed by histologic correlation.

CONCLUSION

We have successfully validated the feasibility of using RFH to enhance direct intratumoral liposomal doxorubicin therapy of HCC.

CLINICAL RELEVANCE/APPLICATION

This concept may open new avenues for effective management of HCCs by combining RF technology with interventional molecular imaging-guided direct intratumoral chemotherapy.

VSIO21-13 Making Sense of Alabtion Technologies for Liver Cancer

Monday, Nov. 28 4:15PM - 4:35PM Room: S406B

Participants
Govindarajan Narayanan, MD, Miami, FL (*Presenter*) Consultant, BTG International Ltd; Consultant, AngioDynamics, Inc; Consultant, Medtronic plc; Consultant, Guerbet SA

VSIO21-14 Transcatheter Arterial Chemoembolization (TACE) followed by Immediate Radiofrequency Ablation (RFA) versus TACE alone in Treatment of Solitary Huge Hepatocellular Carcinoma (HCC>=10cm)

Monday, Nov. 28 4:35PM - 4:45PM Room: S406B

Participants
Zhijun Wang Sr, MD, PhD, Beijing, China (*Presenter*) Nothing to Disclose

PURPOSE

To compare the long-term clinical benefit of conventional TACE followed by immediate CBCT(C-arm Cone Bean CT) guided RFA and TACE alone in treatment of solitary huge HCC (≥10cm).

METHOD AND MATERIALS

This is a retrospective study involving 75 patients with unresectable solitary huge HCC (10.0 cm in diameter or larger) admitted to Chinese PLA General Hospital (Beijing, China) between January 2010 and March 2013. The median follow-up time was 33 months (range, 6–72 months). Of these patients, 44 patients received TACE alone and 31 patients received TACE immediately followed by CBCT guided RFA. For TACE with synchronous RFA group, all of patents received one to three cycles of TACE before combined therapy. The tumor response rate, treatment sessions were compared between the two modalities and overall survival (OS) were hierarchically analyzed using log–rank tests.

RESULTS

All patients successfully underwent TACE alone or TACE followed by immediate RFA with no serious complications. The median survival time was 19 months (range, 4–52 months) for TACE alone and 38 months (range, 6–70 months) for TACE with synchronous RFA group. Comparing to TACE alone, the combined therapeutic modality showed higher rates of complete response (87.1%) with fewer sessions ($P<0.001$). The 1-year, 2-year, and 3-year OS rates we were 66.7%, 31.8%, and 18.2% in TACE alone group, respectively. In contrast, for TACE with synchronous RFA group, the 1-year, 2-year, and 3-year OS rates were 90.3%, 64.5%, and 48.4%, respectively. This difference was statistically significant between the two groups ($P<0.001$).

CONCLUSION

TACE combined with synchronous RFA had advantages in prolonging OS, higher tumor response rate and decreasing therapeutic sessions in patients with unresectable solitary huge HCC when compared to TACE alone. The promising results suggest that the further prospective studies are required to confirm the findings of this study.

CLINICAL RELEVANCE/APPLICATION

The combined therapeutic modalities have the clinical benefit to improve the long-term outcome in treatment of solitary huge HCC.

VSIO21-15 Interventional Oncology Treatment of Cholangiocarcinoma

Monday, Nov. 28 4:45PM - 5:05PM Room: S406B

Participants
Sarah B. White, MD,MS, Philadelphia, PA, (sbwhite@mw.edu) (*Presenter*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, IO Rad

LEARNING OBJECTIVES

VSIO21-16 Treatment of Recurrent, Unresectable Intrahepatic Cholangiocarcinoma using Multi-Agent DSM TACE (Triple-TACE)

Monday, Nov. 28 5:05PM - 5:15PM Room: S406B

Participants
Fabian Goerg, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Bruners, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Christiane K. Kuhl, MD, Bonn, Germany (*Presenter*) Nothing to Disclose

PURPOSE

The aim of the study was to evaluate the efficacy of transarterial multi-agent chemoembolization used in combination with degradable starch microspheres in patients with recurrent, unresectable cholangiocarcinoma (ICC)

METHOD AND MATERIALS

Single-center study on 18 patients (mean age 63y) with unresectable ICC, of whom 7 had undergone hemihepatectomy or trisectorectomy, and another 4 had undergone segmentectomy, and who were secondary-progressive under systemic chemotherapy, were treated by multi-agent DSM-TACE according to a standardized protocol. A total 45 sessions of TACE were performed in 4 week intervals with a mean of 2.5 sessions per patient. The cytotoxic agents were Cisplatin, Mitomycin C and Doxorubicin ("Triple-TACE"). Degradable starch microspheres with a mean diameter of 50 µm were mixed with mitomycin and doxorubicine. After thorough angiography of the celiac trunc and hepatic vessels, a microcatheter was placed in the respective hepatic artery. Cisplatin was injected via perfusor set at 1 ml/min. The mitomycin/doxorubicine/DSM mixture was hand injected under permanent fluoroscopic control of antegrade flow. Local tumor response was evaluated by MRI and CT. In patients with bilio-enteric anastomses, aggressive preventive antibiotic treatment was applied.

RESULTS

Local tumor response according to RECIST 1.1 was as follows: One patient was lost to follow-up; another patient with whole-liver ICC underwent liver transplantation. For the remaining 16 patients for whom follow-up is available, complete response was observed in 2 patients (12.5%), one of whom has remained without intrahepatic disease for over 28 months; partial response in 8 patients (50%), stable disease in 6 patients (43.8%). Beyond RECIST, based on multiparametric hepatic MRI, the reduction of hepatic vital tumor load was categorized as follows: None of the patients had progressive intrahepatic disease; 2/16 (12.5%) had unchanged tumor load; 8/16 (50%) had a substantial reduction of vital tumor load; 4/16 (25%) had an almost complete reduction of tumor load, and 2/16 (12.5%) complete reduction with no vital tumor left.

CONCLUSION

Response assessment based on Recist 1.1 and multiparametric MRI showed excellent local tumor control in patients with ICC after Triple-TACE with degradable starch microspheres.

CLINICAL RELEVANCE/APPLICATION

Triple-TACE with degradable starch microspheres is effective for treatment of otherwise therapy-refractory intrahepatic ICC.

VSIO21-17 Clinical Value of Multimodality 3D Imaging in Interventional Oncology

Monday, Nov. 28 5:15PM - 5:35PM Room: S406B

Participants
Julius Chapiro, MD, New Haven, CT, (julius.chapiro@yale.edu) (*Presenter*) Research Grant, Koninklijke Philips NV

LEARNING OBJECTIVES

1) Understand the challenges in assessing tumor response after interventional oncology procedures. 2) Become acquainted with the more recently introduced solutions for this problem such as computer-assisted tumor segmentation and image analysis. 3) Learn about the previously available tumor response criteria as well as the more recently introduced three-dimensional software-assisted approaches such as the quantitative European Association for the Study of the Liver (qEASL) criteria.

ABSTRACT

Assessing the tumor response of liver cancer lesions after intraarterial therapies is of major clinical interest. Over the last two decades, tumor response criteria have come a long way from purely size-based, anatomic methods such as the Response Evaluation Criteria in Solid Tumors towards more functional, enhancement- and diffusion-based parameters with a strong emphasis on MRI as the ultimate imaging modality. However, the relatively low reproducibility of those one- and two-dimenstional techniques (modified Response Evaluation Criteria in Solid Tumors and the European Association for the Study of the Liver criteria) provided the rationale for the development of new, three-dimensional (3D) quantitative assessment techniques. This talk will summarize and compare the existing methodologies used for 3D quantitative tumor analysis and provide an overview of the published clinical evidence for the benefits of 3D quantitative tumor response assessment techniques.

VSIO21-18 Use of Enhancing Tumor Burden on MRI for Response Assessment and Prediction of the Survival after 90Yttrium Radioembolization in Hepatocellular Carcinoma

Monday, Nov. 28 5:35PM - 5:45PM Room: S406B

Participants
Duc Do Minh, BSc, Berlin, Germany (*Presenter*) Nothing to Disclose
Julius Chapiro, MD, New Haven, CT (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV
Ming De Lin, PhD, Cambridge, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Mansur Ghani, BS, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Qiang Huang, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Cuihong Liu, Jinan, China (*Abstract Co-Author*) Nothing to Disclose
Bruno R. Tegel, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
David Wainstejn, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Bernhard Gebauer, MD, Berlin, Germany (*Abstract Co-Author*) Research Consultant, C. R. Bard, Inc ; Research Consultant, Sirtex Medical Ltd; Research Grant, C. R. Bard, Inc; Research Consultant, PAREXEL International Corporation; Travel support, AngioDynamics , Inc
Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC

PURPOSE

Assessing tumor response after 90Yttrium radioembolization (Y90) has proven difficult when using traditional guidelines for image assessment (i.e. RECIST, mRECIST, WHO and EASL). Thus, novel methodologies for an early assessment of treatment response in patients with relatively short overall survival are needed. This study investigates the concept of enhancing tumor burden [ETB] and uses a whole-liver quantification of tumor enhancement as an early imaging biomarker for tumor response in patients with hepatocellular carcinoma (HCC) after the initial Y90.

METHOD AND MATERIALS

This retrospective single-center study included 35 HCC patients who underwent Y90 between 2000 and 2015. A semi-automated 3D quantification of the ETB as seen on baseline and follow-up contrast enhanced MR imaging was performed (qEASL prototype, Philips Healthcare). Several cutoffs were tested to define response (≥25%, 30%, 50% or 65% volumetric decrease in ETB). The paired student t-test was used to compare pre-and post-therapy ETB. Survival analysis included Kaplan-Meier curves with the log-rank test and Cox-proportional hazards modeling (uni- and multivariate). The predictive value of the various response cutoffs was evaluated via the Akaike information criterion (AIC).

RESULTS

Mean patient age was 62.0 years, 73.3% of patients were males. Only minimal decrease of mean ETB was measured after Y90 (156.4 cm3 to 150.1 cm3; p=0.78). Regarding the cutoff values of ≥25%, 30% and 50%, ETB response was associated with longer survival (HR:0.26; 0.22; 0.09, retrospectively, for p 50%, ETB response with the 50% cutoff remained significant in the multi-variate analysis (HR: 0.09, 95%CI: 0.02-0.41, p<0.01).

CONCLUSION

Volumetric changes in the ETB can be used as an imaging biomarker for tumor response and early survival prediction in patients with HCC after the initial lobar.

CLINICAL RELEVANCE/APPLICATION

Early response assessment after Y90 can be achieve using the ETB concept applied to contrast-enhanced MR imaging as early as 4-8 weeks after the initial therapy session, thus allowing for early therapeutic decisions. The implications of these results warrant further analysis in larger patient cohorts.

VSIO21-19 Tumor Board

Monday, Nov. 28 5:45PM - 6:00PM Room: S406B

Participants

The Use of Ultrasound Contrast Imaging in the Characterization of Focal Liver Lesions: Supported by GE Healthcare

Monday, Nov. 28 3:00PM - 4:30PM Room: S101AB

Participants

PROGRAM INFORMATION

Ultrasound Contrast (CEUS) in the Use of Liver Lesion Characterization Symposium. Come and learn about Bubble Basics as well as how to start using CEUS as a departmental problem solving tool. Speakers will also discuss specific CEUS applications including: hepatocellular carcinoma patients, pediatrics, and interventional procedures. This course does not offer CME credit.

RSVP

http://ge.cvent.com/LiverLesion

MSRO23

BOOST: Gastrointestinal-Case-based Review (An Interactive Session)

Monday, Nov. 28 3:00PM - 4:15PM Room: S103AB

GI RO

AMA PRA Category 1 Credits ™: 1.25
ARRT Category A+ Credits: 1.50

Participants
Mukesh G. Harisinghani, MD, Boston, MA (*Presenter*) Nothing to Disclose
Theodore S. Hong, MD, Boston, MA (*Presenter*) Nothing to Disclose
Lawrence Blaszkowsky, MD, Boston, MA (*Presenter*) Spouse, Stockholder, Pfizer Inc
Cristina Ferrone, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Achieve a basic understanding of the anatomy pertinent to the pancreatico-biliary region and imaging appearance of pancreaticobiliary tumors. 2)Understand strengths and limitations of imaging techniques, including MRI, PET-CT and CT, as they are used in delineating primary tumor and staging involved regional nodes. 3) Identify reasons for local recurrence and recognize the imaging appearances of these recurrences. 4) Improve radiation therapy delivery through understanding the contouring recommendations for the gross tumor volume (GTV) and clinical target volumes (CTV) for anorectal tumors, both in the locally advanced and postoperative setting.

ABSTRACT

In this course cross sectional imaging will be used to contour normal pancreatico-biliary anatomy as well as tumors involving this anatomical region. Also patterns of spread of pathological lymph nodes will be shown, and corss sectional imaging will be used to contour the regional nodal lesions. Cases will be
presented and the participants will be stimulated to do the contouring themselves, and will have feed-back on their results

SSE06

Emergency Radiology (Thoracoabdominal Emergencies)

Monday, Nov. 28 3:00PM - 4:00PM Room: N227B

GI GU CT ER

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Jamlik-Omari Johnson, MD, Atlanta, GA (*Moderator*) Research Grant, Koninklijke Philips NV; Royalties, Cambridge University Press
Stephan W. Anderson, MD, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

SSE06-01 Absent Secondary Signs of Appendicitis When the Appendix is Not Visualized

Monday, Nov. 28 3:00PM - 3:10PM Room: N227B

Awards
Student Travel Stipend Award

Participants
Saad Hussain, MD, New Haven, CT (*Presenter*) Nothing to Disclose
Vivek Patel, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Aditi Vyas, MD, Norwalk, CT (*Abstract Co-Author*) Nothing to Disclose
Mahan Mathur, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Mike Spektor, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study is to determine the negative predictive value (NPV) of the sonographic secondary signs of appendicitis when the appendix is not visualized. The secondary signs of appendicitis seen on ultrasound (US) include free fluid, hyperemia, lymphadenopathy, and phlegmon formation.

METHOD AND MATERIALS

A retrospective review was completed looking for ultrasound images and reports that did not visualize the appendix in its entirety and also specifically stated that no secondary signs of appendicitis were visualized. The review spans 2013-2015. 130 studies were found meeting the inclusion criteria.

RESULTS

Of the 130 total studies, 95 did not have imaging follow up or surgery for appendicitis. Either the ultrasound revealed an alternate diagnosis (example: mesenteric adenitis) or the patient was discharged with an alternate clinical diagnosis (example: constipation). 35 studies had follow up imaging with CT (31), MRI (2) or US (2). Of the 31 follow up CTs, 4 did not visualize the appendix (and the patients were discharged) and the remaining 27 revealed normal appendices. The 2 MRI examinations showed normal appendices and the patients were discharged. One repeat ultrasound was negative and the patient was discharged. The other repeat ultrasound was positive and the patient was taken to surgery and had pathology proven appendicitis.The negative predictive value for absent secondary signs of appendicitis when the appendix is not visualized is 97%. CT, MRI, and repeat US that visualized a negative appendix were considered true negatives.

CONCLUSION

When the appendix is not visualized clinicians are often left to make a decision on whether or not to subject the patient (often pediatric) to ionizing radiation (CT), a lengthy MRI or a repeat US. It is important that radiologists and technologists look for the secondary signs of appendicitis when the appendix is not visualized. The radiologist should specifically mention the lack of secondary signs when appropriate. Based on the findings of this study, such a statement carries a high NPV. Armed with such information, the clinicians will be better suited in making the difficult decision in regards to further imaging or intervention.

CLINICAL RELEVANCE/APPLICATION

Secondary signs of appendicitis carry a high negative predictive value and should be evaluated for when the appendix is not visualized on ultrasound.

SSE06-02 Evaluation of the Diagnostic Value of a Venous Phase in CT Angiography of the Extremities in the Setting of Trauma

Monday, Nov. 28 3:10PM - 3:20PM Room: N227B

Participants
Zachary Masi, MD, Camden, NJ (*Presenter*) Nothing to Disclose
Kathryn Gussman, Camden, NJ (*Abstract Co-Author*) Nothing to Disclose
Joshua Hazelton, DO, Camden, NJ (*Abstract Co-Author*) Nothing to Disclose
Ron Gefen, MD, Camden, NJ (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Patients with traumatic injury to extremities are often evaluated at hospital trauma centers by computed tomography angiography (CTA) to evaluate for vascular injury, which can utilize arterial and venous phases. The purpose of this study is to assess whether the venous phase contributes added value to the diagnostic study.

METHOD AND MATERIALS

Institutional IRB approval was obtained. Retrospective analysis of a radiology information system at a level I trauma center identified adult patients evaluated for injury by upper or lower extremity CTA between September, 2014 and September, 2015 with both arterial and venous phases. Images were evaluated by a diagnostic radiologist for diagnosis of "no injury", "arterial injury", "venous injury" or "vasospasm", made by the arterial phase alone, or in conjunction with the venous phase. Statistical analysis utilized McNemar test and Kappa agreement values (a p value of < 0.05 was considered significant).

RESULTS

There were 157 studies performed on 154 patients, 131 (83%) male and 23 (17%) female (mean age 39). Studies comprised 49 upper and 108 lower extremities. Most common mechanisms of injury were gunshot wound (63), motor vehicle accident (26), and stab wound (13). There were 99 diagnoses of no injury, 35 arterial injuries, 16 vasospasms, and 7 venous injuries. Four diagnoses were changed between interpreting the arterial phase alone and both phases together: three venous injuries including one deep vein thrombosis, and one vasospasm. Only the case of deep vein thrombosis resulted in a change in clinical management. Overall there was no significant difference in diagnosis between the two methods ($p > 0.125$). There was high agreement for diagnosis of no injury (Kappa 0.99), arterial injury (0.96), and vasospasm (0.97), and moderate agreement in diagnosing venous injury (0.59) ($p < 0.001$).

CONCLUSION

The venous phase of CTA extremity studies for trauma does not add statistically significant value in diagnosing vascular injury and can be safely removed from the imaging protocol, thereby decreasing patient scan time and radiation dose.

CLINICAL RELEVANCE/APPLICATION

CT angiography studies of extremities for vascular trauma can be accurately performed with an arterial phase only and do not require a venous phase.

SSE06-03 Toward an MDCT-based Decision Support Tool for Bleeding Pelvic Fractures using Semi-automated Volumetric Hematoma Analysis and Probabilistic Modeling: Preliminary Results

Monday, Nov. 28 3:20PM - 3:30PM Room: N227B

Participants
David Dreizin, MD, Baltimore, MD (*Presenter*) Nothing to Disclose
Nikki Tirada, MD, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose
Uttam Bodanapally, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Eliot L. Siegel, MD, Baltimore, MD (*Abstract Co-Author*) Board of Directors, Brightfield Technologies; Board of Directors, McCoy; Board of Directors, Carestream Health, Inc; Founder, MedPerception, LLC; Founder, Topoderm; Founder, YYESIT, LLC; Medical Advisory Board, Bayer AG; Medical Advisory Board, Bracco Group; Medical Advisory Board, Carestream Health, Inc; Medical Advisory Board, Fovia, Inc; Medical Advisory Board, McKesson Corporation; Medical Advisory Board, Merge Healthcare Incorporated; Medical Advisory Board, Microsoft Corporation; Medical Advisory Board, Koninklijke Philips NV; Medical Advisory Board, Toshiba Corporation; Research Grant, Anatomical Travelogue, Inc; Research Grant, Anthro Corp; Research Grant, Barco nv; Research Grant, Dell Inc; Research Grant, Evolved Technologies Corporation; Research Grant, General Electric Company; Research Grant, Herman Miller, Inc; Research Grant, Intel Corporation; Research Grant, MModal IP LLC; Research Grant, McKesson Corporation; Research Grant, RedRick Technologies Inc; Research Grant, Steelcase, Inc; Research Grant, Virtual Radiology; Research Grant, XYBIX Systems, Inc; Research, TeraRecon, Inc ; Researcher, Bracco Group; Researcher, Microsoft Corporation; Speakers Bureau, Bayer AG; Speakers Bureau, Siemens AG;
Daniel C. Mascarenhas, BS, Cinnaminson, NJ (*Abstract Co-Author*) Nothing to Disclose
Louis Bivona, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Edward H. Herskovits, MD, PhD, Baltimore, MD (*Abstract Co-Author*) Consultant, BioClinica, Inc; Shareholder, Galileo CDS, Inc;

PURPOSE

No single CT sign, including intravenous contrast extravasation (ICE), predicts the need for angioembolization with sufficient accuracy. ICE is only up to 60% sensitive. Active bleeding on angio (AB) is often seen w/o ICE. Pelvic hematoma volumes are predictive of AB, but have not been validated for point of care use because time consuming slice-by-slice segmentation was employed. We aimed to developed a multivariate probabilistic model and online calculator incorporating rapid pelvic hematoma segmentation.

METHOD AND MATERIALS

A retrospective cohort of 116 patients were selected. Inclusion criteria: age > 18, blunt pelvic trauma; arterial phase MDCT prior to angio. Exclusion criteria: no angio was performed; CT only after angio. **Image review:** data collected: presence/absence of ICE; greatest diameter of contrast blush (mm); # vessels with blush; hematoma volumes from seeded region growing segmentation(mL); fractures of the obturator canal or greater sciatic notch; pubic diastasis; osteopenia; age; gender. Stepwise logistic regression with forward selection and backward elimination was performed to determine informative variables for AB at angio.

RESULTS

The variable with the strongest correlation with AB was hematoma vol ($p<0.001$). Age and the greatest diameter of blush were also explanatory and included in the model. Osteopenia; fractures and diastasis; and # of vessels dropped out during successive forward selection and backward elimination steps. Logit transformation was performed to derive a probabilistic formula: **$P=e[(0.027*age)+(0.004*hematoma\ vol)+(0.036*diameter\ largest\ blush)-3.014]/(1+e[(0.027*age)+(0.004*hematoma\ vol)+(0.036*diameter\ largest\ blush)-3.014])$.** A prototype online active bleed calculator was developed- age(yrs) diameter(mm), and hematoma vol(mL) is entered to determine probability of AB.

CONCLUSION

Prior work using manual segmentation found that hematoma vols<200mL result in 5% likelihood of AB, and vols> 500mL have 45% likelihood. Our model provides a greater degree of practicality because 1) rapid segmentation can be done at the point of care, and 2) the model is highly granular.For example, an intermediate sized hematoma of 321 mL, even without blush, results in high likelihood (56%) of AB in an elderly (73yo) victim of blunt trauma.

CLINICAL RELEVANCE/APPLICATION

The proposed model can be used at the point of care to guide trauma/ER radiologists, interventionalists, and trauma surgeons in determining the need for angio.

SSE06-04 Colonic Wall Thickening: Can Iodine Quantification Using Dual Source Dual Energy CT Differentiate Diverticulitis from Adenocarcinoma?

Monday, Nov. 28 3:30PM - 3:40PM Room: N227B

Participants
Kathryn Darras, MD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Sheldon J. Clark, MD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Heejun Kang, MD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Alison C. Harris, MBChB, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Silvia D. Chang, MD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Mohammed F. Mohammed, MBBS, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Tim O'Connell, MD, Meng, Vancouver, BC (*Abstract Co-Author*) President, Resolve Radiologic Ltd Speake, Siemens AG
Savvas Nicolaou, MD, Vancouver, BC (*Abstract Co-Author*) Institutional research agreement, Siemens AG
Patrick D. McLaughlin, FFRRCSI, Vancouver, BC (*Presenter*) Speaker, Siemens AG

PURPOSE

To evaluate the role of iodine quantification in differentiating colonic diverticulitis from colonic adenocarcinoma.

METHOD AND MATERIALS

Institutional review board approval was obtained, with no informed consent required, for this retrospective analysis. 146 consecutive patients with acute diverticulitis were scanned using a standard protocol on a 128-section dual source, dual energy CT system (100/140 keV). Patients who did not have follow up colonoscopy, which served as the gold standard, or who received large volumes of positive oral contrast were excluded. This left 52 patients for analysis, 8 with proven colonic adenocarcinoma and 44 with diverticulitis. Using the virtual non-contrast application, iodine maps and virtual non-contrast datasets were created for all patients. The coloured iodine maps were superimposed onto the virtual non-contrast images to provide both iodine distribution and anatomic detail. The iodine concentration was recorded within the thickened bowel wall using a region of interest analysis (mg/ml). The two groups were compared using two tailed unpaired t tests and the sensitivity and specificity were established.

RESULTS

The average iodine concentration was 1.41±0.56 mg/ml (range 0.2-2.7 mg/ml) in bowel wall thickening due to diverticulitis and 3.15±0.57 mg/ml (range 2.5-4.3 mg/ml) in bowel wall thickening due to adenocarcinoma. This difference was statistically significant ($p < 0.0001$). Using a threshold of 2.5 mg/ml, the sensitivity for identifying adenocarcinoma was found to be 100% and the specificity 95.5%.

CONCLUSION

Using a threshold value of 2.5 mg/ml, dual energy CT iodine quantification was found to have a high sensitivity and specificity for distinguishing colonic wall thickening due to diverticulitis from thickening due to adenocarcinoma.

CLINICAL RELEVANCE/APPLICATION

Identifying the cause of colonic wall thickening, which is generally regarded as a nonspecific CT finding, will allow for appropriate patient referral and triage for colonoscopy.

SSE06-05 Evaluation of Pancreatic Injury: Correlation between Pancreas Injury Grade (PIG) Scoring on MDCT and Clinical Features and other Organ Injuries

Monday, Nov. 28 3:40PM - 3:50PM Room: N227B

Participants
Jung Hyun Noh, MD, Cheonan-si, Korea, Republic Of (*Presenter*) Nothing to Disclose
Sang Wook Son, MD, Cheon-an, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Mi-Hyun Park, MD, Cheonan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young-Seok Lee, MD, Cheonan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Keum-Nahn Jee, MD, PhD, Cheonan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the correlation of radiological PIG scoring on MDCT and clinical features and other associated organ injuries retrospectively

METHOD AND MATERIALS

38 patients (mean age = 38.1, male to female ratio = 22 : 16), diagnosed as traumatic pancreatic injury by clinical and initial MDCT findings, were included from Mar. 2006 to Feb. 2016. Their imaging findings were analyzed about five-scale PIG scoring on MDCT based on AAST grade by consensus of two radiologists. Clinical records were reviewed about injury type, initial vital sign, hospitalization period, prognosis and treatment. Associated abdominal MDCT findings were analyzed about other hollow and solid visceral injury, vascular injury and injuries of other body parts. Evaluation of correlation between radiological PIG scoring on MDCT and other associated organ injuries, and clinical features was done using statistical analyses by Fisher's exact test and Kruskal-Wallis test.

RESULTS

Patients with PIG scoring scale from I to V on MDCT included 13, 5, 11, 7, and 2 patients. Among 38 patients, 23 patients (60.5%) had associated other organ injuries and 4 patients (10.5%) expired early due to unstable vital sign with active arterial bleeding in liver or abdominal cavity and their PIG scoring was grade I (n=2), grade III (n=1) and grade V (n=1). Their injury types were out car accident (n=3), in car accident (n=22), fall down (n=2) and blunt trauma (n=11). Patients with high PIG scoring had characteristics of associated duodenal injury, vascular injury, and treatment choice of operation with statistical significance ($p < 0.05$). And no statistical significant correlations were between PIG scoring and other associated organ injuries in abdomen except

duodenal and vascular injury, interventional treatment, and other clinical findings of initial vital sign, injury type, hospitalization period and death rate.

CONCLUSION

Patients with high PIG scoring have the characteristics of associated duodenal and vascular injuries, and treatment choice of surgery. Associated other organ injuries and mortality cases were not correlated with PIG scoring.

CLINICAL RELEVANCE/APPLICATION

Evaluation of correlation degree between PIG scoring scale and associated every other organ injury and various clinical findings can be clinically meaningful and these results could be considered as a reference of clinical evaluation of pancreatic injury patient despite of limitation of number of included patients.

SSE06-06 Focused Abdomino Pelvic CT in Children with Suspected Acute Appendicitis: Assessing Accuracy and Radiation Dose Reduction by Limiting the Scan Field

Monday, Nov. 28 3:50PM - 4:00PM Room: N227B

Awards
Student Travel Stipend Award

Participants
Andrew Fox, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Christine Saint-Martin, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Imaging is widely used in cases of suspected appendicitis with ultrasound the most common first-line modality in pediatric patients. When sonography is non-diagnostic, a complete abdominopelvic CT is often used as an adjunct to rule in the diagnosis prior to OR. CT has diagnostic superiority over sonography but the associated radiation is a concern and thus methods to reduce radiation are of great interest. The concept of Z-axis limitation with combined analysis of accuracy and radiation dose reduction is yet to be studied in the pediatric population.

METHOD AND MATERIALS

Data was collected from PACS between January 2010-present. The upper limit of the appendix was correlated with the superior endplate of the corresponding vertebra. Subsequently, an upper limit Z-axis for interpretation was set based on the average location of the appendix in our series ($\mu - 2\sigma$), to include >97.5% of the visualized appendices. The studies were then revisited to assess diagnostic accuracy over this focused range, assessing detection of both primary pathology and incidental findings. Radiation dose reduction will be calculated using the Radimetrics software suite.

RESULTS

On the initial scans, the appendix was identified in 116/125 patients and not visualized in 9 patients. The average scan range was 438mm. 27 scans were positive for appendicitis and alternate pathology was identified in 17 patients. The average upper limit of the appendix minus 2 SD corresponded to the L2 vertebra. From L2 caudally, the appendix was completely visualized in 115 scans, and partially visualized in 1 scan. All of the positive appendicitis cases were diagnosed over the limited scan range. 10 alternate diagnoses were completely identified, and 2 were partially identified. 5 cases of pulmonary pathology were missed. The average Z-axis Delta was 141mm, corresponding to a 32% reduction in scan field. Radiation dose reduction is being calculated.

CONCLUSION

Focused abdominopelvic CT for appendicitis in the pediatric population reduces the scan range by approximately 32%, while maintaining 100% diagnostic accuracy for appendicitis (radiation dose reduction pending). Alternate abdominal pathology was either completely or partially identified over this limited range.

CLINICAL RELEVANCE/APPLICATION

By limiting the scanning range of CTs performed for appendicitis, we are hoping to significantly reduce radiation dose to the patient, while maintaining diagnostic accuracy.

SSE07

Gastrointestinal (Multi-modality)

Monday, Nov. 28 3:00PM - 4:00PM Room: E353A

GI CT MR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Michael A. Blake, MBBCh, Boston, MA (*Moderator*) Editor with royalties, Springer Science+Business Media Deutschland GmbH
Atif Zaheer, MD, Baltimore, MD (*Moderator*) Nothing to Disclose

Sub-Events

SSE07-01 Imaging in Patients with Crohn's Disease: Trends in Abdominal CT/MRI Utilization and Radiation Dose Considerations Over a 10-year Period

Monday, Nov. 28 3:00PM - 3:10PM Room: E353A

Participants
Hamed Kordbacheh, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Vinit Baliyan, MBBS, MD, Boston, MA (*Presenter*) Nothing to Disclose
Jessica Serrao, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Michael S. Gee, MD, PhD, Jamaica Plain, MA (*Abstract Co-Author*) Nothing to Disclose
Dushyant V. Sahani, MD, Boston, MA (*Abstract Co-Author*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc
Avinash R. Kambadakone, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To study the trends in utilization of CT and MRI for diagnosis and follow up of patients with suspected Crohn’s disease and to evaluate changes in CT radiation dose over a 10-year period.

METHOD AND MATERIALS

In this IRB approved single institution retrospective study we included patients who underwent CT and MRI scans for diagnosis and follow up evaluation of Crohn’s disease between 2005 and 2014. The medical records and imaging data were reviewed to document patient demographics, scan indication, imaging findings and CT radiation dose. The patient cohort was categorized into 3-groups - <20 years, 20-50 years and >50 years. Trends in CT/MR utilization was assessed by comparing the volume of imaging studies performed each year. The changes in CT radiation dose over the study period were estimated and compared.

RESULTS

A total of 2578 CT scans and 1586 MR scans were performed in 2652 patients (mean age: 34.8±4.9 yrs, age range: 2-93 yrs) for initial diagnosis or follow-up of Crohn’s disease between 2005 and 2014. The annual combined CT/MR utilization demonstrated a 3-fold rise over the past decade (2005: n=267, 2014: n=677). Increased imaging utilization over this period was predominantly due to a substantial growth (30-fold increase) in the number of MR scans (2005: n=13, 2014: n=385, $p<0.001$), while CT scan volume did not show significant difference (2005: n=254, 2014: n=292, 15% increase, $p=0.84$). Increased utilization of MRI was seen across all age groups ($p<0.001$). Over this same period, there was a 54% reduction in mean CT radiation dose (2005: CTDI –17.26±12.4 mGy-cm, DLP- 885±378 mGy and 2014: CTDI-7.53±4.49 mGy-cm, DLP-403±226 mGy, $p<0.001$).

CONCLUSION

A three-fold rise was seen for cross-sectional imaging utilization in patients with Crohn’s disease between 2005 and 2014 with a substantial contribution to this growth from increase in MR scan volume. The trend of increasing imaging utilization paralleled a trend in reduction of CT radiation dose.

CLINICAL RELEVANCE/APPLICATION

Significant reduction in CT radiation dose exposure and increasing utilization of MRI has enabled enhanced role of imaging in diagnosis and management of patients with Crohn’s disease.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Dushyant V. Sahani, MD - 2012 Honored Educator
Dushyant V. Sahani, MD - 2015 Honored Educator
Dushyant V. Sahani, MD - 2016 Honored Educator

SSE07-02 Utilization Trends in Abdominal Imaging from 2002-2014

Monday, Nov. 28 3:10PM - 3:20PM Room: E353A

Awards
Student Travel Stipend Award

Participants
Sarah I. Kamel, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

David C. Levin, MD, Philadelphia, PA (*Abstract Co-Author*) Consultant, HealthHelp, LLC; Board of Directors, Outpatient Imaging Affiliates, LLC
Laurence Parker, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Vijay M. Rao, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To analyze recent trends in the utilization of the various abdominal imaging modalities among the Medicare population.

METHOD AND MATERIALS

The Medicare part B databases for 2002 through 2014 were reviewed. All CPT codes pertaining to noninvasive imaging of the Abdomen were selected and grouped into six categories: CT, MR, Nuclear scans, Ultrasound (US), X-ray and Fluoroscopy. Yearly utilization rate per 1000 Medicare beneficiaries was determined. Medicare physician specialty codes were used to determine how many studies were performed by radiologists versus self-referring nonradiologist physicians. Trends over the 12 year period were studied.

RESULTS

Nonradiologists consistently performed 10-12% of all abdominal imaging throughout the study, mostly US. The following data refer to utilization rates per 1,000 Medicare beneficiaries among radiologists: CT increased from 177 in 2002 to peak at 272 in 2009 (+54%), then dropped to 267 in 2010. A large decline to 143 occurred in 2011 due to code bundling of CT of the abdomen and pelvis. Over the next 3 years a small increase to 149 occurred (+4%). US increased from 97 in 2002 to peak at 111 in 2010 (+14%), then declined slightly to 105 by 2014. MR increased steadily from 6 in 2002 to 12 in 2014 (+100%). Nuclear scans dropped from 12 in 2002 to 10 in 2014 (-17%). Plain x-ray dropped steadily from 123 in 2002 to 84 in 2014 (-32%). Fluoroscopy also dropped steadily from 41 in 2002 to 22 in 2014 (-46%). Overall totals increased from 456 in 2002 to peak at 531 in 2009 (+16%), declined to 526 the next year, and then dropped sharply to 398 in 2011 due to code bundling. A further decline to 383 occurred by 2014.

CONCLUSION

Abdominal imaging is now driven largely by CT and US. Code bundling in 2011 had a large impact on CT utilization rates. From 2011-2014, CT grew slightly while US dropped slightly. MR has a relatively small role but is increasing slowly. Nuclear also has a small role but is declining. Both plain x-ray and fluoroscopy declined substantially over the study period. Radiologists have strongly predominated in abdominal imaging and there is no evidence that this is changing.

CLINICAL RELEVANCE/APPLICATION

N/A

SSE07-03 Defining a "Healthy" Body Composition Profile using MRI: Normative Data Extracted from the UK Biobank Imaging Cohort

Monday, Nov. 28 3:20PM - 3:30PM Room: E353A

Participants
Theresa Tuthill, PhD, Cambridge, MA (*Presenter*) Employee, Pfizer, Inc
Joan Sopczynski, Collegeville, PA (*Abstract Co-Author*) Employee, Pfizer Inc
Yili Chen, Collegeville, PA (*Abstract Co-Author*) Employee, Pfizer Inc
Melissa Miller, Cambridge, MA (*Abstract Co-Author*) Employee, Pfizer Inc
Alexandra Dumitriu, Cambridge, MA (*Abstract Co-Author*) Employee, Pfizer Inc
Jennifer Linge, Linkoping, Sweden (*Abstract Co-Author*) Employee, AMRA AB
Olof Dahlqvist Leinhard, PhD, Linkoping, Sweden (*Abstract Co-Author*) Stockholder, AMRA AB; Employee, AMRA AB

PURPOSE

Understanding the relationship of fat distribution with metabolic disease can aid in risk assessment. To standardize MRI-derived body composition measurements with normative values, criteria for the definition of "healthy" must first be derived.

METHOD AND MATERIALS

Body composition data on a cohort of 3000 subjects (1452 males, 1548 females) ranging from 45 to 78 years was acquired from the UK Biobank imaging study. Images from a 1.5T MR-scanner were from a 6 minute 2-point Dixon imaging protocol covering neck to knee and a 10-point Dixon single axial slice protocol positioned within the liver. Using AMRA® Profiler research (AMRA AB, Sweden, the following parameters were extracted: Visceral adipose tissue volume (VAT), Total abdominal adipose tissue volume (ATAT), Total lean thigh muscle volume and liver proton density fat fraction (PDFF). Two sets of criteria were defined to identify healthy subjects. The first definition (relaxed) excluded subjects with liver disease or diabetes type 2, high alcohol consumption, and BMI > 25. The second definition (strict) excluded subjects with ICD10-codes captured in the definition of previously-defined PheWAS clinical phenotypes deemed incompatible with healthy individual. For each measurement, the median, 25%-percentile and 75%-percentile were calculated. The observed differences were tested using Mann–Whitney U test.

RESULTS

The relaxed definition included 928 subjects, and the strict had 748.The abdominal fat parameters, VAT and ATAT, in the strict group were 2.8 (1.7-3.9) (median, 25%-75%percentile) and 8.5 (5.9-11.7), respectively, and were significantly less than the other definition. The mean liver fat, PDFF, was 1.9 with a narrow range, (1.4-3.3). Using a cutoff of the 95th percentile, a liver fat fraction cutoff for healthy subjects was 5%, with males having a slightly larger cutoff than females.

CONCLUSION

A strict definition of healthy controls, regardless of BMI but taking disease history into account, results in lower VAT, ATAT, and liver fat compared to more relaxed definitions. These normative body compositions values can be used in the context of risk assessment for various diseases.

CLINICAL RELEVANCE/APPLICATION

Ranges for "normal" values of body composition parameters determined through imaging will aid the the risk assessment of diseased

subjects.

SSE07-04 Clinically Acceptable, Optimized Dose Reduction in CT Imaging of Necrotizing Pancreatitis

Monday, Nov. 28 3:30PM - 3:40PM Room: E353A

Participants
Tracy A. Jaffe, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Xiaoyu Tian, durham, NC (*Abstract Co-Author*) Nothing to Disclose
Mustafa R. Bashir, MD, Cary, NC (*Presenter*) Research support, Siemens AG; Research support, Guerbet SA; Research support, General Electric Company; Imaging Core Lab, NGM Biopharmaceuticals; Imaging Core Lab, TaiwanJ Pharma
Daniele Marin, MD, Durham, NC (*Abstract Co-Author*) Research support, Siemens AG
Bhavik N. Patel, MD,MBA, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
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Ehsan Samei, PhD, Durham, NC (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG

PURPOSE

To determine potential radiation dose reduction of contrast enhanced CT (CECT) for imaging of patients with necrotizing pancreatitis (NP) using a novel noise addition tool.

METHOD AND MATERIALS

Through a HIPAA-compliant, IRB approval retrospective search of electronic records, 73 patients were identified who had undergone at least 1 abdominopelvic CECT for NP within a 2 year period using a routine abdomen pelvis protocol. Demographic data, number of CECTs associated with NP episode, dose length product (DLP), and effective dose (ED) were recorded. A subset (60) consecutive CECT scans were selected as reference routine radiation dose (100%) datasets. A noise addition software algorithm was used to simulate 4 additional datasets of increased noise by 10 HU increments. 3 radiologists independently reviewed 300 datasets and rated confidence (1-100, with a score of 75 noted as threshold of perceptual acceptability) for identifying (i) clinically relevant anatomic structures, (ii) complications of NP, and (iii) overall diagnostic acceptability. Observer data were analyzed to identify noise and dose levels associated with acceptability threshold and levels where observer scores were statistically indistinguishable from full dose results.

RESULTS

43 men and 30 women (average age 54 years) underwent an average of 6 CECT scans per episode of NP with average DLP and ED values of 966 mGy-cm and 16.4 mSv, respectively. Observers' perception of image quality tasks decreased progressively with linear increase in noise ($p<0.05$ for all tasks) with an average slope of -0.4 HU-noise/score. Both acceptability and statistical analysis indicated that noise can be increased from an average of 10 HU to 25 HU, corresponding to an average of 86% reduction in dose with observer perception unchanged within 95% confidence interval ($p<0.05$).

CONCLUSION

Imaging NP frequently involves multiple CT scans. Higher image noise levels may be tolerated during interpretation of CECT examinations in patients with NP, allowing significant reduction in patient radiation exposure. It is possible to add increased noise in CT images corresponding to 86% reduction in radiation dose while maintaining clinically acceptable image quality.

CLINICAL RELEVANCE/APPLICATION

Our study suggests the feasibility of significant reduction in radiation exposure during CECT of NP, which may significantly decrease the cumulative radiation burden in this patient population.

SSE07-05 Diagnostic Performance of MRI for Pregnant Patients with Clinically Suspected Appendicitis

Monday, Nov. 28 3:40PM - 3:50PM Room: E353A

Participants
Dae Jung Kim, MD, Seongnam-si, Korea, Republic Of (*Presenter*) Nothing to Disclose

PURPOSE

To evaluate the accuracy of MRI (appendix protocol) in the diagnosis of acute appendicitis in pregnant patients with clinically suspected appendicitis, the ability of additional DWI and the incidence of appendicitis mimicking conditions.

METHOD AND MATERIALS

One hundred twenty-five pregnant patients with clinically suspected appendicitis, who underwent 1.5T MRI for diagnosing/excluding acute appendicitis, were enrolled on this study between May 2011 and January 2016. During this period, two radiologists with more than 10 years of experience in MRI interpretation prospectively predicted appendicitis on MR, during daily interpretation. We retrospectively reviewed clinical records and radiological results were correlated with surgical pathology and clinical outcomes. We calculated sensitivity, specificity and accuracy of MRI for diagnosing of acute appendicitis. We performed additional DWI between August 2014 and January 2016 and we calculated sensitivity, specificity and accuracy of MRI with/without DWI. We reviewed incidence of appendicitis mimicking conditions, which was commented on MRI with appendicitis negative result, and correlated with clinical outcome.

RESULTS

Twenty nine patients underwent surgery and twenty five cases were pathologically diagnosed as acute appendicitis. The sensitivity, specificity and accuracy of MRI (n=125) for acute appendicitis were 100%, 95% and 96%, respectively. The sensitivity, specificity and accuracy of MRI without DWI (n=72); with DWI (n=53) were 100%, 94.7% and 95.8%; 100%, 95% and 96%. The incidence of commented appendicitis mimicking conditions on MRI was 20.8% (20/96) and eleven cases (ureteral stone-4, uterus rupture-1, small bowel obstruction-1, enteritis-2, lymphoma-1, ovarian hyperstimulation syndrome-1, organizing hematoma-1) were clinically diagnosed.

CONCLUSION

MRI has high accuracy for diagnosis of acute appendicitis in pregnant patients with clinically suspected appendicitis and additional

DWI improves accuracy.

CLINICAL RELEVANCE/APPLICATION

MRI with DWI may be acceptable for use as a first line diagnostic test for patients with clinically suspected appendicitis and helpful for looking pathologic processes outside the appendix.

SSE07-06 Infected versus Sterile Abdominal Fluid Collections in Postoperative CT - A Scoring System Based on Clinical and Imaging Findings

Monday, Nov. 28 3:50PM - 4:00PM Room: E353A

Participants
Christoph Radosa, MD, 01307 Dresden, Germany (*Presenter*) Nothing to Disclose
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Danilo Seppelt, Dresden, Germany (*Abstract Co-Author*) Nothing to Disclose
Verena Plodeck, MD, Dresden, Germany (*Abstract Co-Author*) Nothing to Disclose
Ralf-Thorsten Hoffmann, MD, Dresden, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Laniado, MD, Dresden, Germany (*Abstract Co-Author*) Reviewer, Johnson & Johnson
Andreas M. Volk, MD, Dresden, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To implement a scoring system for discrimination between infected and sterile postoperative abdominal fluid collections in CT and to compare it with a published scoring system.

METHOD AND MATERIALS

In a retrospective study (May-November 2015), all patients with portal-venous abdominal CT within 24 hours before CT-guided aspiration/drainage of abdominal fluid collections were included. Two radiologists independently analyzed fluid collections for Hounsfield units (HU), entrapped gas (yes/no) and wall enhancement (yes/no). C-reactive protein (CRP) ≤ 24h before intervention was obtained from electronic patient files. Imaging data and CRP were correlated with microbiology of fluid collections. The same inclusion criteria were applied to a second patient cohort (December 2015 - March 2016) to retrospectively compare our scoring system with a published scoring system which uses HU, entrapped gas, CRP and diabetes (Gnannt R et al. Invest Radiol 2015; 50: 17-23).

RESULTS

From May to November 2015, 50 patients were included. On binary logistic regression analysis, each of the four parameters was associated with the presence of infected fluid collections. A scoring system consisting of nominal categorization of the four variables was developed based on scores from 0 to 11 (CRP

CONCLUSION

The proposed scoring system provides good discrimination between infected and sterile postoperative abdominal fluid collections in CT. It shows slightly better results compared to a recently published scoring system by Gnannt et al.

CLINICAL RELEVANCE/APPLICATION

The new scoring system is a helpful tool to discriminate between infected and sterile fluid collections in postoperative abdominal CT. It might help to prevent unnecessary interventions.

SSE08

Gastrointestinal (Gall Bladder and Biliary Imaging)

Monday, Nov. 28 3:00PM - 4:00PM Room: E353C

GI MR US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Jeong Min Lee, MD, Seoul, Korea, Republic Of (*Moderator*) Grant, Guerbet SA; Support, Siemens AG; Grant, Bayer AG; Grant, General Electric Company; Grant, STARmed Co, Ltd; Grant, RF Medical Co, Ltd; Grant, Toshiba Corporation; Grant, Samsung Medical Healthcare
David J. Lomas, MD, Cambridge, United Kingdom (*Moderator*) Nothing to Disclose

Sub-Events

SSE08-01 Risk Stratification of Gallbladder Polyp Greater than 10 mm Using High-Resolution Ultrasonography (HRUS) and Texture Analysis

Monday, Nov. 28 3:00PM - 3:10PM Room: E353C

Participants
Tae Won Choi, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
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Su Joa Ahn, Seoul , Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ijin Joo, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joon Koo Han, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the important features for differentiating neoplastic from non-neoplastic polyp, and GB carcinoma from adenoma in polyp greater than 10mm using high-resolution ultrasonography (HRUS) findings and texture analysis.

METHOD AND MATERIALS

We included 136 patients with GB polyp (>10 mm) who underwent both pre-operative HRUS and cholecystectomy (non-neoplastic polyp=58, adenoma=32, and carcinoma=46). Two radiologists retrospectively accessed HRUS images and we analyzed relationship between image findings and differential diagnosis of GB polyps. Computerized texture analysis was quantified and texture parameters were compared between GB polyps. Multivariate logistic regression analysis was performed to identify significant predictors for neoplastic polyps and GB carcinomas.

RESULTS

Statistically common findings for neoplastic polyp included single, larger size, sessile shape, lobular surface, vascular core, heterogenous echo, hypoechoic polyp, and non-hyperechoic foci ($P<0.05$). Single (OR, 3.680-3.856, $P<0.05$) and larger size (OR, 1.450-1.477, $P<0.001$) were independently associated with neoplastic polyp. Using polyp >14mm as a cutoff level, diagnostic accuracy to differentiate neoplastic polyp was 80.9-81.6%. To differentiate GB carcinoma from adenoma, sessile shape (OR, 9.485-41.257, $P\leq0.001$) and larger size (OR, 1.267-1.303, $P\leq0.001$) in HRUS, and higher skewness (OR, 6.382, $P=0.006$) and lower grey level co-occurrence matrices (GLCM) contrast (OR, 0.963, $P=0.006$) in texture parameters were significant predictors for GB carcinoma. Using polyp >21mm as a cutoff level, diagnostic accuracy to differentiate GB carcinoma was 73.1-79.5%. Among four significant predictors for GB carcinoma, if polyp showed at least one texture feature (skewness >0.24 or GLCM contrast <24.7) and one HRUS finding (polyp>21mm or sessile shape), diagnostic accuracy to differentiate carcinoma was increased to 89.7-91.0%.

CONCLUSION

In GB polyp >10mm, single lesion and polyp >14mm were useful for prediction of neoplastic polyps. In neoplastic polyps, sessile shape, polyp >21mm, higher skewness, and lower GLCM contrast were useful for prediction of GB carcinoma.

CLINICAL RELEVANCE/APPLICATION

Combined use of HRUS findings and computerized texture analysis would improve the accuracy of sonographic differentiation between GB adenomas and GB carcinomas.

SSE08-02 Varying 18F-FDG Uptake and Glucose Metabolism in Mass Forming Type of Intrahepatic Cholangiocarcinoma

Monday, Nov. 28 3:10PM - 3:20PM Room: E353C

Participants
Kazuto Kozaka, MD, Kanazawa, Japan (*Presenter*) Nothing to Disclose
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Yasunori Sato, Kanazawa city, Japan (*Abstract Co-Author*) Nothing to Disclose
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Kenichi Harada, Kanazawa City, Japan (*Abstract Co-Author*) Nothing to Disclose
Tetsuo Ohta, Kanazawa city, Japan (*Abstract Co-Author*) Nothing to Disclose
Osamu Matsui, MD, Kanazawa, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Recently, intrahepatic cholangiocellular carcinoma (ICC) can be divided by the origin of biliary tree. Bile ductular carcinoma (BDC) is considered to arise from small bile ducts such as septal, interlobular bile ducts and ductal carcinoma (DC) is considered to arise from large bile ducts. The usefulness of 18F-FDG PET/CT in ICC is well-known but some ICCs doesn't show uptake of 18F-FDG. The aim of this study was to assess the 18F-FDG accumulation and glucose metabolism in mass forming type of intrahepatic cholangiocarcinoma (M-ICC) with sub-classification into BDC and DC.

METHOD AND MATERIALS

Surgically resected M-ICC (n=15, all adenocarcinoma) was enrolled. M-ICC could be divided into BDC (n=7, tumor size 23±6.7mm) and DC (n=8, tumor size 47±26mm) by the pathologic appearance. The SUV-max value in 18F-FDG PET/CT was calculated and Glut-1, 2, Hexokinase (HK) Ⅱ and glucose-6-phosphatase (G6P) expression were evaluated by 5 point score using the number of positive cells and staining density.

RESULTS

SUV-max value in BDC was significantly lower than that in DC (3.2±0.8 vs 7.6±3.2, $p<0.01$). The score of Glut-1 and HKⅡ in DC were significantly higher than those of BDC. The expressions of Glut 2 and G6P were variable and not significant in BDC and DC.

CONCLUSION

18F-FDG accumulation, Glut-1, and HKⅡ expression in DC was higher than those in BDC and thus ICC could be divided into BDC and DC by 18F-FDG PET/CT findings.

CLINICAL RELEVANCE/APPLICATION

Glucose metabolism is different between DC and BDC and 18F-FDG PET/CT is recommended not only for making disease staging but for distinguish them.

SSE08-03 Intrahepatic Mass Forming Type Cholangiocarcinoma: Subtype Differentiation between Small Duct Type and Large Duct Type Using MDCT

Monday, Nov. 28 3:20PM - 3:30PM Room: E353C

Participants
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PURPOSE

To identify useful MDCT imaging features for the differential diagnosis between small duct (SD) and large duct (LD) types of intrahepatic mass forming type cholangiocarcinoma (IMCC), which are regarded to have different stem cell origins and prognoses.

METHOD AND MATERIALS

This retrospective study was approved by our institutional review board and the requirement for informed consent was waived. Eighty-two patients with surgically confirmed IMCCs (60 SD type; 22 LD type) and available preoperative four-phase MDCTs were included. Two independent radiologists assessed the dynamic enhancement patterns and morphologic characteristics of IMCCs as well as the presence or absence of ancillary features. All discrepancies were resolved by a third reviewer. Univariate and multivariate logistic regression analyses were performed to identify relevant MDCT features in the differentiation between SD and LD type IMCCs.

RESULTS

On the arterial phase, peripheral hyper-enhancement and diffuse or heterogeneous enhancement were significantly frequent in SD type IMCCs (56.7%, 34/60 and 17.1%, 12/60, respectively) while absence of arterial hyper-enhancement was frequent in the LD type (63.6%, 14/22) (P=0.003). Frequencies of the presence of centripetal enhancement or washout were not significantly different between the types (all Ps>0.05). Regarding morphologic and ancillary features, presence of bile duct encasement; and lymph node enlargement were significantly associated with the LD type (SD vs. LD type: 41.7%, 25/60 vs. 81.8%, 18/22; 23.3% 14/60 vs 14/22 63.6%, P=0.013 and 0.007, respectively). Lesion size did not show a significant difference (5.73 cm ± 3.34 vs. 4.79 cm ± 2.26, P=0.227). On multivariate analysis, presence of arterial hyper-enhancement, absence of bile duct encasement, lobulated contour, and absence of lymph node enlargement were significant MDCT findings suggestive of SD type rather than LD type IMCCs (all Ps<0.05).

CONCLUSION

MDCT imaging features including the presence of arterial hyper-enhancement and absence of bile duct encasement can help differentiate SD type from LD type IMCCs.

CLINICAL RELEVANCE/APPLICATION

As SD type and LD type IMCCs are known to have different prognoses, preoperative differentiation of subtype using MDCT would be important for patient management and prediction of outcomes.

SSE08-04 Added Value of Gadoxetic Acid Enhanced T1 Weighted Magnetic Resonance Cholangiography in Diagnosing Biliary Complications of Liver Transplant

Monday, Nov. 28 3:30PM - 3:40PM Room: E353C

Participants

Sonja Kinner, MD, Madison, WI (*Presenter*) Nothing to Disclose
Tilman B. Schubert, MD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Adnan Said, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Joshua Mezrich, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Scott B. Reeder, MD, PhD, Madison, WI (*Abstract Co-Author*) Institutional research support, General Electric Company Institutional research support, Bracco Group

PURPOSE

Biliary complications after liver transplantation (LT) are common. We compared T2 weighted (T2w) and gadoxetic acid enhanced T1 weighted (T1w) magnetic resonance cholangiography (MRC) to evaluate the additional value of contrast-enhanced MRC to depict anastomosis stenosis (AST), non-anastomotic strictures (NAS), and biliary casts.

METHOD AND MATERIALS

Retrospective analysis of the local transplant database identified 60 patients with high suspicion of biliary complications after LT who underwent T2w MRCP and gadoxetic enhanced T1w MRC followed by endoscopic retrograde or percutaneous transhepatic cholangiography. Two readers independently reviewed the MRC datasets and rated the image quality (IQ) as well as likelihood for AST, NAS and biliary casts on a 5-point Likert scale. Sensitivity and specificity values were calculated as well as receiver operating characteristics (ROC) curves created and inter-reader variability assessed. The added value of gadoxetic acid enhanced T1w MRC was questioned for each patient (yes/no, why?).

RESULTS

On average IQ was high for all sequences without any statistically significant differences (2.83-2.88). In 39 patients ERCP/PTC detected at least one stricture or cast. Sensitivity/specificity values for AST were 0.69-0.82 for both readers using T2w MRCP, which increased to 0.79-1 using all sequences. For NAS and biliary casts, the addition of gadoxetic enhanced MRC increased sensitivities from 0.57/0.74 to 0.71/0.93 and 0.6/0.68 to 0.76-0.89, respectively, for the two readers. Patients with bilioenteric anastomoses showed a higher increase in sensitivity values compared to choledocho-choledochostomies. Kappa values were substantial (0.45-0.62). Added value of gadoxetic acid enhanced MRC was found in 75%/83.3% of the cases (enhanced diagnostic certainty, correct diagnosis possible).

CONCLUSION

The addition of gadoxetic acid enhanced T1w MRC to T2w MRCP increased the sensitivity and specificity and diagnostic confidence to evaluate biliary complications in patients after LT with suspected biliary complications. Gadoxetic acid enhanced T1w MRC is a valuable tool to evaluate for post-transplant biliary complications.

CLINICAL RELEVANCE/APPLICATION

The addition of gadoxetic acid enhanced T1w MRC to T2w MRCP aids in the detection of biliary complications in patients after LT.

SSE08-05 Non-specific Common Bile Duct Dilation on Ultrasound: Yield of Subsequent MRCP & Role in Patient Management

Monday, Nov. 28 3:40PM - 3:50PM Room: E353C

Awards
Student Travel Stipend Award

Participants
Kristy Lee, MD, Boston , MA (*Presenter*) Nothing to Disclose
Katherine M. Troy, MD, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose
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Koenraad J. Mortele, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the yield of MRCP recommended for nonspecific dilation of the CBD on ultrasound (US); to compare MRCP diagnosis with pathology and/or clinical follow up; to identify other imaging or clinical markers that could help triage patients for further management

METHOD AND MATERIALS

A retrospective review was performed of all patients in 2014 with an abdominal US in which MRCP was recommended for evaluation of new CBD dilation without a sonographically evident cause. Patients with pre-existing CBD stents were excluded. Accuracy, sensitivity, specificity, PPV and NPV of MRCP was calculated using pathology and/or ≥1 year clinical outcomes as reference standard. T-tests comparing lab values, CBD diameter, and the presence of pancreatic duct dilation at imaging between those with pancreaticobiliary pathology and those without were determined to establish if there were any secondary parameters that could predict pathology on MRCP.

RESULTS

131 cases were relevant to the study. 63/131 (48%) cases of CBD dilation without an identifiable cause at US underwent MRCP. MRCP revealed a specific pancreaticobiliary (PB) cause for obstruction in 67% of cases (56% benign and 11% malignant), a non-PB cause in 17% of cases, normal in 13% of cases and 3% of cases were indeterminate. Accuracy of MRCP for detection of pathology was 90% (sensitivity 92%, specificity 85%, PPV 92%; NPV 85%). 68/131 patients did not undergo MRCP. Of these, 30/68 underwent ERCP. A specific PB cause was identified in 66% of cases (57% benign and 13% malignant). A non-PB cause was identified in 7% of cases and 27% of cases were normal. 38/131 did not undergo MRCP or ERCP. Only alkaline phosphate was found to be significantly greater in those with a PB pathology compared to those without.

CONCLUSION

Of all patients with a new dilated CBD without any identifiable cause on US, approximately 50% underwent MRCP as per the

recommendation. Of those, 67% of patients will have a specific PB cause for the dilation. The incidence of PB malignancy was found in 10% of all cases. Biochemical or additional US features are not reliably consistent at predicting which patients are more likely to have disease.

CLINICAL RELEVANCE/APPLICATION

MRCP is an accurate and non-invasive means of further characterizing PB pathology and has high yield in patients with a new dilated CBD without any identifiable cause on US .

SSE08-06 Feasibility of 3D MRCP with Compressed Sensing at 3T: Comparison with Navigator-Triggered 3D MRCP

Monday, Nov. 28 3:50PM - 4:00PM Room: E353C

Participants
Nieun Seo, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
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Jin-Young Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Honsoul Kim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hye Jin Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Minsu Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Heejin Bae, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myeong-Jin Kim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Bayer AG

PURPOSE

To assess the feasibility of 3-dimensional (3D) MR cholangiopancreatography (MRCP) with compressed sensing (CS) in clinical use compared with standard 3D navigator-triggered MRCP without CS

METHOD AND MATERIALS

From January 2016 to March 2016, 30 patients who required MRCP for suspected pancreaticobiliary disease were prospectively enrolled in this study. All patients underwent 3D navigator-triggered MRCP with and without CS. Acquisition times of both sequences were recorded. Quantitative comparison including relative duct-to-periductal contrast ratio (RC) at three biliary segments and acquisition times between two sequences were performed. Qualitative evaluation regarding the visualization of seven segments of the pancreaticobiliary tree and the degree of artifacts was performed by six radiologists of three different experience subgroups with blinding. The data were analyzed using the paired *t*-test and the Wilcoxon paired signed-rank test. Interobserver agreement of qualitative evaluation was calculated using the weighted κ statistics.

RESULTS

The mean acquisition time of MRCP with CS (131.87 ± 33.60 sec) was significantly shorter than that of MRCP without CS (253.63 ± 56.08 sec)(P<0.001). On quantitative evaluation, RC at two segments using MRCP with CS was slightly lower than that using MRCP without CS (P=0.007 and P=0.002), and RC of one segment was similar between MRCP with and without CS (P=0.816). On qualitative analysis, the visualization of seven pancreaticobiliary segments and the degree of artifacts were not significant different between MRCP with and without CS (P>0.08) in all three experience groups. The interobserver agreement was moderate to good ranging from 0.475 to 0.632 according to the segment.

CONCLUSION

MRCP with CS application can provide comparable image quality with standard navigator-triggered MRCP without CS in about half the acquisition time. Therefore, CS is feasible for 3D navigator triggered MRCP in a clinical setting.

CLINICAL RELEVANCE/APPLICATION

CS is a recently introduced undersampling method, and clinical applications of CS have been increasing. CS is a promising time-saving, and feasible technique for 3D navigator-triggered MRCP.

SSE09

Gastrointestinal (Loco-regional Therapy Imaging)

Monday, Nov. 28 3:00PM - 4:00PM Room: E350

GI CT MR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Debra A. Gervais, MD, Boston, MA (*Moderator*) Nothing to Disclose
Ronald S. Arellano, MD, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

SSE09-01 Ultrasound-Guided Therapeutic Modulation of Hepatocellular Carcinoma Using Complementary microRNAs

Monday, Nov. 28 3:00PM - 3:10PM Room: E350

Participants
Sayan Mullick Chowdhury, MSc,PhD, Belmont, CA (*Presenter*) Nothing to Disclose
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Sunitha Bachawal, PhD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Lotfi Abou Elkacem, PhD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Rammohan Devulapally, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Ramasamy Paulmurugan, PhD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Juergen K. Willmann, MD, Stanford, CA (*Abstract Co-Author*) Research Consultant, Bracco Group; Research Grant, Siemens AG; Research Grant, Bracco Group; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company; Advisory Board, Lantheus Medical Imaging, Inc; Advisory Board, Bracco Group

PURPOSE

Treatment options for hepatocellular carcinoma (HCC) are limited and new strategies to successfully treat this deadly disease are critically needed. The aim of this study was to evaluate treatment effects of two miRNAs of complementary function (microRNA-122 and antimicroRNA-21) encapsulated in biodegradable poly (lactic-co-glycolic acid) nanoparticles (PLGA-NP), co-administered by an ultrasound (US) guided and microbubble (MB)-enhanced localized delivery approach in doxorubicin resistant and non-resistant HCC.

METHOD AND MATERIALS

An US-guided drug delivery apparatus optimized for PLGA-NP delivery in cancers was used for the experiments. Lipid-shelled MB were used. For US-guided drug delivery, 1.8 MHz US pulses were used, generated by an array transducer connected to a research platform (V1, Verasonics, Redmond, WA). Proliferation and invasiveness of human HCC cells were assessed in vitro. Confocal microscopy and qRT-PCR were used to quantitate intracellular miRNA-loaded PLGA-NP delivery. Modulation of miRNA downstream targets, multidrug resistance proteins and extent of apoptosis were assessed in vivo in treated human HCC xenografts in mice.

RESULTS

Compared to single miRNA therapy, co-treatment of complementary miRNAs resulted in significantly ($P<0.05$) stronger therapeutic effects with higher resensitization to doxorubicin in HCC cells. US-guided delivery significantly ($P=0.0001$) increased (>5-fold) miRNA delivery in human HCC xenografts compared to controls (no US treatment) and electronic microscopy confirmed the internalization of PLGA-NP into tumor cells. In both resistant and non-resistant HCC, western blot analysis established down-regulation of anti-apoptotic proteins after complementary miRNA treatment while ex vivo assays confirmed that the delivered miRNAs could significantly improve sensitivity of HCC to doxorubicin.

CONCLUSION

Ultrasound-guided delivery of complementary miRNAs is highly efficient in treating doxorubicin-resistant and non-resistant HCC and can be further developed to aid better treatment of patients with HCC.

CLINICAL RELEVANCE/APPLICATION

Therapeutic complementary miRNA modulation under ultrasound guidance has the potential to fulfill the current therapeutic void for patients with drug resistant advanced HCC and/or poor hepatic reserve.

SSE09-02 Detection of Residual Hepatocellular Carcinoma after Locoregional Treatment by MRI: A Comparative Study between Extracellular Gadolinium and Gadoxetic Acid

Monday, Nov. 28 3:10PM - 3:20PM Room: E350

Participants
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Matthew S. Davenport, MD, Cincinnati, OH (*Abstract Co-Author*) Royalties, Wolters Kluwer nv; ;
Peter S. Liu, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Theodore Brown, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Barbara McKenna, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Hero K. Hussain, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the diagnostic accuracy of extracellular gadolinium-based contrast-enhanced MRI (Gd-MRI) and gadoxetic acid-

enhanced MRI (EOB-MRI) for the assessment of hepatocellular carcinoma (HCC) response to locoregional therapy (LRT) using explant correlation as the reference standard.

METHOD AND MATERIALS

IRB approval was obtained for this retrospective cohort study. Forty-nine subjects with cirrhosis and HCC treated with LRT who underwent liver MRI using either Gd-MRI (n=26) or EOB-MRI (n=23) within 90 days of liver transplantation were included. Four radiologists (two independent, two in consensus) reviewed the MR images blinded to histology to determine the size and percentage of viable residual HCC compared to the pre-treatment tumor volume using a per-lesion explant reference standard. Sensitivities, specificities, and areas under the receiver operating characteristic (ROC) curves for the detection of any viable tumor were calculated. Agreement (percent viable HCC on MRI vs. histology) was assessed with intra-class correlation coefficients.

RESULTS

Gd-MRI had greater agreement with histology (ICC: 0.98 [0.95-0.99] vs. 0.80 [0.63-0.90]) and greater sensitivity for viable HCC (76% [13/17 50-93%] vs. 58% [7/12; 28-85%]) than EOB-MRI; specificities were similar (84% [16/19; 60-97%] vs. 85% [23/27; 66-96%]). Areas under ROC curves for detecting residual viable tumor were 0.80 (0.64-0.92) for Gd-MRI and 0.72 (0.55-0.85) for EOB-MRI. Gd-MRI had greater inter-rater agreement than EOB-MRI for determining the size (mm) of residual viable HCC (ICC: 0.96 [0.92-0.98] vs. 0.85 [0.72-0.92]).

CONCLUSION

Gd-MRI may be more accurate and repeatable than EOB-MRI for the assessment of viable HCC following LRT.

CLINICAL RELEVANCE/APPLICATION

Imaging assessment of hepatocellular carcinoma response to loco-regional therapy is critical for patient management.

SSE09-03 A Cost-effectiveness Analysis of the Diagnostic Imaging Strategies in Decision Making of Curative Treatment for Early Stage Hepatocellular Carcinoma: Dynamic Contrast Enhanced CT vs. Adding Gadoxetic Acid-enhanced MRI

Monday, Nov. 28 3:20PM - 3:30PM Room: E350

Participants
Chong Hyun Suh, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Kyung Won Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seong Ho Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, DONGKOOK Pharmaceutical Co, Ltd

PURPOSE

We evaluated a cost-effectiveness of two different diagnostic imaging strategies in decision making of curative treatment for early stage hepatocellular carcinoma (HCC).

METHOD AND MATERIALS

We developed a decision analytic model used as its starting point cohort of patients aged 55 years with HCC within the Milan criteria detected on dynamic contrast-enhanced CT and Child-Pugh A cirrhosis. The model compared two main diagnostic imaging strategies on the initial workup, (1) conventional CT strategy using dynamic contrast-enhanced CT only, (2) EOB-MRI strategy using additional the gadoxetic acid-enhanced MRI. A Markov cohort model was developed to simulate a cohort of patients after undergoing curative and/or adjuvant treatment, and followed up over their remaining life expectancy. We analyzed the mean life-years gain, quality-adjusted life-years (QALYs), costs per person, and incremental cost-effectiveness ratios (ICERs). To evaluate the robustness of the results of the model, we performed one-way, two-way, and probabilistic sensitivity analyses.

RESULTS

The mean life-years gain of the conventional CT strategy was 7.22 years and the EOB-MRI strategy was 7.79 years. The QALY of the conventional CT strategy was 5.08 and the EOB-MRI strategy was 5.52. The total expected costs were $99,770 for the conventional CT strategy, and $105,025 for the EOB-MRI strategy in the U.S.A. In the cost-effectiveness analysis, the ICER of the EOB-MRI strategy was $11,957 compared to the conventional CT strategy, which was lower than cost-effectiveness threshold of %50,000/QALY. One-way, two-way, and probabilistic sensitivity analyses showed unchanged results over an acceptable range.

CONCLUSION

The EOB-MRI strategy is the cost-effective strategy for detecting additional HCC in patients with early stage HCC compared to the conventional CT strategy. This cost effectiveness of EOB-MRI should be considered in the management of patients with early stage HCC during staging process.

CLINICAL RELEVANCE/APPLICATION

The gadoxetic acid-enhanced MRI should be considered in the management of patients with early stage HCC during staging process.

SSE09-04 Validation of Clinical Scoring Systems ART and ABCR after Transarterial Chemoembolization of Hepatocellular Carcinoma

Monday, Nov. 28 3:30PM - 3:40PM Room: E350

Participants
Roman Kloeckner, MD, Mainz, Germany (*Presenter*) Nothing to Disclose
Michael B. Pitton, MD, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Christoph Dueber, MD, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Irene Schmidtmann, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Peter R. Galle, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Sandra Koch, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Marcus A. Worns, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose

Arndt Weinmann, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Transarterial Chemoembolization (TACE) is the standard of care for intermediate stage hepatocellular carcinoma (HCC). It remains challenging to decide whether to repeat treatment. Hence, we performed external validations of two scoring systems recently developed to evaluate TACE: the ART (assessment for retreatment with TACE) and the ABCR (alpha fetoprotein [AFP], Barcelona clinic liver cancer [BCLC] stage, Child-Pugh score, and treatment response) and compared their prognostic value.

METHOD AND MATERIALS

From 2000 to 2015, 871 patients with HCC underwent TACE at our tertiary referral hospital. We acquired baseline data on BCLC-stages and AFP levels, and data measured before the second TACE on Child-Pugh scores, aspartate aminotransferase levels, and radiologic tumor responses. Overall survival for the different score groups (ART: 2 groups, ABCR: 2 and 3 groups) was calculated. Scores were validated and compared with Harrell´s C-index, the integrated Brier score (IBS), and prediction error curves.

RESULTS

176 patients were included. Low and high ART scores predicted median survivals of 20.8 and 15.3 months, respectively. Low and high ABCR scores (2 groups) predicted median survivals of 20.2 and 9.8 months, respectively. Low, intermediate, and high ABCR scores (3 groups) predicted median survivals of 24.5, 15.8, and 5.8 months, respectively. For the ART score Harrell´s C-index was 0.572. For the ABCR score Harrell´s C-index yielded 0.543 (2 groups) and 0.608 (3 groups). IBS were 0.135, 0.136, and 0.128 for ART and ABCR, respectively. For both scores, an increase in Child Pugh ≥2 points and a radiological response independently predicted survival.

CONCLUSION

Both ART and ABCR scores provided some indication of which patients had a dismal prognosis, and were unlikely to benefit from repeated TACE. The ABCR score with 3 groups had slightly greater predictive value compared to the ART score and the ABCR score with only 2 groups.

CLINICAL RELEVANCE/APPLICATION

Neither score was sufficient to support clear-cut clinical decisions. Further effort is necessary to determine criteria for valid predictions.

SSE09-05 The Role of Perfusion-CT as an Early Predictor of Survival in Patients with Advanced Hepatocellular Carcinoma Treated with Sorafenib

Monday, Nov. 28 3:40PM - 3:50PM Room: E350

Awards
Student Travel Stipend Award

Participants
Giulia Querques, MD, Monza, Italy (*Presenter*) Nothing to Disclose
Davide Ippolito, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Cammillo R. Talei Franzesi, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Pietro A. Bonaffini, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Sandro Sironi, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the role of quantitative perfusion-CT (pCT) as a diagnostic tool for the early prediction of survival in patients with advanced hepatocellular carcinoma (HCC) treated with Sorafenib.

METHOD AND MATERIALS

Between 2012 and 2015, 22 cirrhotic patients (n.19 M, n.3 F) with biopsy proven multifocal HCC underwent MDCT and pCT examinations before and every 3 months after Sorafenib administration. pCT technique is based on the acquisition of 16 dynamic slices/scan per 40 scans, performed on a 256-slice MDCT scanner, after iv bolus injection of 50 ml of iodinated contrast agent (350 mgI/ml) at a flow rate of 5 ml/s. According to mRECIST, patients were stratified in complete (CR) or partial response (PR), stable (SD) or progressive disease (PD). The following pCT parameters were calculated: hepatic perfusion (HP, ml/s/100g), arterial perfusion (AP, ml/s), and percentage variation (Δ) of HP and AP, before and 3 months after treatment. Kaplan-Meier analyses estimated the time to survival in the overall population and after stratifying patients into mRECIST.

RESULTS

A significant reduction ($p<0.01$) in mean ΔHP of 79.1% vs 51.7% vs 20.8% was observed in CR vs PR vs SD, respectively. Conversely, ΔHP increased of 22.2% among PD. Similarly, a significant reduction ($p<0.003$) in mean ΔAP of 82.8% vs 56.8% vs 18.6% was observed in CR vs PR vs SD, respectively, while ΔAP increased of 16.0% among PD. Median follow-up was 14 months with an overall survival rate of 31.0% at 18 months follow-up. When patients were stratified into mRECIST, the overall survival rate was 50% (CR) vs 30% (PR) vs 28% (SD) vs 20% (PD).

CONCLUSION

ΔHP and ΔAP significantly differ among mRECIST categories, showing good correlation with overall survival. These parameters might represent prognostic indicators of response to anti-angiogenic therapy, thus permitting the selection of patients who will benefit from treatment.

CLINICAL RELEVANCE/APPLICATION

pCT represents a feasible non-invasive technique for the quantitative assessment of hemodynamic changes related to Sorafenib in patients with advanced HCC, allowing for early prediction of HCC outcome.

SSE09-06 Ablation Therapy for Partially Responded Multi-Nodular HCCs after TACE Improves Achievement of Complete Response and Clinical Outcome

Monday, Nov. 28 3:50PM - 4:00PM Room: E350

Participants
Dong Ho Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jeong Min Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Grant, Guerbet SA; Support, Siemens AG; Grant, Bayer AG; Grant, General Electric Company; Grant, STARmed Co, Ltd; Grant, RF Medical Co, Ltd; Grant, Toshiba Corporation; Grant, Samsung Medical Healthcare

PURPOSE

Ablation therapy can be used for residual hepatocellular carcinomas (HCCs) after transarterial chemoembolization (TACE). We retrospectively evaluated the role of ablation therapy for patients with multinodular HCCs initially treated by TACE.

METHOD AND MATERIALS

A total of 168 patients who underwent TACE for 2 to 5 HCCs≤5cm were included. After initial TACE, 'on-demand' re-treatment was done using repeated TACE or ablation therapy. Initial, best response was evaluated using modified Response Evaluation Criteria in Solid tumors. According to achievement and time of complete response (CR), patients were classified into three groups: initial CR, subsequent CR and persistent non-CR. Overall survival (OS) was estimated using Kaplan-Meier method. Cox-regression analysis was performed to find out significant predicting factors.

RESULTS

Achieving CR as best response was significant predicting factor better OS (hazard ratio=6.09 [3.09-12.0], P<0.001). The 5-year OS was 17.0% in 32 patients of persistent non-CR group and significantly poorer than that in 79 patients of initial CR group (50.9%) (P=0.001) or in 57 patients of subsequent CR group (56.3%) (P<0.001). The CR rate of ablation therapy (77.8%) as second session treatment was significantly higher than that of repeated TACE (41.1%) (P=0.004). OS of ablation group was also significantly better than that of repeated TACE group (P=0.003), due to higher CR rate.

CONCLUSION

Achieving CR as best response was a significant predictor for better OS in patients with 2 to 5 nodular HCCs≤5cm initially treated by TACE, and ablation therapy for residual tumor after initial TACE can improve achievement of CR and OS.

CLINICAL RELEVANCE/APPLICATION

Achieving CR as best response was a significant predictor for better OS in patients with 2 to 5 nodular HCCs≤5cm initially treated by TACE, and ablation therapy for residual tumor after initial TACE can improve achievement of CR and OS.

SSE24

Radiation Oncology (Gastrointestinal)

Monday, Nov. 28 3:00PM - 4:00PM Room: S104A

GI RO OI

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Tarita O. Thomas, MD, PhD, Chicago, IL (*Moderator*) Nothing to Disclose
Richard Tuli, MD, PhD, Los Angeles, CA (*Moderator*) Nothing to Disclose

Sub-Events

SSE24-01 Feasibility of Vascular Matching for Pancreatic Stereotactic Body Radiotherapy

Monday, Nov. 28 3:00PM - 3:10PM Room: S104A

Awards
Student Travel Stipend Award

Participants
Subha Perni, New York, NY (*Presenter*) Nothing to Disclose
Christine Chin, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Ping Yan, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Theodore Yanagihara, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
David Horowitz, MD, New York, NY (*Abstract Co-Author*) Consultant, Champions Oncology

PURPOSE

Implanted fiducial markers (IFM) and biliary stents are established as targets for image-guidance during stereotactic body RT (SBRT) in treatment of pancreatic adenocarcinoma (PDAC). IFM are well tolerated, but may delay treatment. IFM/stent migration may also cause insufficient target coverage and normal tissue toxicity. This study evaluated vascular matching (VM), IFM and stent matching for image-guidance in delivery of SBRT for PDAC.

METHOD AND MATERIALS

Between April 2011- November 2015, 39 patients received SBRT for PDAC at our institution. Cone beam CT (CBCT) was performed for setup verification. 221 CBCT images were analyzed for setup shifts based on either IFM, stent or celiac and SMA vasculature contoured using Mosaiq, version 2.60 (IMPAC Medical Systems, Inc. Sunnyvale, CA). Kaplan-Meier calculations, analysis of variance, likelihood ratio, and Wilcoxon tests were used to evaluate local control and survival and compare groups.

RESULTS

15 patients were treated with IFM, 9 with stents, and 15 with VM. Waiting times from consult to treatment in the IFM, stent, and VM groups were 24 days (range 2-91 days), 14 days (range 9-56 days), and 19 days (range 5-39 days), respectively. The average magnitude for superior/inferior shifts was 0.45 ± 0.42 mm (IFM), 0.48 ± 0.46 mm (stent), and 0.37 ± 0.33 mm (VM) ($p = 0.24$), lateral shifts 0.42 ± 0.99 mm, 0.29 ± 0.35 mm, and 0.26 ± 0.22 ($p = 0.26$), and anterior/posterior shifts were 0.33 ± 0.40 mm, 0.34 ± 0.28 mm, and 0.37 ± 0.28 mm ($p = 0.70$). Vector magnitudes were 0.85 ± 1.04 mm, 0.74 ± 0.53 mm, and 0.67 ± 0.36 mm, respectively ($p = 0.24$). There were no complications from IFM or stent placement or significant differences in GI toxicities ($p = 0.25$), but there was one Grade 3 toxicity in the stent group. There were no significant differences in tumor resectability ($p = 0.70$), margin status ($p = 0.43$), local control ($p = 0.31$), or overall survival ($p = 0.88$).

CONCLUSION

There was no difference in positional shifts, toxicity, or outcomes for patients planned with implanted fiducial markers, stents, or vascular matching. VM may be preferable over more invasive methods of target localization.

CLINICAL RELEVANCE/APPLICATION

Vascular matching is a feasible, less invasive image-guidance technique that allows for reproducible and convenient SBRT delivery to PDAC and shorter treatment delays.

SSE24-03 Repeat Stereotactic Body Radiation Therapy for Liver Tumors

Monday, Nov. 28 3:20PM - 3:30PM Room: S104A

Awards
Student Travel Stipend Award

Participants
James O. Galle, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose
David Long, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose
Mark Tann, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose
Susannah Ellsworth, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose
John A. Cox, MD, Carmel, IN (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Stereotactic body radiation therapy (SBRT) for liver tumors has high rates of local control (LC) and acceptable toxicity. Some patients develop recurrent hepatic disease and additional SBRT can be considered; however, outcomes after repeat SBRT are not well described.

METHOD AND MATERIALS

383 patients treated with liver SBRT at a single institution from 2006-2016 were reviewed; 16 patients underwent multiple SBRT courses. 7 patients were re-treated for hepatocellular carcinoma (HCC), 1 for cholangiocarcinoma, and 8 for metastases (LM). 2 patients with HCC were excluded; 1 for incomplete radiation plans and 1 who had routine liver transplant after 1 fraction of repeat SBRT without toxicity. 2 patients received a 3rd course of SBRT.

RESULTS

Median dose for patients with primary liver tumors (PLT) was 48 Gray (Gy) / 3 fractions for the 1st SBRT and 40 Gy / 5 fractions for 2nd SBRT, compared to 54 Gy / 3 fractions and 50 Gy / 5 fractions for LM for the 1st and 2nd SBRT, respectively. Median follow up was 18.2 months in living patients. Crude LC for the 1st and 2nd treatment was 78.6% and 85.7%, respectively. For the whole cohort, mean progression free survival (PFS) and overall survival (OS) from the 2nd SBRT were 11.9 and 28.1 months, respectively. PFS was significantly shorter in patients with LM compared to PLTs with median values of 4.3 vs 18.4 months, respectively (p=0.01), but there was no difference in OS between the two groups (median 20.7 vs. 26.6 months, p=0.18). Change in liver volume between the 1st and 2nd SBRT courses was predictive of PFS and OS (p=0.05 and p=0.02, respectively). Median OS in patients with liver volume loss between SBRT courses was 13.1 vs 42.5 months in patients without volume loss (p=0.01, HR 5.17 [0.83-32.37]). 2nd SBRT was well tolerated, but severe liver decompensation was seen in both patients receiving a 3rd SBRT course.

CONCLUSION

A 2nd course of liver SBRT is safe and associated with high LC; however, PFS differs between patients with PLT and LM. Patients with liver volume loss appear to have worse outcomes. Significant toxicity occurred in both patients undergoing a 3rd SBRT. Weaknesses of this study include its retrospective nature and low patient numbers.

CLINICAL RELEVANCE/APPLICATION

Although a 2nd course of liver SBRT appears safe, caution should be used when considering re-treating patients with liver volume loss; more than 2 SBRT courses were not well tolerated.

SSE24-04 The Dosimetric Impact of Inter-fractional Organ-at-Risk Movement during Liver Stereotactic Body Radiation Therapy

Monday, Nov. 28 3:30PM - 3:40PM Room: S104A

Participants
Ryan Schmid, BS, Milwaukee, WI (*Presenter*) Nothing to Disclose
An Tai, Milwaukee, WI (*Abstract Co-Author*) Nothing to Disclose
Khalid Ramahi, Milwaukee, WI (*Abstract Co-Author*) Nothing to Disclose
Taylor Giordano, Milwaukee, WI (*Abstract Co-Author*) Nothing to Disclose
Slade Klawikowski, PhD, Milwaukee, WI (*Abstract Co-Author*) Nothing to Disclose
X. A. Li, PhD, Milwaukee, WI (*Abstract Co-Author*) Nothing to Disclose
Jared R. Robbins, MD, Milwaukee, WI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The use of stereotactic body radiation therapy (SBRT) for treating liver malignancies is increasing. The impact of inter-fractional variation of organs-at-risk (OAR) during SBRT is not well studied. We examine the dose variations due to inter-fractional organ movement in patients treated with liver SBRT.

METHOD AND MATERIALS

Ten subjects treated with liver SBRT were analyzed. Most patients were treated with five fraction regiments with gated treatment delivery. Daily image-guidance with diagnostic quality CT-on-rails imaging was performed prior to each fraction. OARs were delineated on daily CTs including the liver, heart, right kidney, esophagus, stomach, duodenum and large bowel. Contouring and planning was performed using Monaco planning software (Stockholm, Sweden). Dose distribution on each daily CT was generated by templating the original plan to the daily CT using the daily shifts to replicate the daily treatment isocenter. Daily doses to all 7 OARs were recorded including the maximum dose to the 5cc, 3cc, 1cc, 0.3cc and 0.1cc and other clinically relevant metrics.

RESULTS

Although the doses to the OARs varied daily, only one organ in one patient on one day exceeded a clinically relevant threshold for a rate of error <1/300. For all OARs the dose to the liver was most consistent between fractions. For the liver dose parameters, the composite average percent change ranged from -5.92% to 1.2% with standard deviations of 0.11 to 0.74. Doses to the other OARs varied more between fractions depending on the proximity of the OAR to the target volume and organ motion. There were some large variations between the planned and delivered doses with up to two-fold differences for some OARs, but these did not exceed clinically meaningful levels.

CONCLUSION

With our current standard using CT-on-rails and respiratory gating, inter-fractional variations in liver doses were fairly consistent, while more variation was observed for other OARs. While inter-fractional variations of daily dose could be large, it was rarely clinically relevant. Dose accumulation measurement may help further evaluate the clinical significance of these changes, but currently no extra planning parameters seem necessary in most patients and scenarios.

CLINICAL RELEVANCE/APPLICATION

There can be significant inter-fractional variation in radiation doses to OARs during liver SBRT, but in this study the variation did not lead to clinically significant risks to patients.

SSE24-06 Radiotherapy Technique Can Be Important on Survival in Patients with Gastric Cancer Treated with Postoperative ChemoRadiotherapy

Monday, Nov. 28 3:50PM - 4:00PM Room: S104A

Participants
Beyza Sirin Ozdemir, antalya, Turkey (*Presenter*) Nothing to Disclose

ABSTRACT

Purpose/Objective(s): To investigate the clinical and pathological features and evaluate the survival rate of patients with gastric carcinoma receiving postoperative chemoradiotherapy.Materials/Methods: Two hundred and four patients who have had postoperative chemoradiotherapy for the diagnosis of gastric cancer in our clinic between 1999 and 2014 have been evaluated retrospectively. Clinical prognostic factors affecting survival were studied.Results: One hundred and twenty nine (63%) of the patients were male, 75 (37%) were female and median age was 57 years (range 28-81). According to the stage distribution; 4 (%2) patients were on stage I, 61 (30%) patients were on stage II and 139 (68%) patients were on stage III. Applied surgery type: subtotal gastrectomy on 128 (62,7%) patients and total gastrectomy on 76 (37,3%) patients. Histopathologically, 73% of the patients were adenocarcinoma, 24% were signet-ring cell and 3% were other histopathological diagnosed. Tumor differentiation was evaluated in 197 patients and 11,2% of them were well-differentiated, 33% were moderately differentiated and 55,8% were poorly differentiated. Surgical margin status was positive or close in 33 (16,7%) out of 204 patients. Lymphatic dissection type was D1 on 159 (78%) patients, D2 on 28 (14%) patients; however, it was unknown in 17 (8%) patients. The median number of the dissected lymph node was 16 (range 0-90), which was 10 or less in 63 (31%) patients, more than 10 in 141 (69%) patients. 166 (81,4%) of the patients had lymph node metastasis. 92% of the patients received 5-fluorouracil (5-FU) -based chemotherapy during radiotherapy (RT). Doses of RT ranged from 40 to 54 Gy with a median dose of 46 Gy in 1.8-2 Gy fractions. RT technique was two-dimensional conventional on 98 (48%) patients and three-dimensional conformal RT on 106 (52%) patients. During chemoradiotherapy, it was monitored that 14,3% of the patients had hematologic, 5% of the patients had gastrointestinal grade 3 and more toxicity. The median follow-up was 29 months (range 3-147). The overall survival rates for 2, 5 and 10 years were 52%, 37% and 32% respectively. Stage, lymphatic dissection type (D1 or D2), presence of lymph node metastasis, dissected lymph node number (10 or less) and RT technique (two-dimensional conventional or three-dimensional conformal) have been found as significant prognostic factors in terms of overall survival. The 2, 5 and 10- year progression-free survival rates were 59%, 51% and 46%, respectively. Stage and presence of nodal metastasis are significant prognostic factors of progression-free survival. Conclusion: Postoperative chemoradiotherapy should be considered for all patients with high risk of recurrence after gastrectomy. Beside well-known prognostic factors such as stage, lymph node metastasis, lymphatic dissection type; RT technique was an important prognostic factor in our study. These results suggest that there is a long-term survival benefit for patients treated with three-dimensional conformal radiotherapy.

SPDL21

RSNA Diagnosis Live™: Chest and Abdomen

Monday, Nov. 28 4:30PM - 6:00PM Room: E451B

CH GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Stentor/Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Medical Advisory Board, lifeIMAGE Inc; Advisory Board, Bayer AG
Neety Panu, MD, FRCPC, Thunder Bay, ON (*Presenter*) Nothing to Disclose
Gregory L. Katzman, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The participant will be introduced to a series of radiology case studies via an interactive team game approach designed to encourage "active" consumption of educational content. 2) The participant will be able to use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) The attendee will receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

ABSTRACT

URL

MSRO29

BOOST: Gastrointestinal-eContouring

Monday, Nov. 28 4:45PM - 6:00PM Room: S104B

GI RO

AMA PRA Category 1 Credits ™: 1.25
ARRT Category A+ Credits: 1.50

Participants

Theodore S. Hong, MD, Boston, MA (*Presenter*) Nothing to Disclose

ED005-TU

Gastrointestinal Tuesday Case of the Day

Tuesday, Nov. 29 7:00AM - 11:59PM Room: Case of Day, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

Participants

Christine M. Peterson, MD, Hummelstown, PA (*Presenter*) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Constantine A. Raptis, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Rex A. Parker III, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Elizabeth B. Maddox, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Christopher Molloy, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Andrew P. Robbins, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Andrew L. Warren, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Vincent M. Mellnick, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Oscar Garcia-Fraga, MD, Hershey, PA (*Abstract Co-Author*) Nothing to Disclose
Kelly Tung, MD,MS, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) Each GI case of the day will be taken from disorders of the luminal GI tract as well as the liver, spleen, pancreas, and biliary system. The findings may be uncommon manifestations of common diseases or common manifestations of uncommon diseases.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Perry J. Pickhardt, MD - 2014 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

SPDL30

RSNA Diagnosis Live™: Imaging in the Cobra Kai Dojo

Tuesday, Nov. 29 7:15AM - 8:15AM Room: E451B

CA GI HN MK NR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants

Adam E. Flanders, MD, Narberth, PA, (adam.flanders@jefferson.edu) (*Presenter*) Nothing to Disclose
Sandeep P. Deshmukh, MD, Philadelphia, PA, (sandeep.deshmukh@jefferson.edu) (*Presenter*) Nothing to Disclose
Christopher G. Roth, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The participant will be introduced to a series of radiology case studies via an interactive team game approach designed to encourage "active" consumption of educational content. 2) The participant will be able to use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) The attendee will receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

RC309

Gastrointestinal Series: Liver Imaging

Tuesday, Nov. 29 8:30AM - 12:00PM Room: E350

GI

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 3.50

Participants

Mustafa R. Bashir, MD, Cary, NC (*Moderator*) Research support, Siemens AG; Research support, Guerbet SA; Research support, General Electric Company; Imaging Core Lab, NGM Biopharmaceuticals; Imaging Core Lab, TaiwanJ Pharma
Jay P. Heiken, MD, Saint Louis, MO (*Moderator*) Patent agreement, Guerbet SA; Patent agreement, Bayer AG
Frank H. Miller, MD, Chicago, IL (*Moderator*) Research Grant, Siemens AG

Sub-Events

RC309-01 Hypervascular Liver Lesions in Non-cirrhotic Patients

Tuesday, Nov. 29 8:30AM - 8:50AM Room: E350

Participants
Dushyant V. Sahani, MD, Boston, MA (*Presenter*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Dushyant V. Sahani, MD - 2012 Honored Educator
Dushyant V. Sahani, MD - 2015 Honored Educator
Dushyant V. Sahani, MD - 2016 Honored Educator

RC309-02 Distinguishing Benign from Malignant Hyperenhancing Hepatic Nodules in Post-Fontan Patients

Tuesday, Nov. 29 8:50AM - 9:00AM Room: E350

Participants
Michael L. Wells, MD, Rochester, MN (*Presenter*) Nothing to Disclose
David M. Hough, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Jeff L. Fidler, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Joseph Poterucha, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
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Sudhakar K. Venkatesh, MD, FRCR, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Describe the imaging characteristics and pathological etiology of hyperenhancing hepatic nodules arising in post-Fontan patients (pts).

METHOD AND MATERIALS

Post-Fontan pts with hyperenhancing hepatic nodules found at dedicated abdominal multiphasic CT and/or MRI were identified by retrospective review of medical records. Imaging findings were reviewed by consensus agreement of four staff radiologists using LIRADs criteria. Nodules with characteristic imaging findings of focal nodular hyperplasia (FNH) were defined as typical, and nodules with findings associated with hepatocellular carcinoma (HCC) (LIRADS 4 or 5) were defined as atypical. Alpha fetoprotein levels (AFP) and central venous pressures (CVP) were recorded. Eight atypical nodules had histological confirmation.

RESULTS

32 pts, 17 with cirrhosis, had average age of 26.5 years (range 10-41 years) at diagnosis of a liver nodule. CVP was elevated (>8mmHg) in 22/23 (96%) pts. AFP was elevated (>20ng/mL) in 4/27 (15%) pts. 291 hyperenhancing nodules (257 typical, 34 atypical) were detected. 13/32 (41%) pts had one or more atypical nodule. Pts with atypical nodules had significantly higher CVP (19.2 vs 14.2mmHg, P=0.016) and number of nodules (13 vs 4, P=0.01). Atypical nodules showed washout in 33 (portal phase in 7, delayed phase in 33), pseudocapsule in 2, threshold growth in 3, tumor in vein in 1, and ancillary features favoring malignancy in 6 (mosaic architecture in 5). 20 atypical nodules showed washout without additional concerning features. Pathology confirmed HCC in 5 atypical nodules in 4 pts and FNH in 3 atypical nodules in 2 pts and 4 typical nodules in 2 pts. 2 atypical nodules were present in a pt with clinical diagnosis of HCC. Atypical nodules were significantly more likely to be HCC than FNH (either biopsy-proven or stable >24 months without biopsy) when showing portal venous phase washout (P<.001), threshold growth (P=0.006), mosaic architecture (P<0.001) or when AFP was elevated (P<0.001).

CONCLUSION

Benign masses in Fontan pts may demonstrate washout and be mistaken as HCC by imaging criteria. Portal phase washout, threshold growth, mosaic architecture and elevated AFP were associated with HCC in this population.

CLINICAL RELEVANCE/APPLICATION

Post-Fontan patients with chronic passive hepatic congestion commonly develop benign arterial hyperenhancing masses within the liver which may show washout and be mistaken for HCC.

RC309-03 Dealing with Liver Incidentalomas

Tuesday, Nov. 29 9:00AM - 9:20AM Room: E350

Participants
Jay P. Heiken, MD, Saint Louis, MO, (heikenj@wustl.edu) (*Presenter*) Patent agreement, Guerbet SA; Patent agreement, Bayer AG

LEARNING OBJECTIVES

1) Identify the imaging characteristics of common incidentally discovered liver lesions. 2) Recommend the most appropriate test to characterize an indeterminate incidentally discovered liver lesion. 3) Recognize the differences in risk of an incidentally discovered liver lesion being malignant based on history of extrahepatic malignancy or cirrhosis.

RC309-04 Colorectal Cancer Liver Metastases: Enhancement Pattern on Hepatobiliary Phase of Gadoxetic Acid-enhanced MRI and Its Prognostic Value

Tuesday, Nov. 29 9:20AM - 9:30AM Room: E350

Participants
Seunghyun Park, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jin-Young Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Honsoul Kim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myeong-Jin Kim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Bayer AG
Eun Kyung Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate factors associated with hepatobiliary phase (HBP) enhancement of gadoxetic acid-enhanced MRI and whether quantitative and qualitative analysis of HBP images could be used to predict prognosis in patients with liver metastases (LM) from colorectal cancer.

METHOD AND MATERIALS

Ninety-eight patients who underwent surgical resection for LM were retrospectively analyzed. We evaluated HBP enhancement pattern of LM, qualitatively and classified into mixed and clearly hypointense groups. For quantitative measurement, 4 parameters were calculated by the following equations. (1) Relative intensity ratio on HBP image (RIRpost) = SI of the nodule/SI of the liver parenchyma on HBP image. (2) Relative intensity ratio on precontrast image (RIRpre). (3) Relative enhancement ratio (RER) = RIRpost/RIRpre. (4) Contrast to noise ratio (CNR). To investigate factors associated with HBP enhancement, the amount of tumor components (fibrosis, necrosis, tumor cellularity) was scored on a semi-quantitative 4 point scale. Immunohistochemistry was performed to evaluate the presence of organic anionic transporting polypeptide 1B3 (OATP1B3). Univariate and multivariate analyses were done to determine significant factors for visual enhancement in both subgroups based on preoperative chemotherapy. Overall survival and disease-free survival after tumor removal were analyzed using Kaplan-Meier method and differences in survival curve were analyzed using the log-rank test.

RESULTS

Of the total 98 nodules, mixed and clearly hypointense group was 67 (68%), and 31 nodules (32%), respectively. In surgically resected 55 nodules without preoperative chemotherapy, a multivariate analysis revealed that OATP1B3 expression was the only significant factor regarding the HBP enhancement (P= 0.049). In this subgroup, nodules with OATP1B3 expression showed significantly higher RIRpost and RER than nodules without OATP1B3 expression (P= 0.0285, 0.0014, respectively). Mixed hypointense group showed worse survival rate and disease free survival rate with statistical significance (P= 0.0169, 0.0466, respectively).

CONCLUSION

The enhancement pattern of CRLM could be associated with OATP1B3 expression in non-chemotherapy group. The quantitative and qualitative analyses of enhancement patterns on HBP may predict prognosis in patients with CRLM.

CLINICAL RELEVANCE/APPLICATION

HBP may predict prognosis in patients with CRLM and is recommended before making treatmen plan.

RC309-05 The Difficult Hepatocellular Carcinoma

Tuesday, Nov. 29 9:30AM - 9:50AM Room: E350

Participants
Cher Heng Tan, MBBS, FRCR, Singapore, Singapore, (Cher_Heng_Tan@ttsh.com.sg) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Relate the classic imaging features of hepatocellular carcinoma (HCC) to its histological characteristics.2) Explain the limitations of the criteria set forth by current clinical guidelines for the imaging diagnosis of HCC.3) Assess the potential of diffusion weighted MRI and hepatocyte specific contrast MRI agents for improving detection of HCC.

ABSTRACT

Hepatocellular carcinoma (HCC) is widely known for its association with chronic hepatitis and liver cirrhosis. The classic imaging features of HCC can be explained by its unique histological characteristics. This enables patients to proceed to definitive treatment without lesion biopsy, provided that specific criteria for imaging diagnosis are met. However, due the heterogeneous nature of HCC, non-classical imaging findings are frequently encountered. Diffusion weighted MRI and hepatocyte specific contrast MRI agents may play a bigger role in imaging diagnosis in such instances.

Active Handout:Cher Heng Tan

http://abstract.rsna.org/uploads/2016/16000479/The Difficult HCC Cher Heng Tan handouts.pdf

RC309-06 Added Value of Peripheral Dark Rim in the Hepatobiliary Phase of Gadoxetic Acid-enhanced MRI in Detecting Capsule and Diagnosing Hepatocellular Carcinoma

Tuesday, Nov. 29 9:50AM - 10:00AM Room: E350

Participants
Chae Jung Park, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Chansik An, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sungwon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sumi Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Song-Ee Baek, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yeun Yoon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myeong-Jin Kim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Bayer AG

PURPOSE

To examine the added value of peripheral smooth dark rim in the hepatobiliary phase (HBP) of gadoxetic acid-enhanced magnetic resonace imaging (MRI) in detecting tumor capsule and in diagnosing hepatocellular carcinoma (HCC).

METHOD AND MATERIALS

Between Jan 2008 and Dec 2011, 349 consecutive patients at risk for HCC underwent hepatic resection after gadoxetic acid-enhanced MRI at a single tertiary hospital. A total of 379 pathologically confirmed hepatic lesions from these patients were our final study subjects: 330 HCCs, 35 non-HCC malignancies, and 13 benign lesions. For each hepatic lesion, two abdominal radiologists determined in consensus the presence or absence of arterial enhancement, washout, conventional capsule appearance (defined as peripheral rim of smooth hyper-enhancement in the portal or delayed phase), and HBP capsule appearance (defined as peripheral smooth dark rim in the HBP), as well as Liver Imaging Reporting and Database system (LI-RADS) category (LR-5 and LR-5V were considered positive for HCC). Diagnostic accuracy was compared using generalized estimating equation method.

RESULTS

Using the results of pathologic examination as the reference standard, 249 (75.5%) of 330 HCCs and 8 (16.7%) of 48 non-HCC lesions had fibrous capsules. Diagnostic accuracy for the presence of fibrous capsule was significantly higher when the presence of either conventional or HBP capsule appearance was considered positive than when only conventional capsule appearance was considered (54% vs. 70.9%, P<0.001). Diagnostic accuracy of LI-RADS for HCC was also significantly higher when HBP capsule appearance was included for the definition of capsule appearance in addition to conventional capsule appearance (61.4% vs. 79.4%, P<0.001)

CONCLUSION

Peripheral smooth dark rim seen in the HBP should be included for the definition of capsule appearance on gadoxetic acid-enhanced MRI.

CLINICAL RELEVANCE/APPLICATION

Capsule appearance can be masked when hepatobiliary contrast agents are used. This may be overcome by using the smooth dark rim in hepatobiliary phase as a complement to conventional capsule appearance.

RC309-07 Long-term Observation of Hypovascular Hypointense Nodules (HHNs) on Gadoxetic Acid-enhanced MRI

Tuesday, Nov. 29 10:00AM - 10:10AM Room: E350

Participants
Tatsuya Shimizu, MD, Yamanashi, Japan (*Presenter*) Nothing to Disclose
Utaroh Motosugi, MD, Yamanashi, Japan (*Abstract Co-Author*) Nothing to Disclose
Katsuhiro Sano, MD,PhD, Chuo, Japan (*Abstract Co-Author*) Nothing to Disclose
Shintaro Ichikawa, MD, Chuo-Shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroshi Onishi, MD, Yamanashi, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Hepatocellular carcinomas (HCCs) commonly develop via multistep carcinogenesis, which first appear as hypovascular HCCs also known as early HCCs. Early HCCs show hypointensity on gadoxetic acid-enhanced hepatobiliary phase images. In this study, we call these nodules “hypovascular hypointense nodule (HHN)”. We investigated outcomes of HHNs with long-term observation, and conducted a retrospective study to perform risk analysis of development of hypervascular HCC from HHNs (hypervascularization).

METHOD AND MATERIALS

We reviewed the radiological records about the patients who underwent gadoxetic acid-enhanced MRI for the purpose of screening for HCC at our hospital from February 2008 to February 2011. We included all patients who had HHN and follow-up MRI (222 HHNs in 92 patients). Endpoint of this study was the development of hypervascular HCC in the liver. Risk factors of hypervascular HCC were analyzed by univariate and multivariate Cox proportional hazard model with the following factors: age, sex, tumor size, signal intensity on T2-weighted images and fat-saturated T1-weighted images, fat-containing appearance on opposed-phase T1-weighted images, growth rate in size. The incidence rate of hypervascular HCC was assessed using Kaplan-Meier curves.

RESULTS

Median of observation period was 775 days (184-2858). During the follow-up, 123 HHNs became hypervasular HCCs. Incidence rate of hypervascularization at 3 years and 5 years were 41.21% and 68.61%, respectively. Multivariate analysis revealed that, fat-saturated T1-weighted images (1.85 [1.09 – 3.08]), lager tumor size (>10mm, 1.56 [1.01 – 2.41]) were the independent risk factors of hypervascularization.

CONCLUSION

Cumulative rate of hypervascularization from HHNs were ever-increasing over 5 years. Size of >10 mm were one of the independent

risk of becoming hypervascular HCCs.

CLINICAL RELEVANCE/APPLICATION

Cirrhotic patients with large hypovascular hypointense nodules on gadoxetic acid-enhanced MRI should be intensely followed up, especially when the size is large (≥10mm).

RC309-08 Assessing the Risk of Developing Hepatocellular Carcinoma by Gadoxetic Acid-enhanced MRI and MR Elastography: A Prospective Study

Tuesday, Nov. 29 10:10AM - 10:20AM Room: E350

Participants
Tatsuya Shimizu, MD, Yamanashi, Japan (*Presenter*) Nothing to Disclose
Utaroh Motosugi, MD, Yamanashi, Japan (*Abstract Co-Author*) Nothing to Disclose
Shintaro Ichikawa, MD, Chuo-Shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroshi Onishi, MD, Yamanashi, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Hypovascular hypointense nodules (HHNs) in the liver, as depicted in gadoxetic acid-enhanced hepatobiliary phase (HBP) images, and higher liver stiffness in MR elastography are risk factors for hepatocellular carcinoma (HCC) development in patients with chronic liver disease. In this study, we conducted a prospective study to investigate whether those MR features are risk factors for HCC.

METHOD AND MATERIALS

From March 2012 to May 2014, 110 chronic liver disease patients without a history of HCC were prospectively enrolled. All patients underwent MRI for screening HCC. The patients were classified on the basis of presence of HHN in the liver on gadoxetic acid-enhanced HBP images (present [non-clean liver], n=34; absent [clean liver], n=76), and stiffness value by MR elastography (soft liver, <4.0kPa, n=53; and stiff liver, ≥4.0kPa, n=45). Risk factors for incidence of hypervascular HCC were analyzed by univariate and multivariate Cox regression analyses of the following factors: age, gender, liver cirrhosis, fatty liver, alcohol abuse, diabetes millitus, non-clearn liver, stiff liver. Then, we calculated the incidence rates of hypervasculer HCC using Kaplan–Meier curves. The log-rank tests were used to analyze significant differences.

RESULTS

During the follow-up period (median, 25.0 months), 16 patients developed HCC. Patients with non-clean liver showed higher incidence of HCC compared to those with clean liver (3 year HCC incidence rates, 52.0% and 6.4%; $p<0.05$). However, no significant difference in incidence of HCC was observed between patients with soft and stiff livers. Cox-proportional model analysis revealed that non-clean liver was an independent risk of HCC development, with a relative risk of 18.75 (95%CI, 4.83–128.63, $p<.0001$).

CONCLUSION

Patients showing HHNs on gadoxetic acid-enhanced HBP images are at high risk for developing HCC.

CLINICAL RELEVANCE/APPLICATION

Hypovascular hypointense nodule (HHN) on gadoxetic acid-enhanced MRI is a strong indicator of subsequent development of hypervascular HCCs in patients with chronic liver disease.

RC309-09 Diffuse Liver Disease: Fat and Iron

Tuesday, Nov. 29 10:40AM - 11:00AM Room: E350

Participants
Aliya Qayyum, MBBS, Houston, TX (*Presenter*) Spouse, Founder, In Context Reporting

RC309-10 Hepatic Proton Density Fat Fraction Measurements:Same-Day Agreement between Readers and Across Scanner Manufacturers

Tuesday, Nov. 29 11:00AM - 11:10AM Room: E350

Participants
Suraj Serai, PhD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Jonathan R. Dillman, MD, Cincinnati, IA (*Abstract Co-Author*) Research Grant, Siemens AG; Research Grant, Guerbet SA; Travel support, Koninklijke Philips NV; Research Grant, Toshiba
Andrew T. Trout, MD, Cincinnati, OH (*Presenter*) Advisory Board, Koninklijke Philips NV; Travel support, Koninklijke Philips NV ; Author, Reed Elsevier; Research Grant, Siemens AG

PURPOSE

Given the accuracy of MRI based proton density fat-fraction (PDFF) sequences in determination of hepatic steatosis. These sequences may ultimately replace biopsy for the diagnosis & monitoring of patients with steatosis and may serve to monitor response to treatment. This is particularly important for long-term follow-up as patients may be imaged on different scanners and possibly at different field strengths. The purpose of this study was to examine the agreement of hepatic MRI based PDFF measurements between readers, scanner manufacturers and field strengths.

METHOD AND MATERIALS

Following informed consent, 24 adult volunteers were scanned on one 1.5T (Philips) & two different 3T (GE 750W & Philips) MR scanners on the same day in order to estimate hepatic PDFF. A single breath-hold Dixon-based acquisition was performed (mDIXON Quant [Philips], IDEAL IQ [GE]). One large region of interest (ROI), inclusive of as much liver parenchyma as possible in the right lobe while avoiding large vessels, was placed by 5 readers on scanner generated parametric maps to measure PDFF. Two-way ICCs were used to assess inter-reader agreement and agreement across 3 scanner platforms.

RESULTS

There was excellent inter-reader agreement for hepatic PDFF measurements obtained using mDIXON Quant on the Philips 1.5T scanner (ICC = 0.995, 95% CI: 0.991–0.998), mDIXON Quant on the Philips 3T scanner (ICC = 0.992, 95% CI: 0.986-0.996), and IDEAL IQ on the GE 3T scanner (ICC = 0.966, 95% CI: 0.939-0.984). Individual reader (n=5) ICCs for hepatic PDFF measurements across all three scanner manufacturer/field strength combinations also showed excellent inter-scanner agreement, ranging from 0.917 to 0.942.

CONCLUSION

Our study shows that hepatic PDFF estimation using mDIXON Quant and IDEAL IQ is highly reproducible across MRI scanner platforms (including different manufacturers & field strengths), with only minimal average bias. Additionally, PDFF measurement made by multiple readers show excellent inter-reader agreement.

CLINICAL RELEVANCE/APPLICATION

PDFF is a robust and reliable noninvasive biomarker of hepatic steatosis that will likely be increasingly important in the initial assessment and follow-up of fatty liver disease. Furthermore, it is also likely that this technique will play an important role in the evaluation of pharmacologic therapies that are currently under development for the treatment of fatty liver disease, serving as a noninvasive, radiologic surrogate end-point.

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Jonathan R. Dillman, MD - 2016 Honored Educator

RC309-11 Metabolic Effects Resulting from Changes of Liver Volume, Intrahepatic Fat and Body Weight in the Course of a Lifestyle Interventional Study

Tuesday, Nov. 29 11:10AM - 11:20AM Room: E350

Participants
Malte N. Bongers, MD, Tuebingen, Germany (*Presenter*) Nothing to Disclose
Norbert Stefan, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Hans-Ulrich Haering, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Andreas Fritsche, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Konstantin Nikolaou, MD, Tuebingen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG; Speakers Bureau, Bracco Group; Speakers Bureau, Bayer AG
Fritz Schick, MD, PhD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Juergen Machann, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate associations between changes of liver volume, intrahepatic lipids (IHL) and body weight during lifestyle intervention and to delineate effects on metabolic markers of liver function and systemic low grade-inflammation.

METHOD AND MATERIALS

Participants were retrospectively selected from prospective cohort studies, characterizing the risk of developing a type 2 diabetes mellitus. All participants followed a caloric restriction diet for 6-9 months. 66 females and 45 males, mean age 48 years (22–71years) with an average body mass index (BMI) of 31kg/m² (20-47kg/m²) were enrolled. The liver volume was determined using three-dimensional MRI (figure 1, A)and IHL were quantified by volume-selective 1H-MRS (figure 1, B). Liver enzymes and high sensitive C-reactive protein (hsCRP) as surrogate marker for systemic low grade inflammation were determined. Gender stratified correlation analyses were performed.

RESULTS

ΔLV was significantly correlated with ΔIHL in females and males (females: r=0.64, p<.0001; males: r=0.51, p<.005). ΔLV was significantly associated with ΔGGT in both genders (females: r=0.36, p=0.005; male: r=0.5, p=0.001), but not associated with ΔBW. In females, a significant correlation between ΔIHL and ΔGGT (r=0.45, p<.005) respectively ΔALT (r=0.28, p=0.02) was present. Males showed a significant correlation between ΔIHL and ΔALT (r=0.49, p<.005) and ΔAST (r=0.40, p=0.008). In females, but not in males a significant association between ΔIHL and ΔCRP could be identified (females: r=0.45, p<.005).

CONCLUSION

The change of liver volume during lifestyle intervention is independent of change in body weight and is primarily determined by the change of IHL. Changes of liver volume seems to be directly connected to changes of GGT in both genders. Reduction of IHL seems to have gender-specific effects on liver enzymes, mainly reducing GGT in females and ALT in males as well as having a positive effect in reducing the systemic low grade inflammation only in females. These results of a lifestyle intervention show the reversibility of augmented liver volume in steatosis and the resulting gender-specific benefits on metabolism.

CLINICAL RELEVANCE/APPLICATION

Knowing the details about hepatic steatosis and the effects on liver volume, liver function and systemic low-grade inflammation is of highest importance to determine effective lifestyle interventions.

RC309-12 MR Elastography and Liver Fibrosis

Tuesday, Nov. 29 11:20AM - 11:40AM Room: E350

Participants
Frank H. Miller, MD, Chicago, IL, (fmiller@northwestern.edu) (*Presenter*) Research Grant, Siemens AG

LEARNING OBJECTIVES

1) Understand the role of MR elastography in the diagnosis of hepatic fibrosis and cirrhosis. 2) Understand the advantages and limitations of MR elastography. 3) Recognize uncommon causes of elevated stiffness.

ABSTRACT

MR imaging plays in important role in the diagnosis of cirrhosis and hepatic. Invasive biopsy is currently the standard approach to diagnosis and stage liver fibrosis and inflammation. Biopsies however are invasive, prone to sampling error and poor patient acceptance. Magnetic resonance elastography can measure fibrosis-associated changes in liver stiffness. MR elastography is rapid and allows differentiation between the different stages of fibrosis and can be easily added to conventional liver MR examinations. Studies in the literature using MR elastography to assess hepatic fibrosis will be discussed. Comparisons with conventional imaging features of cirrhosis will be described. The role of MR elastography will also be discussed in diagnosing conditions such as nonalcoholic steatohepatitis in patients with nonalcoholic fatty liver disease. Uncommon causes of elevated hepatic stiffness values on MR elastography will be discussed. In addition, challenges faced with MR elastography including iron overload will be discussed.

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Frank H. Miller, MD - 2012 Honored Educator
Frank H. Miller, MD - 2014 Honored Educator

RC309-13 Test-Retest Repeatability of Magnetic Resonance Elastography of Liver-A Meta-Analysis

Tuesday, Nov. 29 11:40AM - 11:50AM Room: E350

Participants
Suraj Serai, PhD, Cincinnati, OH (*Presenter*) Nothing to Disclose
Nancy A. Obuchowski, PhD, Cleveland, OH (*Abstract Co-Author*) Research Consultant, Siemens AG; Research Consultant, QT Ultrasound Labs; Research Consultant, Elucid Bioimaging Inc
Sudhakar K. Venkatesh, MD, FRCR, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;
Patricia E. Cole, MD, PhD, East Hanover, NJ (*Abstract Co-Author*) Nothing to Disclose
Edward Ashton, Pittsford, NY (*Abstract Co-Author*) Officer, VirtualScopics, Inc
Mark Palmeri, MD, PhD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Frank H. Miller, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Siemens AG
Richard L. Ehman, MD, Rochester, MN (*Abstract Co-Author*) CEO, Resoundant, Inc; Stockholder, Resoundant, Inc;

PURPOSE

Magnetic resonance elastography (MRE) is a non-invasive tool for staging liver fibrosis and is suitable for repeated use, to assess disease progression & treatment response. Multiple studies of the test-retest repeatability of MRE have been published. The purpose of this work was to conduct a critical meta-analysis to generate a summary estimate of the repeatability coefficient from these multiple studies. This work was conducted to develop a longitudinal MRE "claim" by the RSNA QIBA MRE workgroup.

METHOD AND MATERIALS

A systematic search of PubMed, EMBASE, SCORPUS, Cochrane, Web of Science, CINAHL and Google scholar databases was performed for publications on MRE during the ten year period 2006-2015 at two major institution libraries. Studies performed on humans & published in English or translations available were included. The following data were extracted: (1) Author, journal and year of publication; (2) within-subject Coefficient of variation (wCV); (3) number of subjects; (4) number of readers; and (5) notes on method used to calculate the wCV. Two reviewers independently determined the percent repeatability coefficient (%RC) and effective sample size from each article. The wCV were recalculated & validated as reported. A forest plot was constructed of the %RC estimates from the various studies. A 95% percentile bootstrap confidence interval (CI) was constructed for the summary %RC.

RESULTS

Library 1 search found 309 articles and library 2 search found 350 articles. Duplicate articles were removed and a list of 450 articles was collected in a single end note library. The identified studies were screened independently and then verified reciprocally by two observers. Twelve studies comprising of 299 patients met the inclusion criteria and were included for analysis. The studies %RC ranged from 10 to 37% (Figure 1). The estimated summary RC was 22.2%, with 95% CI of [16.4 – 27.8].

CONCLUSION

An accurate assessment of the degree of hepatic fibrosis has therapeutic & prognostic implications. The meta-analysis results provide the basis for the following draft longitudinal QIBA MRE claim: a measured change in hepatic stiffness of 22% or greater indicates that a true change in stiffness has occurred with 95% confidence.

CLINICAL RELEVANCE/APPLICATION

Our estimated Meta-analysis summary RC for MRE was 22.2% with 95% CI of [16.4–27.8]. Assuming no change in MRE hardware & software, a measured change exceeding the RC can be considered a true change over time.

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Frank H. Miller, MD - 2012 Honored Educator
Frank H. Miller, MD - 2014 Honored Educator
Richard L. Ehman, MD - 2016 Honored Educator

RC309-14 Comparing the Accuracy of Magnetic Resonance Elastography with that of Liver Biopsy Samples for Diagnosing Liver Fibrosis

Tuesday, Nov. 29 11:50AM - 12:00PM Room: E350

Participants
Hiroyuki Morisaka, MD, Kofu, Japan (*Presenter*) Nothing to Disclose
Utaroh Motosugi, MD, Yamanashi, Japan (*Abstract Co-Author*) Nothing to Disclose
Shintaro Ichikawa, MD, Chuo-Shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Tadao Nakazawa, MD, PhD, Chuo, Japan (*Abstract Co-Author*) Nothing to Disclose
Tetsuo Kondo, MD, PhD, Chuo, Japan (*Abstract Co-Author*) Nothing to Disclose
Masanori Matsuda, MD, Yamanashi, Japan (*Abstract Co-Author*) Nothing to Disclose
Katsuhiro Sano, MD,PhD, Chuo, Japan (*Abstract Co-Author*) Nothing to Disclose
Tomoaki Ichikawa, Hidaka-shi, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Liver biopsy for the staging of liver fibrosis has some clinical concerns: sampling errors, inter-observer variability, and rare but serious complications. Sampling error can happen in the assessment of biopsy specimen, because liver fibrosis is heterogeneous. Therefore, large volume of non-tumorous liver tissue as obtained by surgical resection is necessary for correct staging of liver fibrosis. In this study, we aimed to compare the diagnostic accuracy of magnetic resonance elastography (MRE) and liver biopsy for liver fibrosis staging by using surgically resected liver specimens as a standard of reference.

METHOD AND MATERIALS

This retrospective study included 170 patients with normal liver and chronic liver disease who underwent preoperative MRE on a 1.5 or 3-Tesla clinical MR scanner and subsequent surgical liver resection. Fifty patients, 10 patients each for 5 fibrosis stages (F0-F4) corresponding to the METAVIR scoring system, were used to calculate optimal threshold liver stiffness values (kPa) and mean and standard deviation of liver stiffness in each 5 liver fibrosis stage. Liver biopsy samples were directly obtained from surgically resected liver tissues in the other 120 patients by using an 18-gauge biopsy needle. Liver fibrosis was graded by a pathologist by using Masson trichrome stain. Liver stiffness of the 120 patients was then measured using MRE, and these results were used to make MRE-based fibrosis staging by using the threshold and Bayesian prediction methods. Diagnostic accuracy was determined as the proportion of correct staging of liver fibrosis with use of whole tissue specimens as reference standards. The equivalence in accuracy between liver biopsy samples and the threshold and Bayesian prediction MRE methods within a given range of ± 20% was tested using a modified McNemar's test.

RESULTS

Diagnostic accuracy of liver fibrosis stages were 51.6% [62/120] for liver biopsy samples, 50.8% [61/120] for MRE with threshold method, and 56.6% [68/120] for MRE with the Bayesian prediction method. The diagnostic accuracies of both MRE-based methods were not inferior to that of liver biopsy ($p<0.009$), indicating that diagnostic accuracies of liver biopsy samples and MRE-based methods were statistically similar.

CONCLUSION

MRE provides equal diagnostic accuracy as liver biopsy for staging liver fibrosis.

CLINICAL RELEVANCE/APPLICATION

Liver MRE can be used as an alternative to liver biopsy in clinical practice.

RC331

Tumor Ablation beyond the Liver: Practical Techniques for Success

Tuesday, Nov. 29 8:30AM - 10:00AM Room: S104A

GI IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Debra A. Gervais, MD, Boston, MA (*Presenter*) Nothing to Disclose
Terrance T. Healey, MD, Providence, RI (*Presenter*) Nothing to Disclose
Anil N. Kurup, MD, Rochester, MN, (kurup.anil@mayo.edu) (*Presenter*) Research Grant, Galil Medical Ltd; Royalties, UpToDate, Inc
Muneeb Ahmed, MD, Wellesley, MA, (mahmed@bidmc.harvard.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe indications for tumor ablation in extrahepatic sites. 2) Describe approaches and techniques to help prevent and manage organ specific complications. 3) Review results of tumor ablation in the lung, kidney, and bone.

ABSTRACT

Pulmonary malignancies, and specifically lung cancer, are a leading cause of death worldwide. Utilization of best current therapies results in an overall five-year relative survival rate for all stages combined to be only 15%, necessitating the use of alternative therapies. Image-guided ablation of lung malignancies is a revolutionary concept whose clinical applications are just beginning to be developed. It has some advantages over traditional radiotherapy and chemotherapy. Its safety profile is similar to percutaneous image guided lung biopsy. Almost all image-guided ablative procedures can be performed in an outpatient setting, mostly with conscious sedation. Multiple applications can be performed without any additional risks. Contraindications are few and include uncontrollable bleeding diathesis and recent use of anticoagulants.Image-guided ablation of lung malignancies is performed with two basic rationales. In the first group it is used with an intention of achieving definitive therapy. These are patients who are not candidates for surgery because of co-morbid medical contraindications to surgery, like poor cardiopulmonary reserve or patients refusing to undergo operation. This cohort could potentially derive significant benefit form a minimally invasive alternative therapy. In the second group it is used as a palliative measure as follows: (a) to achieve tumor reduction before chemotherapy (b) to palliate local symptoms related to aggressive tumor growth, such as chest pain, chest wall pain or dyspnea (c) hematogenous painful bony metastatic disease (d) tumor recurrence in patients who are not suitable for repeat radiation therapy or surgery Image-guided ablation is expanding treatment options for the local control of non-small cell lung cancer and metastatic disease.

Honored Educators

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Debra A. Gervais, MD - 2012 Honored Educator

RC352

Liver Elastography (Hands-on)

Tuesday, Nov. 29 8:30AM - 10:00AM Room: E264

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

Richard G. Barr, MD, PhD, Youngstown, OH (*Presenter*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Toshiba Corporation; Research Grant, Esaote SpA; Research Grant, B and K Ultrasound; Research Grant, Hitachi Aloka Ultrasound
Giovanna Ferraioli, MD, Pavia, Italy, (giovanna.ferraioli@unipv.it) (*Presenter*) Speaker, Koninklijke Philips NV; Speaker, Hitachi Ltd; Speaker, Toshiba Corporation
Carlo Filice, MD, Pavia, Italy (*Presenter*) Speaker, Koninklijke Philips NV; Speaker, Hitachi, Ltd ; Research Grant, Bracco Group; Research Grant, Hitachi, Ltd; Research Grant, Toshiba Corporation; Research Grant, Esaote SpA
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Fabrizio Calliada, MD, Pavia, Italy (*Presenter*) Research Grant, Toshiba Corporation; Speakers Bureau Member, Hitachi, Ltd; Speakers Bureau Member, Shenzhen Mindray Bio-Medical Electronics Co, Ltd
Ann E. Podrasky, MD, Coral Gables, FL (*Presenter*) Nothing to Disclose
Michelle L. Robbin, MD, Birmingham, AL (*Presenter*) Consultant, Koninklijke Philips NV;
Nitin G. Chaubal, MD, MBBS, Mumbai, India, (thaneultrasound@gmail.com) (*Presenter*) Nothing to Disclose
Hisham A. Tchelepi, MD, Los Angeles, CA (*Presenter*) Research Grant, General Electric Company; Research Grant, Roper Industries, Inc
Norihisa Yada, Osaka-Sayama, Japan, (yada@med.kindai.ac.jp) (*Presenter*) Nothing to Disclose
Paul S. Sidhu, MRCP, FRCR, London, United Kingdom, (paulsidhu@nhs.net) (*Presenter*) Speaker, Koninklijke Philips NV; Speaker, Bracco Group; Speaker, Hitachi, Ltd; Speaker, Siemens AG
Juergen K. Willmann, MD, Stanford, CA, (willmann@stanford.edu) (*Presenter*) Research Consultant, Bracco Group; Research Grant, Siemens AG; Research Grant, Bracco Group; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company; Advisory Board, Lantheus Medical Imaging, Inc; Advisory Board, Bracco Group
Laura Maiocchi, MD, Pavia, Italy (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Improve basic knowledge and skills relevant to clinical practice in Liver elastography of the participants. 2) Teach how to practice liver elastography. 3) Show live how to do a proper examination, providing tips and triks and updating current knowledge on different techniques. 4) Practical hands-on and slide presentation with key messages will be used.

ABSTRACT

SSG04

Gastrointestinal (CT Technique and Contrast)

Tuesday, Nov. 29 10:30AM - 12:00PM Room: E352

GI BQ CT SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Vahid Yaghmai, MD, Chicago, IL (*Moderator*) Nothing to Disclose
Naveen Kulkarni, MD, Milwaukee, WI (*Moderator*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Moderator*) Nothing to Disclose

Sub-Events

SSG04-01 Fine Focal Spot CT Improves Image Quality in Abdominal CT Imaging

Tuesday, Nov. 29 10:30AM - 10:40AM Room: E352

Participants
Yin P. Goh, MBBS, Clayton, Australia (*Presenter*) Nothing to Disclose
Sidney M. Levy, MBBS, BMedSc, Melbourne, Australia (*Abstract Co-Author*) Nothing to Disclose
Kenneth K. Lau, MBBS, FRANZCR, Melbourne, Australia (*Abstract Co-Author*) Nothing to Disclose
Keat Y. Low, MBBS, FRANZCR, Melbourne, Australia (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

CT tubes usually have two focal-spot sizes, with the finer focal spot providing higher spatial resolution. The aim of this retrospective study is to compare the image quality of the abdominal viscera between fine focal spot size (FFSS) and standard focal spot size (SFSS).

METHOD AND MATERIALS

All contrast-enhanced CT abdomen and pelvis (CTAP) of all adult patients between June and September 2014 were included. Two blinded radiologists assessed the margin clarity of the abdominal viscera and the detected lesions using a 5-point grading scale. Cohen’s kappa test was used to examine the inter-observer reliability amongst the two reviewers for organ margin clarity. Mann-Whitney U test was used to assess the statistical differences of the margin clarity of the abdominal viscera and the detected lesions between the two groups.

CONCLUSION

FFSS improves the image quality in abdominal CT imaging in terms of better organ and lesion margin clarity.

SSG04-02 Effect of Different Reconstruction Algorithms of MDCT Examinations for Quantitative Imaging Features: Comparison with Liver Parenchyma, Focal Liver Lesion and Renal Cyst

Tuesday, Nov. 29 10:40AM - 10:50AM Room: E352

Participants
Su Joa Ahn, Seoul , Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung Hoon Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Sang Joon Park, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joon Koo Han, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine whether different reconstruction algorithms affect quantitative features of CT imaging in liver parenchyma, focal liver lesions and renal cysts.

METHOD AND MATERIALS

We included 300 adult patients (192 men, 108 women; mean age, 58 years) who underwent MDCT with one CT scanner. Among 300 patient, normal liver parenchyma without chronic liver disease nor malignant disease (n=200), well circumscribed focal liver lesion (n=100; 81 metastases, 9 hepatocellular carcinoma, 6 hemangioma, 4 hepatic abscess), and renal cysts larger than 1cm (n=34) were included. All CT images were reconstructed with filtered back projection (FBP), adaptive statistical iterative reconstruction (IRT), and iterative model reconstruction (IMR) algorithms. Computerized texture analysis was performed by extracting 16 quantitative imaging features including histographic parameter (mean attenuation, standard deviation, skewness, kurtosis, entropy, homogeneity), volumetric parameter (volume, effective diameter, surface area) , and morphologic features (sphericity, discrete compactness, GLCM moments, GLCM ASM, GLCM IDM, GLCM Contrast, GCLM entropy) using semi-automatic segmentation of target lesions.

RESULTS

Different reconstruction algorithms had a significant effect on quantitative imaging features. IMR had more significant effect on than IRT. IRT had a significant effect on five, eight, and three of the features for liver parenchyma, focal liver lesion, and renal cysts ($P < .005$), whereas IMR had a significant effect on seven, 11, and five of the features for respectively ($P < .005$). Focal liver lesion had more significant effect on different reconstruction algorithms (eight on IRT, 11 on IMR) than liver parenchyma (five on IRT, seven on IMR) or renal cysts (three on IRT, five on IMR). Although quantitative imaging features were significantly affected by different reconstruction algorithms, the volumetric features did not effect on reconstruction algorithm ($p > .03$).

CONCLUSION

Different reconstruction algorithms affect quantitative features of CT imaging. In focal liver lesion, reconstruction algorithms show

Different reconstruction algorithms affect quantitative features of CT imaging. In focal liver lesion, reconstruction algorithms show more significant effect on the quantitative features than liver parenchyma or renal cysts.

CLINICAL RELEVANCE/APPLICATION

Because of different reconstruction algorithms affect quantitative features of CT imaging, imaging quantification using uniform reconstruction algorithms would be increased their reliability level.

SSG04-03 Sub-Second High-Pitch Abdominopelvic CT Angiography With Ultra-Low Dose Contrast Media (<30 mL) at 80kV: A Feasibility Study

Tuesday, Nov. 29 10:50AM - 11:00AM Room: E352

Awards
Student Travel Stipend Award

Participants
Faezeh Sodagari, MD, Chicago, IL (*Presenter*) Grant, Siemens AG
Alan L. Goodwin, RT, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Jeremy D. Collins, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Vahid Yaghmai, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate homogeneity of vascular enhancement and image quality in sub-second high-pitch abdominopelvic CT angiography (CTA) with ultra-low dose contrast media at 80 kV.

METHOD AND MATERIALS

In this HIPAA-compliant IRB-approved prospective study, twelve patients underwent high-pitch sub-second abdominopelvic CTA at 80kV with ultra-low dose (<30 mL) of non-ionic iodinated contrast media (iopamidol 370) in a large academic institution. All scans were performed using third generation dual source CT scanner. The homogeneity of the intravascular contrast attenuation at suprarenal aorta, infrarenal aorta, and right common iliac artery was assessed. Image noise, contrast-to-noise ratio, and signal-to-noise ratio were measured to assess the objective image quality. Subjective image quality was evaluated on a 5-point scale (1 = unacceptable; 5 = excellent). Volume CT dose index (CTDIvol) was extracted from dose reports to assess radiation dose. Repeated-measures analysis of variances was used for data analysis. Significance was set at 0.05.

RESULTS

Six men and 6 women with the mean ± standard deviation (SD) age of 64.2 ± 13 years and the mean weight of 75.8 ± 16.2 kg were included in this study. The patients received 15 to 28 mL of contrast with a mean of 20 ± 3.4 mL. The mean CTDIvol was 3.8 ± 1.1 mGy. Mean CNR and SNR were 9.2 ± 4.9 and 9.9 ± 4.1, respectively. Mean image noise was 24.4 ± 5.0 Hounsfield units (HU). All images had diagnostic image quality with the median subjective image quality score of 4 (Good). The contrast attenuation was homogeneous across suprarenal aorta, infrarenal aorta, and right common iliac artery levels with the mean attenuation of 228.6 ± 74.3, 249.3 ± 59.7, and 249.2 ± 56.1 HU, respectively (P = 0.16).

CONCLUSION

Abdominopelvic CTA with ultra-low dose (<30 mL) contrast at 80kV is technically and clinically feasible with good diagnostic image quality and homogenous attenuation across vascular levels.

CLINICAL RELEVANCE/APPLICATION

This study shows the potential for reducing the contrast dose to as low as 15 mL for high-pitch abdominopelvic CT angiography at 80kV. This may have clinical implications in abdominopelvic CT angiography in patients with renal impairment.

Honored Educators

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Vahid Yaghmai, MD - 2012 Honored Educator
Vahid Yaghmai, MD - 2015 Honored Educator

SSG04-04 Low-kV CT Can Reduce the Frequency of Acute Adverse of Intravenous Iodine Contrast Medium

Tuesday, Nov. 29 11:00AM - 11:10AM Room: E352

Participants
Tomoki Maebayashi, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Satoru Takahashi, MD, Suita, Japan (*Presenter*) Nothing to Disclose
Tatsuya Nishii, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Atsushi K. Kono, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Noriyuki Negi, RT, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Kiyosumi Kagawa, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Erina Suehiro, RT, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Wakiko Tani, RT, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Toshinori Sekitani, MS, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Hideaki Kawamitsu, MD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuro Sugimura, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, Eisai Co, Ltd Research Grant, DAIICHI SANKYO Group

PURPOSE

Acute adverse reactions of CM are either allergy-like reactions or physiologic reactions. Although dose and concentration of CM

unlikely affect allergic-like contrast reactions, physiologic reactions (chemotoxic or osmotoxic reactions) are often dose and concentration dependent. Because recently introduced low-kV CT has enabled the reduction of contrast dosage in daily clinical practices, the incidence of acute adverse events would decrease in low-kV post-contrast body CT (CECT).The purpose of this retrospective study was to compare the incidence of acute adverse events in low-kV CT with reduced CM and conventional CT with full-dose CM.

METHOD AND MATERIALS

Routine CECT in 3rd generation dual-source CT has been acquired at 70 kV with 60% dose of 270 mgI/Kg CM (70 kV protocol), while in remaining scanners it has been acquired at 120 kV with a standard dose of 450 mgI/Kg CM (120 kV protocol) in our institution. Because injection duration and scan delay time are fixed for routine CECT, iodine deliver rate at 70 kV protocol is also 60% of 120 kV protocol. Between January 20, 2015 and February 26, 2016, contrast reaction reports and medical records of patients were reviewed.

RESULTS

1,317 patients underwent with 70 kV protocol, while 4,234 with 120 kV. Mean body weight in 70 kV protocol was smaller than 120 kV protocol ($p<.001$). Mean injection dose and rate of CM for 70 kV protocol (50.6±9.4 mL, 1.1±0.2 mL/sec) were significantly smaller than those for 120 kV protocol (82.1±15.2 mL, 1.8±0.3 mL/sec), respectively ($p<.001$).Among all 5,551 patients, allergic-type reactions occurred in 64 (1.15%) of patients, while physiologic reaction in 28 (0.50%): 86 (93%) reactions were mild and 6 (7%) were moderate. Seven (0.52%) patients showed allergic-type reactions in 70 kV protocol, while 57 (1.35%) in 120 kV protocol ($p<.05$; $\chi 2$). Three (0.22%) patients demonstrated physiologic reaction in 70 kV protocol, while 25 (0.59%) in 120 kV protocol ($p=.16$; $\chi 2$).

CONCLUSION

Low kV CT with reduced CM injection may decrease the incidence of acute adverse events, especially allergic-like reaction.

CLINICAL RELEVANCE/APPLICATION

Although further larger prospective study is essential, reduced CM dosage with low-kV CT may reduce the chance of adverse events.

SSG04-05 Prospective Evaluation of Reduced Dose Computed Tomography for the Detection of Low-contrast Liver Lesions: Direct Comparison with Concurrent Standard Dose Imaging

Tuesday, Nov. 29 11:10AM - 11:20AM Room: E352

Awards
Student Travel Stipend Award

Participants
B. Dustin Pooler, MD, Madison, WI (*Presenter*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
David H. Kim, MD, Middleton, WI (*Abstract Co-Author*) Consultant, Viatronix, Inc; Co-founder, VirtuoCTC, LLC; Medical Advisory Board, Digital ArtForms, Inc; Stockholder, Cellectar Biosciences, Inc
Oliver T. Chen, MD, Frederick, MD (*Abstract Co-Author*) Nothing to Disclose
Ke Li, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Guang-Hong Chen, PhD, Madison, WI (*Abstract Co-Author*) Research funded, General Electric Company Research funded, Siemens AG
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV

PURPOSE

To prospectively compare diagnostic performance of reduced-dose (RD) contrast-enhanced CT (CECT) with standard-dose (SD) CECT for detection of low-contrast liver lesions.

METHOD AND MATERIALS

70 adults with non-liver primary malignancies underwent abdominal SD-CECT immediately followed by RD-CECT, aggressively targeted at 60-70% dose reduction. SD series were reconstructed using FBP. RD series were reconstructed with FBP, ASIR, and MBIR. Three readers—blinded to clinical history and comparison studies—reviewed all series, identifying liver lesions ≥4 mm. Non-blinded review by two experienced abdominal radiologists—assessing SD against available clinical and radiologic information—established the reference standard.

RESULTS

RD-CECT mean effective dose was 2.01±1.36 mSv (median, 1.71), a 64.1±8.8% reduction. Pooled per-patient performance data were (sensitivity/specificity/PPV/NPV/accuracy) 0.91/0.78/0.60/0.96/0.81 for SD-FBP, compared with RD-FBP 0.79/0.75/0.54/0.91/0.76; RD-ASIR 0.84/0.75/0.56/0.93/0.78; and RD-MBIR 0.84/0.68/0.49/0.92/0.72. ROC AUC values were 0.896/0.834/0.858/0.854 for SD-FBP/RD-FBP/RD-ASIR/RD-MBIR, respectively. RD-FBP ($P=0.005$) and RD-MBIR ($P=0.047$) AUC were significantly lower than SD-FBP; RD-ASIR was not ($P=0.084$). Reader confidence was lower for all RD series ($P<0.001$) compared with SD-FBP, especially when calling patients entirely negative.

CONCLUSION

Aggressive CT dose reduction resulted in inferior diagnostic performance and reader confidence for detection of low-contrast liver lesions compared to SD. Relative to RD-ASIR, RD-FBP showed decreased sensitivity and RD-MBIR showed decreased specificity.

CLINICAL RELEVANCE/APPLICATION

Aggressive CT dose reduction may result in mischaracterization of low-contrast liver lesions at contrast-enhanced CT, including both false positive and false negative casese.

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Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
Perry J. Pickhardt, MD - 2014 Honored Educator

SSG04-06 Contrast Agent Dose Reduction in Combination with Low-Tube Voltage and Adaptive Statistical Iterative Reconstruction Algorithm in CT Enterography: Effect on Image Quality and Radiation Dose

Tuesday, Nov. 29 11:20AM - 11:30AM Room: E352

Participants
Cui Feng, MD , Wuhan, China (*Presenter*) Nothing to Disclose
Zhen Li, MD, PhD, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of the study was to investigate the image quality and radiation exposure of contrast enhanced CT enterography with low-tube-voltage, low-concentration contrast agent combined with adaptive statistical iterative reconstruction (ASIR).

METHOD AND MATERIALS

From October 2015 to February 2016,137 patients (65 female,72 male,mean age 54±14years) underwent contrast enhanced CT enterography using a 64-slice MDCT scanner (Discovery CT750 HD,GE Healthcare,USA).All the cases were randomly assigned into two groups.Group A (n=79) were examined on CT with low-tube-voltage according to BMI (BMI<23kg/m2, 80-kVp; BMI≥23kg/m2,100-kVp),and low-concentration contrast agent (270mgI/mL).The raw data were reconstructed with standard filtered back projection (FBP) and 50%ASIR respectively.Group B (n=58) underwent conventional CT at 120-kVp,350 mgI/mL contrast agent with FBP.The CTDIvol, DLP were recorded,effective dose(ED) and total contrast medium dosage were calculated and compared. The CT value,SNR,CNR of the bowel wall, gastrointestinal lesions,mesenteric vessel were assessed and compared statistically.The subjective image quality was assessed by two radiologist using five-point Likert scale(1=poor;2=acceptable;3=moderate;4=good;5=excellent).

RESULTS

There were 63 gastrointestinal cancers,21 gastrointestinal inflammation proved pathologically by surgery or endoscopy.Compared with group B,CTDIvol,ED,DLP and total iodine contrast medium dosage in group A were decreased by 25.2%,25.7%,25.7%,26.07% respectively.The average qualitative image quality score of FBP image of group A(4.02±0.39),50% ASIR image of group A(4.02±0.37) were lower than FBP image of group B (4.21±0.55),the difference was not statistically significant(P>0.05).SD of 50%ASIR image of group A was significantly lower than FBP image of group A (13.18+2.687 vs.15.69±3.60,p<0.001).CT value,CNR and SNR were significantly higher in SMA,SMV,gastrointestinal lesions in 50 % ASIR image of group A (P<0.05).

CONCLUSION

Compared with conventional protocol,CT enterography performed at low tube voltage and low-concentration contrast agent combined with 50% ASIR produced diagnostically acceptable image quality with a mean ED of 6.34 mSv and a total iodine dose reduction of 26.07%.

CLINICAL RELEVANCE/APPLICATION

Contrast agent dose reduction ,low tube voltage with ASIR is feasible in contrast enhanced CT enterography,reduce the radiation dose and the risk of contrast induced nephrology (CIN), without impairment of image quality.

SSG04-07 Reduction of Patient Radiation Dose with a New Organ based Dose Modulation Technique for Chest Abdomen Pelvis CT

Tuesday, Nov. 29 11:30AM - 11:40AM Room: E352

Participants
Marie Fillon, MD, Lyon, France (*Presenter*) Nothing to Disclose
Philippe Coulon, PhD, Suresnes, France (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Salim Si-Mohamed, Bron, France (*Abstract Co-Author*) Nothing to Disclose
Aurelie Vuillod, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
Paul Klahr, PhD, Cleveland, OH (*Abstract Co-Author*) Researcher, Koninklijke Philips NV
Loic Boussel, MD, Lyon, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

In a single scan for chest, abdomen and pelvis (CAP) CT, using standard Automatic Exposure Control (AEC), the requirement for contrast resolution in the liver is setting the target image quality for the whole scan, and, as a result, the radiation dose. The purpose of this study was to evaluate dose reduction and image quality resulting from a new organ based dose modulation system allowing setting different image quality in the liver than in the chest and the pelvis.

METHOD AND MATERIALS

Our retrospective study included 37 patients who had CAP CT scans for oncology follow up in less than a year time difference, on 2 scanners, one using standard AEC (Standard AEC) and one using new Liver DoseRight Index organ based dose modulation system (Liver DRI). For each acquisition, average Water Equivalent Diameter (WED), CT Dose Index (CTDI) and Size-Specific Dose Estimates (SSDE) were calculated for the total scan and for lung, breast, liver and pelvis area. Signal to Noise Ratio (SNR) was measured in the muscle at each anatomic level and diagnostic confidence was evaluated by 2 radiologists. Quantitative and qualitative variables were compared using respectively paired t-test and Wilcoxon signed rank tests with Bonferroni correction.

RESULTS

While no significant WED difference was observed between the two scans (all p-values > 0.05), patient radiation dose was

While no significant WED difference was observed between the two scans (all p-values > 0.05), patient radiation dose was significantly reduced with Liver DRI compared to Standard AEC (all p-values <0.01) in the total scan, lung, breast and pelvis area, with a CTDI reduction of respectively 26.9%, 22.6%, 24.0% and 30.6% and a SSDE reduction of 23.2%, 20.5%, 22.6% and 28.7%. There was no significant dose reduction (p>0.08) in the liver area. SNR reduction was only significant (p<0.02) in the pelvis (4.2±1.2 vs 5.2±1.7). There was no significant difference (p>0.05) in diagnostic confidence between the 2 types of scan, in any of the anatomic regions with a good inter-observers correlation (kappa=0.72).

CONCLUSION

Liver DoseRight Index organ based dose modulation technique allows significant dose reduction compared to standard AEC while preserving diagnostic image quality in all CAP body areas.

CLINICAL RELEVANCE/APPLICATION

Liver DoseRight Index organ based dose modulation technique allows an optimization of dose and image quality in the different body areas individually and thus decreases the total radiation exposure in Chest Abdomen Pelvis CT.

SSG04-09 Photon-Counting-Detector CT for the Evaluation of Non-contrast Enhanced Abdominal Imaging in Patients

Tuesday, Nov. 29 11:50AM - 12:00PM Room: E352

Awards
Trainee Research Prize - Fellow

Participants
Roy Marcus, MD, Rochester, MN (*Presenter*) Institutional research agreement, Siemens AG; Research support, Siemens AG
Joel G. Fletcher, MD, Rochester, MN (*Abstract Co-Author*) Grant, Siemens AG; ;
Shannon P. Sheedy, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Jeff L. Fidler, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Zhoubo Li, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Zhicong Yu, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Felicity Enders, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Ahmed Halaweish, PhD, Rochester, MN (*Abstract Co-Author*) Employee, Siemens AG
Cynthia H. McCollough, PhD, Rochester, MN (*Abstract Co-Author*) Research Grant, Siemens AG

PURPOSE

To assess in patients the overall clinical image quality of routine unenhanced abdominal CT on a preclinical photon-counting-detector CT (PCCT) compared to the conventional CT using energy integrating detectors.

METHOD AND MATERIALS

Thirty patients received a routine unenhanced exam of the abdomen on a commercial 2nd generation dual-source CT (SOMATOM Flash, Siemens Healthcare) in dual energy mode (DECT). DECT scans were acquired using 80/140Sn kV or 100/140Sn kV, dependent on patient size. PCCT scans were acquired at 140 kV in macro-mode with energy thresholds set at 25 and 75 keV. CTDIvol values were matched between exams. 5 mm slices at 2.5 mm interval with reconstructed for both scanners using filtered back projection and a D30 kernel. Low threshold PCCT images (25–140 keV) and mixed DECT (mDECT) images were evaluated by 3 abdominal radiologists in a blinded side-by-side comparison. After evaluating solid and hollow abdominal organs, readers independently selected one of the datasets as their preference according to a 2-point scale (1=preferred but no effect on diagnostic confidence; 2=definitely preferred and resulted in improved diagnostic confidence); ties were not allowed. Overall preference was decided by a majority rules criterion. Patient size was recorded as diameter at the level of the right renal vein.

RESULTS

There was no overall preference regarding the subjective image quality for routine unenhanced abdominal CT (16 cases preferred for PCCT vs. 14 cases for mDECT). On a per reader basis, the preference showed a nonsignificant trend towards PCCT (p= 0.28). Subjective image preference was not patient size dependent (p=0.81).Both modalities performed equally in displaying small structures and parenchymal lesions, such as para aortal lymph nodes or parenchymal masses. However PCCT was beneficial in better demarcating small low attenuation structures such as biliary and pancreatic ducts, and reducing the osseous blooming effect.

CONCLUSION

No difference was found in image quality between PCCT images and conventional DECT mixed images for non-enhanced abdominal CT. PCCT appears promising for displaying small low attenuation structures. Patient's size did not influence reader preference.

CLINICAL RELEVANCE/APPLICATION

PCCT has previously been shown to offer improved contrast-to-noise ratio for iodine imaging. This study demonstrated clinical benefit for unenhanced imaging as well.

GIS-TUA

Gastrointestinal Tuesday Poster Discussions

Tuesday, Nov. 29 12:15PM - 12:45PM Room: GI Community, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
Rajan T. Gupta, MD, Durham, NC (*Moderator*) Consultant, Bayer AG; Speakers Bureau, Bayer AG; Consultant, Koninklijke Philips NV; Consultant, Halyard Health, Inc; Consultant, Siemens AG

Sub-Events

GI371-SD-TUA1 When Size Matters: Achieving Better Interreader Agreement with a Modified LIRADS Algorithm in the Diagnosis of Hepatocellular Carcinoma

Station #1

Participants
Anton S. Becker, Zurich, Switzerland (*Presenter*) Nothing to Disclose
Borna Barth, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Olivio Donati, MD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Erika J. Ulbrich, MD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Christoph A. Karlo, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Caecilia S. Reiner, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Michael A. Fischer, MD, Stockholm, Sweden (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

LiRads is a standardized reporting system for liver lesions. Although providing excellent diagnostic performance, interreader agreement is only moderate at best. We propose a simplified LiRads decision tree for indeterminate or likely malignant lesions to improve interreader agreement while maintaining diagnostic performance for HCC.

METHOD AND MATERIALS

MRI scans of 104 liver lesions were retrospectively selected and stratified for LiRads grades (LR1-5). Histopathology and imaging follow up served as standard of reference. Previous exams were provided to readers if available. Four independent and blinded radiologists categorized all lesions as benign (LR1-2) or potentially malignant (LR3-5), determined the primary LiRads based imaging features lesion size, arterial enhancement, wash-out, capsule-like enhancement and threshold growth for LR3-5 lesions and timed their readouts. LR3-5 lesions were classified according to LiRads v.2014-C and to a modified LiRads (mLiRads) algorithm. Diagnostic performance and Interreader agreement were determined for LiRads and mLiRads using receiver operating characteristics (ROC) and Fleiss' and Cohen's Kappa analysis respectively.

RESULTS

Diagnostic performance for LiRads and mLiRads was equal with an area under the receiver-operator curve of 0.91. Feature-wise interreader agreement was better for lesions ≤ 2 cm for arterial enhancement (0.61 ± 0.13 vs. 0.37 ± 0.18), washout (0.48 ± 0.13 vs. 0.33 ± 0.18), and threshold growth (0.44 ± 0.13 vs. 0.13 ± 0.18). Interreader agreement was higher using mLiRads as compared to current LiRads showing an improved overall (κ = 0.53±0.04 vs. 0.45±0.04), and pair-wise agreement between most readers (κ range 0.42-0.67 vs. 0.35-0.60) at a reduced evaluation time (median 44 vs. 62 sec/lesion, $p<0.0001$).

CONCLUSION

Giving lesion size and washout-behaviour more weight in a simplified, stepwise LiRads algorithm for LR3-5 lesions results in higher interobserver reliability and faster classification while maintaining diagnostic accuracy.

CLINICAL RELEVANCE/APPLICATION

Evaluation of HCC-suspect liver lesions using LiRads may be simplified for higher interreader agreement at preserved diagnostic performance.

GI373-SD-TUA3 Can Extra-Mural Vascular Invasion on MRI Rectum Predict Development of Liver Metastases in Rectal Cancer?

Station #3

Awards
Student Travel Stipend Award

Participants
Barry Hutchinson, MBBCh, MRCS, Galway, Ireland (*Presenter*) Nothing to Disclose
Jeeban-Paul Das, MBBS, MRCPI, Galway, Ireland (*Abstract Co-Author*) Nothing to Disclose
Declan G. Sheppard, MD, Galway, Ireland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The MRI features of extramural vascular invasion (EMVI) in rectal cancer have been well-described and are an independent predictor of poor prognosis and synchronous hepatic metastases. The correlation between EMVI and development of hepatic/distant metastases in patients who were M0 at initial staging has not been well-described. The purpose of this study was to review the MRI findings of a large cohort of patients with rectal cancer for EMVI to look for an association between those who

do and don't go on to develop hepatic/distant metastases.

METHOD AND MATERIALS

The pre-operative MRI rectum studies of 150 patients with histologically-proven adenocarcinoma of rectum, <15 cm from the anus were reviewed. Studies were assessed for the presence of EMVI, as evidenced by the presence of: Increased vessel caliber, increased signal within the lumen, mural thickening/irregularity or visible extension of tumor into an adjacent vessel. The T staging, overall tumor length, enlarged lymph nodes and involvement of the circumferential resection margin (CRM) were also recorded. All staging studies were reviewed for the presence of hepatic and distal solid organ metastases. Measure of correlation was assessed using a Chi-square test.

RESULTS

16 patients were excluded as they had no follow-up staging. Mean age was 66 +/- 11 years and median tumor length was 50 mm. The radiological T staging was T1 in 8 patients, T2 in 43, T3 in 73 and T4 in 10 patients. 44/134 (32.8%) demonstrated MRI features of EMVI. Enlarged or abnormal lymph nodes were reported in 109 (81.3%) and involvement of the CRM in 26/134 (19.4%). 20 patients (14.9%) were diagnosed with synchronous metastases and a further 23 patients (17.2%) developed hepatic/distant metastases on follow-up CT staging (median follow-up time of 26 months). EMVI was demonstrated in 9/11 (45%) with synchronous metastases, 12/23 (52.2%) of those who subsequently developed metastases and 21/43 (48.8%) of all patients with metastases (p= 0.007, 0.08, 0.01). Involvement of the CRM was found to be significant for presence of synchronous metastases (p=0.04). Age, tumor length and MRI nodal status showed no correlation with metastases.

CONCLUSION

The presence of EMVI was found to be the only significant independent predictor of interval development of metastatic disease in patients with rectal cancer in this study.

CLINICAL RELEVANCE/APPLICATION

EMVI detected on MRI in rectal cancer can be a predictor of metastases.

GI374-SD-TUA4 Diagnostic Accuracy of R2* as a Noninvasive Biomarker for Hepatic Iron Concentration

Station #4

Participants
Adrija Mamidipalli, MBBS, San Diego, CA (*Presenter*) Nothing to Disclose
Jonathan C. Hooker, BS, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Gavin Hamilton, PhD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Tanya Wolfson, MS, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Curtis N. Wiens, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Nathan Artz, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Alan B. McMillan, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Santiago Horgan, MD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Michael S. Middleton, MD, PhD, San Diego, CA (*Abstract Co-Author*) Consultant, Allergan plc Institutional research contract, Bayer AG Institutional research contract, sanofi-aventis Group Institutional research contract, Isis Pharmaceuticals, Inc Institutional research contract, Johnson & Johnson Institutional research contract, Synageva BioPharma Corporation Institutional research contract, Takeda Pharmaceutical Company Limited Stockholder, General Electric Company Stockholder, Pfizer Inc Institutional research contract, Pfizer Inc
Scott B. Reeder, MD, PhD, Madison, WI (*Abstract Co-Author*) Institutional research support, General Electric Company Institutional research support, Bracco Group
Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;

PURPOSE

The purpose of this study was to estimate the accuracy and identify the diagnostic cutoff of R2* to diagnose hepatic iron overload in adults with nonalcoholic fatty liver disease (NAFLD), using contemporaneous percutaneous liver biopsy as the reference standard

METHOD AND MATERIALS

In this prospective, cross-sectional study, fifty-three adults with NAFLD, without suspicion for hepatic iron overload, and undergoing standard-of-care percutaneous liver biopsy had 3T MR exams within three days of biopsy. Each exam included low-flip-angle, multi-echo magnitude (M)- and complex (C)-based MRI with spectral modeling of fat to generate hepatic R2* parametric maps. For each method (M- and C-MRI), regions of interest (ROIs) were placed on the R2* maps in each of the nine Couinaud liver segments, and average whole-liver R2* values were calculated. Demographics (BMI, age, sex) were collected. Biopsy was the reference standard for the presence and degree of iron overload, scored using a standard hepatic iron grading system. Receiver operating characteristics (ROC) analyses were performed and diagnostic parameters at the Youden-index-based cutoffs computed for each method

RESULTS

Nine subjects had biopsy-proven iron overload with iron grades of 1 or 2; R2* values ranged from 44 to 112 s-1 (mean 76 s-1) for M-MRI and 39 to 129 s-1 (mean 75 sec-1) for C-MRI. Forty-four subjects had biopsy-proven absence of iron overload; R2* ranged from 27 to 96 s-1 (mean 49 s-1) for M-MRI and 25 to 119 s-1 (mean 44 s-1) for C-MRI. Areas under ROC curves were 0.82 and 0.85 for M-MRI and C-MRI, respectively. Youden-based cutoffs and their corresponding sensitivities/specificities were 59.5 s-1 and 67%/80% for M-MRI, and 57 s-1 and 78%/84% for C-MRI

CONCLUSION

R2* estimated by M- and C-MRI provides reasonable accuracy to diagnose unsuspected iron overload in NAFLD. At 3T, R2* values greater than 43 s-1 for M-MRI, and greater than 38 s-1 for C-MRI suggest the diagnosis. These cutoffs are lower than reported previously using non-histology reference standards

CLINICAL RELEVANCE/APPLICATION

Our findings support that R2* estimated at 3T by M-MRI and C-MRI can diagnose unsuspected iron overload in adults with NAFLD;

Our findings support that R2* estimated at 3T by M-MRI and C-MRI can diagnose unsuspected iron overload in adults with NAFLD; C-MRI had a slightly higher accuracy than M-MRI

GI377-SD-TUA7 Quantification of Dual-Energy CT Iodine Uptake in Hepatic Metastases Using a Novel Volumetric Segmentation

Station #7

Participants
Katharina Stella Winter, Munich, Germany (*Presenter*) Nothing to Disclose
Julian Holch, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Markus Haindl, BS, Muenchen, Germany (*Abstract Co-Author*) Nothing to Disclose
Martin U. Sedlmair, MS, Forchheim, Germany (*Abstract Co-Author*) Employee, Siemens AG
Melvin D'Anastasi, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Florian Schwarz, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Thorsten R. Johnson, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Christoph G. Trumm, MD, Munich, Germany (*Abstract Co-Author*) Speaker, Siemens AG
Maximilian F. Reiser, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Wieland H. Sommer, MD, Munich, Germany (*Abstract Co-Author*) Founder, QMedify GmbH

PURPOSE

With its unique capability to quantify absolute iodine uptake, dual-energy CT has the potential to reveal considerable diagnostic information about vascularity and viability of hepatic metastases – however, there currently is no consensus on how to measure absolute iodine uptake within metastatic tissue. Our aim was to compare interobserver agreement of a novel tool for 3D-segmentation to quantify iodine uptake in hepatic colorectal metastases with conventional 2D-measurements.

METHOD AND MATERIALS

Seventy-five consecutive patients with a total of 222 hepatic metastases from colorectal cancer who had undergone Dual-Energy CT of the abdomen (140kVp plus Tin-Filter at 155mAs and 100kVp at 200mAs) were included. For semiautomatic segmentation and VOI-based quantification of specific iodine uptake (mgl/cm³) of all hepatic metastases, a novel software prototype was used by two independent observers. At an interval of four weeks, both observers also used manual 2D-ROI-measurements on 3.0mm slices to quantify specific iodine uptake on a representative slice for each metastasis. To account for the clustering of metastases within patients, linear regression with random effects was used for calculating correlations. Intra-class-correlation coefficient was compared between the two methods.

RESULTS

The two methods showed high correlation in iodine uptake of metastases ($r=0.85$, $p<0.01$). However, 3D VOI-based quantification of iodine uptake yielded systematically higher values than 2D ROI-based assessment (1.2±0.48 mgI/cm³ vs. 1.05±0.51 mgI/cm³, $p<0.05$). Interobserver agreement for the 3D-VOI-based approach was significantly higher than for 2D ROI-based measurements ($r=0.99$ vs. $r=0.88$, $p<0.01$).

CONCLUSION

For the assessment of specific iodine uptake in hepatic metastases, 3D VOI-based shows a significantly higher interobserver agreement than the conventional 2D-approach. Assuming that the 3D VOI-based quantification is more accurate, our results indicate that conventional 2D-approaches underestimate iodine uptake.

CLINICAL RELEVANCE/APPLICATION

In patients with colorectal liver metastases, the novel 3D VOI-based method produces more reliable results and might therefore become a valuable tool for an improved therapy response evaluation.

GI378-SD-TUA8 Validation of Clinical Scoring System SNACOR (Tumor Size and Number, Baseline Alpha-fetoprotein, Child-Pugh and Objective Radiological Response) after TACE of HCC

Station #8

Participants
Roman Kloeckner, MD, Mainz, Germany (*Presenter*) Nothing to Disclose
Aline Maehringer-Kunz, MD, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael B. Pitton, MD, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Christoph Dueber, MD, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Irene Schmidtmann, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose
Arndt Weinmann, Mainz, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Transarterial Chemoembolization (TACE) is the standard of care for intermediate stage hepatocellular carcinoma (HCC). Deciding to what extent treatment should be repeated remains challenging. Therefore, we performed an external validation of the recently published SNACOR risk prediction model.

METHOD AND MATERIALS

933 patients with HCC underwent TACE at our institution from 01/2000 to 09/2015. All variables needed to calculate the SNACOR (at baseline: tumor Size and Number, baseline Alpha-fetoprotein, Child-Pugh and after the first TACE Objective radiological Response) were determined. The score could range from 0 - 10 points. Overall survival was calculated for a low (0-2 points), intermediate (3-6 points), and high risk (7-10 points) group. Furthermore, Harrell´s C-index and the integrated Brier score (IBS) were calculated. Cox regression was performed in order to identify independent predictors of survival.

RESULTS

256 patients were finally included. The final evaluation date was the 31st of December 2015, by then 216 patients had been deceased and 40 were censored. Low, intermediate, and high SNACOR scores predicted median survivals of 24.9, 17.3, and 8.1

months, respectively. Harrell´s C-index was 0.562 and IBS was 0.130. Baseline Child-Pugh and Alpha-fetoprotein as well as objective radiological response after the first TACE were independent predictors of survival (all p<0.05). Tumor size and tumor number were no additional independent predictors for survival.

CONCLUSION

The SNACOR risk prediction model is able, after the first TACE, to identify patients with a dismal prognosis which are unlikely to benefit from further TACE. Nonetheless, Harrell´s C-index showed only a moderate performance.

CLINICAL RELEVANCE/APPLICATION

This risk prediction model tends to overly simplify clinical decision-making as this is usually based on a greater number of variables. Accordingly, this risk prediction model can only serve as one of several components in forming the decision whether the treatment should be repeated. Further research is needed to more reliably identify patients who may benefit from further TACE sessions.

GI119-ED-TUA9 An Approach to the Diagnosis of Focal Liver Masses with CEUS

Station #9

Awards
Magna Cum Laude
Identified for RadioGraphics

Participants
David P. Burrowes, MD, Calgary, AB (*Presenter*) Nothing to Disclose
Alexandra Medellin-Kowalewski, MD, Calgary, AB (*Abstract Co-Author*) Nothing to Disclose
Alison C. Harris, MBChB, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Laurent Milot, MD, MSc, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Stephanie R. Wilson, MD, Calgary, AB (*Abstract Co-Author*) Equipment support, Siemens AG; Equipment support, Koninklijke Philips NV

TEACHING POINTS

Diagnosis of focal liver masses with CEUS has similar algorithms to those for CT and MR based on enhancement in the arterial, portal, and delayed phases of contrast enhancement.Differentiation of benign and malignant disease is initially achieved by assessing enhancement in the portal venous phase.Malignant tumors are characterized by washout, a reduction of the enhancement of a region of interest to less than the adjacent liver parenchyma, following initial enhancement. Washout raises the possibility of malignant disease. Timing and intensity of washout differentiate malignant disease as hepatocellular or nonhepatocellular in origin. Sustained enhancement in the portal venous and delayed phase is supportive of benignancy.Benign tumors, hemangioma, focal nodular hyperplasia, and adenoma have specific and suggestive arterial phase vascular morphology, well shown with the high temporal resolution of dynamic real-time CEUS.Malignant tumors have more variable arterial phase enhancement on CEUS, making it less helpful for specific diagnoses..

TABLE OF CONTENTS/OUTLINE

An Approach to diagnosis with CEUSWashout – its significance.Washout – variations of intensity and timingSpecific AP enhancement morphology of benign liver tumorsMalignant enhancement characteristics on CEUS

RCC33

Computer-Aided Diagnosis: Effective Use of Computer-Aided Diagnose in Clinical Practice

Tuesday, Nov. 29 12:30PM - 2:00PM Room: S501ABC

BR CH GI IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Hiroyuki Yoshida, PhD, Boston, MA, (yoshida.hiro@mgh.harvard.edu) (*Moderator*) Patent holder, Hologic, Inc; Patent holder, MEDIAN Technologies;

LEARNING OBJECTIVES

Learn about 1) the best uses of CAD in clinical practice, 2) current and upcoming reading paradigms for clinical use, 3) strengths and weaknesses of CAD systems, 4) characteristics and pitfalls of CAD prompts, 5) how to best incorporate CAD results into the diagnostic decision-making process.

ABSTRACT

Computer-aided diagnosis (CAD) has become a standard tool in diagnostic radiology. This refresher course will explain and demonstrate how to use three widely available CAD systems--breast CAD, lung CAD, and colon CAD--effectively in clinical practice. The purpose of CAD is to improve radiologists' diagnostic accuracy. A number of CAD systems have been made commercially available in the United States and worldwide, including CAD for the detection of breast cancer on mammograms and breast tomosynthesis, detection of lung nodules on chest radiographs and on thoracic CT, as well as detection of polyps on CT colonography. However, the use of CAD in clinical practice has not been well standardized, and its most effective use is not understood well by radiologists. Each CAD system has its own unique strengths and weaknesses depending on how it was developed and on the data that were used for its development. A good understanding of the intended use of CAD and its limitations in different modalities is important, because using CAD beyond its limitations can lead to ineffective or even harmful results. This course will provide the best CAD practices in clinical use, current and upcoming reader paradigms for clinical use, strengths and weaknesses of different CAD systems, characteristics of CAD prompts including pitfalls, and how to best incorporate CAD results into the diagnostic-decision making process.

Sub-Events

RCC33A Effective Use of Breast Computer-Aided Diagnosis in Clinical Practice

Participants
Robert M. Nishikawa, PhD, Pittsburgh, PA, (nishikawarm@upmc.edu) (*Presenter*) Royalties, Hologic, Inc; Research Consultant, iCAD, Inc;

LEARNING OBJECTIVES

1) Learn current state of computer-aided detection in screening mammography. 2) Learn new possible ways to implement computer-aided detection clinically. 3) Learn how computer-aided detection is used clinically affects its effectiveness.

ABSTRACT

RCC33B Effective Use of Lung Computer-Aided Diagnosis in Clinical Practice

Participants
Matthew T. Freedman, MD, MBA, Baltimore, MD (*Presenter*) Institutional research contract, Riverain Technologies, LLC

LEARNING OBJECTIVES

1) Be aware that CADe and image processing approaches are available to help them (a) detect lung nodules and lung cancer on chest radiographs and lung CTs, (b) the detection of change, the detection of tubes, lines and catheters on chest radiographs, and (c) to measure the extent of COPD, 2) Computer image processing approaches can suppress the visibility of ribs on chest radiographs and pulmonary blood vessels on CTs. 3) They will be informed that some CADe devices, in clinical tests, decrease the time for the detection of lung nodules and the localization of tubes, lines and catheters. 4) They will better understand a basic approach to start to select CADe software for their own clinical practices.

Active Handout:Matthew T. Freedman

http://abstract.rsna.org/uploads/2016/16005049/ACTIVE RCC33B.pdf

RCC33C Effective Use of Colon Computer-Aided Diagnosis in Clinical Practice

Participants
Stuart A. Taylor, MBBS, London, United Kingdom, (stuart.taylor1@nhs.net) (*Presenter*) Research Consultant, Robarts Clinical Trials, Inc

LEARNING OBJECTIVES

1) To understand the rational for CAD in CT colonography. 2) To appreciate the diagnostic accuracy of CAD in detecting colonic neoplasia according to lesion morphology. 3) To learn about the various CAD reading paradigms used in CT colonography, and the pros and cons of each. 4) To understand how colon CAD can be integrated into clinical practice.

GI232-ED-TUB8

Advanced Use of Specific Contrast Agents for Abdominal Imaging: How to Transform Common Contrast Agents into a Magic Bullet

FDA Discussions may include off-label uses.

Participants
Shota Tatsumoto, Kashihara, Japan (*Presenter*) Nothing to Disclose
Nagaaki Marugami, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
Shigeo Ichihashi, MD, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
Takahiro Itoh, MD, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
Toshihiro Tanaka, MD, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
Kimihiko Kichikawa, MD, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
Hideyuki Nishiofuku, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
Takeshi Sato, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To learn the advanced usage of various specific contrast agents for abdominal imaging that might help in high-level imaging interpretations and treatment. To evaluate the clinical impact of the results achieved from appropriate and inventive contrast techniques.

TABLE OF CONTENTS/OUTLINE

1) Introduction Although radiologists use various contrast agents in daily practice, maximizing the potential of these agents is a challenge. Here, we present the advanced usage of various contrast agents beyond manual. 2) Case presentation SPIO (detection of endoleaks after endovascular aneurysm repair for renal failure and detection of extra-hepatic tumor), Gd-EOB-DTPA (evaluation of bile flow), negative oral contrast agents for MRCP (imaging interpretation pitfalls), CO2 (assessment of drug distribution using intra-arterial chemoinfusion for renal failure), iodized oil (maximize anticancer effect of transarterial chemoembolization and treatment for lymphatic leakage), US contrast agent (evaluation of patients with renal failure), and barium (diagnosis of histological types of gastric cancer and treatment of colonic diverticular hemorrhage). 3) Conclusion Radiologists can utilize the advantages of various specific contrast agents, while using an appropriate technique that may help resolve complex clinical situations and in the direct patient management. **Please note, this exhibit will not be a CME discussion presentation as originally listed.**

GIS-TUB

Gastrointestinal Tuesday Poster Discussions

Tuesday, Nov. 29 12:45PM - 1:15PM Room: GI Community, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
Rajan T. Gupta, MD, Durham, NC (*Moderator*) Consultant, Bayer AG; Speakers Bureau, Bayer AG; Consultant, Koninklijke Philips NV; Consultant, Halyard Health, Inc; Consultant, Siemens AG

Sub-Events

GI379-SD-TUB1 Colorectal Carcinoma: Ex Vivo Evaluation with 3-T High-Spatial-Resolution Quantitative T2 Mapping--Correlation with Histopathologic Findings

Station #1

Participants
Ichiro Yamada, MD, Tokyo, Japan (*Presenter*) Nothing to Disclose
Norio Yoshino, DDS, Bunkyo-ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Keigo Hikishima, PhD, MS, Kawasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Naoyuki Miyasaka, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Shinichi Yamauchi, MD, Bunkyo-ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroyuki Uetake, MD, Bunkyo-ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Masamichi Yasuno, MD, Bunkyo-ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Yukihisa Saida, MD, Bunkyo-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Ukihide Tateishi, MD, PhD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Daisuke Kobayashi, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshinobu Eishi, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To establish the feasibility of high-spatial-resolution (HSR) quantitative T2 mapping at 3-T MR imaging as a method of diagnosing the depth of mural invasion by colorectal carcinomas.

METHOD AND MATERIALS

Twenty colorectal specimens each containing a carcinoma were imaged with a 3-T MR system equipped with a 4-channel phased-array surface coil. HSR quantitative T2 maps were acquired by using a spin-echo sequence: repetition time/echo time (TR/TE), 7650/22.6-361.6 ms (16 echoes); field of view (FOV), 87 x 43.5 mm; section thickness, 2 mm; matrix, 448 x 224; and averages, one. HSR T2-weighted images were also acquired by using a fast spin-echo sequence: TR/TE, 5000/91 ms; FOV, 87 x 43.5 mm; section thickness, 2 mm; matrix, 384 x 192; averages, 10; and turbo factor, 12. Differences between the T2 values (ms) of the tumor tissue and both the colorectal wall layers and fibrosis were measured, and the MR images and the histopathologic findings were then compared.

RESULTS

HSR quantitative T2 maps and T2-weighted images acquired at 3 T clearly depicted the normal colorectal wall in all 20 specimens (100%) as consisting of eight layers, each of which had T2 values that differed from its adjacent layers ($P < 0.001$): epithelium (84.1 ± 7.4 ms), lamina propria mucosae (111.8 ± 5.2 ms), muscularis mucosae (85.5 ± 10.4 ms), submucosa (165.9 ± 20.9 ms), inner circular muscle (95.2 ± 4.7 ms), intermuscular connective tissue (121.2 ± 10.6 ms), outer longitudinal muscle (95.1 ± 5.9 ms), and subserosa-serosa or adventitia (166.4 ± 16.4 ms). HSR quantitative T2 maps made it possible to clearly differentiate between the tumor tissue (104.2 ± 6.4 ms) and fibrosis (73.6 ± 9.4 ms) ($P < 0.001$). In 19 of the 20 colorectal carcinomas (95%), HSR quantitative T2 maps made it possible to determine the same depth of tumor invasion of the colorectal wall as determined by the histopathologic examination.

CONCLUSION

3-T HSR quantitative T2 mapping enables clear depiction of the layers of the colorectal wall and clear differentiation of tumor tissue from fibrosis, and it provides excellent diagnostic accuracy of mural invasion by colorectal carcinomas.

CLINICAL RELEVANCE/APPLICATION

By using 3-T HSR quantitative T2 mapping, we may have an effective tool to noninvasively diagnose the depth of mural invasion by colorectal carcinomas.

GI380-SD-TUB2 Dual-energy CT to Evaluate the Efficacy of Neoadjuvant Chemotherapy in Patients with Stage III/IV Gastric Cancer

Station #2

Participants
Xiaoyuan Gao, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Huan Zhang, Shanghai, China (*Presenter*) Nothing to Disclose
Zilai Pan, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Lianjun Du, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Jing Yan, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Fuhua Yan, MS, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The study was to prospectively evaluate the different parameters of dual-energy CT in the assessment of efficacy during neoadjuvant chemotherapy for stage III/IV gastric cancer.

METHOD AND MATERIALS

Thirty patients with stage III/IV gastric cancer were examined with DECT one week before, and three cycles after the start of neoadjuvant chemotherapy. Image data were processed with the prototype software syngo.IPIPE. The percentage decrease of tumor volume (%△V), mean iodine-uptake (%△MIU-p, %△MIU-d), total iodine-uptake (%△TIU-p, %△TIU-d) in portal-phase and delayed-phase, tumor density in portal-phase (%△HU, Choi criteria), maximum transverse diameter (%△D, RECIST) and tumor area (%△S, WHO criteria) were calculated. After surgery, the correlation between %△V, %△MIU-p, %△MIU-d, %△TIU-p, %△TIU-d, %△HU, %△D, %△S and histopathologic grades of regression (Becker score) were determined. The best cutoff value to distinguish responder and nonresponder were calculated by ROC analysis. The association between responder, nonresponder and progression-free survival (PFS) time was assessed.

RESULTS

%△V, %△MIU-p and %△TIU-p were significant correlation with the pathological reaction(P=0.007, P=0.005, P=0.007, respectively). The correlation of the pathological regression with WHO, RECIST, and Choi criteria were no statistically significant(P=0.878, 0.100, 0.105, respectively). %△V cutoff value of -43.34% and %△MIU-p cutoff value of -21.51% were acquired and the differences of the PFS time between the responder and non-responder groups were not statistically significant (P=0.303, 0.512, respectively). Using -66.13% as the %△TIU-p cutoff level, the differences of the PFS time between the responders and non-responders were statistically significant (P=0.046).

CONCLUSION

The percentage decrease of volume and iodine-uptake in DECT can be used to assess the response of neoadjuvant chemotherapy in patients with stage III/IV gastric cancer. %△TIU-p is hopeful to be a valuable predictive parameter of PFS time for the patients with gastric cancer after neoadjuvant chemotherapy and surgery.

CLINICAL RELEVANCE/APPLICATION

(dealing with gastric cancer)"the volume and iodine-uptake changes in DECT are hopeful to replace WHO, RECIST and Choi criteria to evaluate the effect of neoadjuvant chemotherapy for gastric cancer."

GI381-SD-TUB3 Protocol Optimization of Magnetic Resonance Colonography for Polyp Detection Using Pig Colonic Phantom: Influence of Magnetic Field Strength, Colonic Distension Technique, and MRI Sequence

Station #3

Participants
Eun-Suk Cho, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jeong Min Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Junyoung Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yun Jung Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

There is currently no consensus for the optimal techniques of MR colonography (MRC), in respect of magnetic field strength, colonic distension technique and MRI sequences. The aim of this study was to compare the diagnostic performance for polyp detection and image quality of different techniques of MRC using pig colon phantoms and to evaluate the influence of magnetic field strength (1.5 T or 3.0 T), colonic distension technique (bright- or dark-lumen), and MRI sequences.

METHOD AND MATERIALS

Six pig colon segments (60–92 cm) with 56 artificial colon polyps (0.4–1.6 cm in diameter, fat and sessile in shape) were placed in plastic container containing soybean oil. The colon was distended using room air for dark-lumen MRC and with tap water or a gadolinium-chelate based enema fluid for bright-lumen MRC. Each colon phantom was scanned on both 1.5 T and 3.0 T scanners using the following sequences: two-dimensional (2D) fast imaging with steady-state precession (True-FISP), T2-weighted fat-suppressed (FS) 2D single-shot fast spin echo (SSFSE), and/or T1-weighted FS three-dimensional gradient-echo (3D GRE) sequences. We tried to acquire the highest spatial resolution within a 20-s acquisition time. Two radiologists evaluated the presence of polyps based on a 4-point scale and analyzed image quality with respect to artifacts, colonic wall conspicuity, polyp conspicuity, and polyp contrast using a 5-point scale.

RESULTS

For polyp detection sensitivity and image quality, MRC obtained at 1.5 T was better than that obtained at 3.0 T, and a bright-lumen technique was superior to a dark-lumen technique. Bright-lumen MRC at 1.5 T was most sensitive for polyp detection ($p < 0.001$) and gave the highest image quality ($p < 0.05$) regardless of polyp size and shape. SSFSE and 3D GRE sequences at bright-lumen MRC at 1.5 T had highest sensitivity for polyp detection (83.9% and 83.0%, respectively) and highest image quality.

CONCLUSION

The most effective sequences of MRC for polyp detection were SSFSE- or 3D GRE-based bright-lumen MRC obtained with a 1.5 T scanner. These sequences had the highest polyp detection rate and the best image quality.

CLINICAL RELEVANCE/APPLICATION

Single-shot fast spin echo or 3D gradient echo-based bright-lumen MR colonography obtained at 1.5T scanner has higher sensitivity for polyp detection and superior image quality, compared to dark-lumen MRC or MRC obtained at 3.0T scanner.

GI382-SD-TUB4 Experience with Second and Third Generation Iterative Reconstruction (IR) Techniques for Improving Routine Abdomino-pelvic CT in Morbidly Obese Patients

Station #4

Participants
Khalid W. Shaqdan, MD, Boston, MA (*Presenter*) Nothing to Disclose
Manuel Patino, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Rodrigo Canellas, MD, Cambridge, MA (*Abstract Co-Author*) Nothing to Disclose
Avinash R. Kambadakone, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Debra A. Gervais, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Dushyant V. Sahani, MD, Boston, MA (*Abstract Co-Author*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc

PURPOSE

To investigate the diagnostic performance of abdomen CT images reconstructed using filtered back projection (FBP) and 2nd (ASiR, SAFIRE) and 3rd generation (ADMIRE) iterative reconstruction (IR) algorithms in morbidly obese patients (BMI 40-55).

METHOD AND MATERIALS

A total of 193 portal phase abdomen-pelvis CT exams (5mm thickness) performed between Feb 2015 to Feb 2016 in 186 morbidly obese patients (mean age=51, mean BMI = 45.6) were reviewed. 76/188 exams were reconstructed using FBP (120 kVp, ATCM 74-550 mA), and 117 exams were processed using IR (ASiR = 32, SAFIRE = 37, ADMIRE = 48) using 100-140 kVp and ATCM. Patients were stratified into three BMI groups (<45, 45-49.9, 50-55) and images were reviewed for image quality (IQ), image noise (IMN), and artifacts. Objective noise and attenuation were also determined. Complex cases were identified as: presence of truncation artifacts, presence of metal artifacts, and arms positioned on abdomen. Size-specific-dose-estimates (SSDE) were compared and statistically analyzed.

RESULTS

Diagnostic interpretation was rendered in all 193 exams with higher mean IQ score for IR (FBP = 3.4 and IR = 4.1). The mean image noise and CNR was comparable between ADMIRE (IMN = 15.2, CNR = 1.8) and SAFIRE (IMN = 15 and CNR = 2). Trends for all parameters were similar in patients across weight and BMI sub-categories. 94 exams (11 which had >1 complex issue) were categorized as complex due to truncation artifacts in 65 (FBP=31, IR=34), metal artifacts in 26 (FBP = 6, IR = 20), and in 3 exams arms were positioned by waist (IR = 3). Patients with BMI 45-55 were frequently scanned using IR (FBP exams = 32 and IR exams = 60). To correct for patient distribution based on BMI, dose comparisons were made for exams in <45 BMI group (FBP = 44, IR=57), and results showed lower dose for IR (IR = 13.8 mGy, FBP = 15.4).

CONCLUSION

In morbidly obese patients, despite technical challenges (abdomen girth, metal artifacts, proper positioning), diagnostic quality images could be generated with minimal artifacts and image noise with 2nd and 3rd generation IR when compared to FBP.

CLINICAL RELEVANCE/APPLICATION

As obesity rates continue to rise in the United States, radiologists and technologists face challenges imaging larger patients. For CT, achieving diagnostic imaging studies with minimum noise and artifacts is challenging. This abstract aims to show benefits of IR compared to FBP when imaging morbidly obese patients.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Debra A. Gervais, MD - 2012 Honored Educator
Dushyant V. Sahani, MD - 2012 Honored Educator
Dushyant V. Sahani, MD - 2015 Honored Educator
Dushyant V. Sahani, MD - 2016 Honored Educator

GI383-SD-TUB5 Acoustic Radiation Force Impulse - Virtual Touch tissue Quantification (ARFI - VTQ) imaging in Acute and Chronic Pancreatitis

Station #5

Awards
Student Travel Stipend Award

Participants
Pushkaran Muralitharan, MBBS,DMRD, Chennai, India (*Presenter*) Nothing to Disclose
Sudhakar Kattoju, DMRD, MD, Chennai, India (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine whether pancreatic parenchyma in acute and chronic pancreatitis exhibit significantly different ARFI-VTQ values as compared to normal pancreatic parenchyma.

METHOD AND MATERIALS

A prospective observational study was conducted in our institution. Consecutive patients of acute and chronic pancreatitis were included. For standardisation of reference values, controls were also included. Imaging was done with a 4C1 curved array transducer of Siemens Acuson S2000 ultrasound system having virtual touch tissue quantification software. Three ARFI-VTQ values were obtained from head & neck, body and tail of pancreas. Mean ARFI-VTQ of these three regions was calculated and from these the mean for the entire pancreas was obtained. In patients for whom the entire pancreas could not be visualised due to technical factors, at least three ARFI-VTQ values were obtained from a particular segment (head & neck, body or tail) and this mean alone or combined with the mean of less than three ARFI-VTQ values from other segments was used to compute the mean for the entire pancreas.

RESULTS

Mean ARFI-VTQ values in acute pancreatitis patients (1.37±0.44 m/s) and chronic pancreatitis patients (2.23±0.35 m/s) were higher than controls (0.93±0.13 m/s) with a statistically significant difference.Using mean ARFI-VTQ cut off values of 1.01 m/s & 1.39 m/s, acute and chronic pancreatitis patients could be differentiated from controls by 80% & 100% sensitivity, 73% & 93% specificity, 75% & 93% positive predictive value, 79% & 100% negative predictive value respectively.There was no significant difference in mean ARFI-VTQ values between acute necrotising pancreatitis (1.36±0.53 m/s) and interstitial oedematous pancreatitis (1.37±0.39 m/s).No significant difference in mean ARFI- VTQ values was seen between chronic pancreatitis patients with calcification (2.22±0.34 m/s) and chronic pancreatitis patients without calcification (2.24±0.37 m/s).

CONCLUSION

ARFI-VTQ imaging can distinguish acute and chronic pancreatitis from normal parenchyma. ARFI-VTQ cannot differentiate acute necrotising and interstitial oedematous pancreatitis. ARFI-VTQ cannot differentiate chronic pancreatitis patients with and without calcification.

CLINICAL RELEVANCE/APPLICATION

ARFI-VTQ may detect chronic pancreatitis before calcification and significant atrophy have occurred.

GI384-SD-TUB6 Non-invasive Prediction of Portal Hypertension with MR Elastography and DCE-MRI of the Liver and Spleen

Station #6

Participants
Mathilde Wagner, MD, PhD, Paris, France (*Presenter*) Consultant Olea Medical
Stefanie Hectors, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Octavia Bane, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Thomas Schiano, NEW YORK, NY (*Abstract Co-Author*) Nothing to Disclose
Aaron M. Fischman, MD, Harrison, NY (*Abstract Co-Author*) Consultan, Surefire Medical, Inc Consultant, Terumo Corporation Speakers Bureau, Koninklijke Philips NV
Bachir Taouli, MD, New York, NY (*Abstract Co-Author*) Consultant, MEDIAN Technologies ; Grant, Guerbet SA

PURPOSE

To assess the diagnostic performance of MR elastography (MRE) and dynamic contrast-enhanced MRI (DCE-MRI) of liver and spleen for non-invasive prediction of portal pressures.

METHOD AND MATERIALS

This ongoing prospective study included 26 patients (M/F 11/15, mean age 50y) with chronic liver disease who underwent hepatic venous pressure gradient (HVPG) measurement. MRI examination (1.5T/3.0T) was performed within 3 months of HVPG and included 2D-GRE-MRE of liver and spleen (n=25) and abdominal DCE-MRI using 3D-FLASH sequence (n=20). Liver (LS) and spleen (SS) stiffness were determined from stiffness maps. DCE-MRI data was analyzed using model-free parameters and pharmacokinetic modeling (dual-input single compartment model for liver and Tofts model for spleen). MRI parameters were correlated with HVPG. ROC and sensitivity/specificity analysis for prediction of HVPG ≥5 mm Hg (portal hypertension) and ≥10mmHg (significant portal hypertension) were performed for individual and combinations of parameters.

RESULTS

Mean HVPG was 8.0±7.5 mmHg. There were significant positive correlations between HVPG and liver time-to-peak (TTP; r=0.712, P<0.001), liver mean transit time (MTT; r=0.514, P=0.020) and LS (r=0.478, P=0.016), while liver upslope was negatively correlated with HVPG (r=-0.548, P=0.01). ROC analysis provided significant AUCs for HVPG ≥5mmHg (LS 0.786/SS 0.752) and for HVPG ≥10mmHg (LS 0.833, SS 0.771, liver MTT 0.786, liver TTP 0.857, liver upslope 0.869, spleen TTP 0.845, spleen upslope 0.786). Sensitivity/specificity of LS for detection of HVPG≥10mmHg were 67% and 92%, while LS and spleen TTP combined yielded the highest sensitivity/specificity (100%/92%).

CONCLUSION

These preliminary results suggest that liver and spleen perfusion and stiffness metrics can be combined into a multiparametric analysis to maximize diagnostic performance for the non-invasive prediction of clinically significant portal hypertension.

CLINICAL RELEVANCE/APPLICATION

MRE and DCE-MRI parameters can be used as potential biomarkers of portal hypertension in patients with liver disease.

GI385-SD-TUB7 Combined Hepatocellular Carcinoma-cholangiocarcinoma: Clinicopathologic Features and Gadoxetic Acid-enhanced MRI Findings

Station #7

Participants
So Hyun Park, MD, Incheon, Korea, Republic Of (*Presenter*) Nothing to Disclose
Seung Soo Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Cheol Mog Hwang, MD, Daejeon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Sil Yu, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Ho Byun, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yong Moon Shin, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Moon-Gyu Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess clinicopathologic features and imaging findings of combined hepatocellular carcinoma-cholangiocarcinoma (cHCC-CC) on gadoxetic acid-enhanced MRI according to the latest WHO classification and determine survival outcomes of patients in relation to arterial enhancement of tumors after curative surgery.

METHOD AND MATERIALS

Our institutional review board approved this study and waived the requirement for informed consent. 82 consecutive patients (64 men, 18 women: mean age, 54.0 years; range, 30-81 years) with surgically-proven cHCC-CC who underwent gadoxetic acid-enhanced liver MRI were included in this retrospective study. We assessed clinical characteristics and pathologic findings according to the 2010 WHO classification. We analyzed imaging findings about arterial enhancement, hepatobiliary phase findings and morphologic features in gadoxetic acid-enhanced MR imaging and compared these features with pathologic types. We also studied 60 patients with cHCC-CC of surgical outcome in correlation with arterial enhancement after curative surgery.

RESULTS

Of 82 patients liver cirrhosis or chronic hepatitis was presence in 73 (89.0%) patients. 82 cHCC-CCs were classified into the classical type (n = 53) or stem cell type (n = 29) including typical (n=14), intermediate (n=7), cholangiolocellular (n=3), and unclassified (n=5) subtypes. In the arterial phase, global enhancement was the most common enhancement pattern seen in 48 (58.8%) lesions, followed by rim enhancement (n = 21, 25.6%), peripheral enhancement (n = 11, 13.4%), and isointensity (n = 2, 2.4%). In the HBP, all tumors showed hypointensity or target pattern. Target appearance in the HBP was seen in 30 (36.6%) lesions. When MR imaging findings were compared between classical type and stem cell type tumors, none of morphologic and enhancement characteristics showed statistically significant difference ($p \geq 0.33$). Arterial enhancement of cHCC-CC was an independent factors associated with overall survival ($p = 0.033$).

CONCLUSION

cHCC-CC had various imaging findings on gadoxetic acid-enhanced MR and histologic diversity. Imaging findings seems to be significant and important to predict tumor composition and prognosis of cHCC-CC. Arterial enhancement cHCC-CC was an independent factor of overall survival.

CLINICAL RELEVANCE/APPLICATION

cHCC-CC shares clinical characteristics with HCC. Arterial enhancement of cHCC-CC is an independent factor associated with overall survival.

GI024-EB-TUB Enterocutaneous Fistula: Can Interventional Radiologists Fix Big Leaks?

Hardcopy Backboard

Participants
Nicole A. Keefe, MD, Charlottesville, VA (*Presenter*) Nothing to Disclose
Ziv J. Haskal, MD, Baltimore, MD (*Abstract Co-Author*) Advisory Board, W. L. Gore & Associates Research Consultant, W. L. Gore & Associates Advisory Board, IC Sciences Corporation Royalties, Cook Group Incorporated Research Support, C. R. Bard, Inc Research Consultant, C. R. Bard, Inc Advisory Board, NovaShunt AG Advisory Board, Endoshape, Inc

TEACHING POINTS

Enterocutaneous fistulae (ECF) can be a chronic, debilitating, high cost condition with a significant impact on quality of life. While surgical and medical approaches may prove successful, these approaches carry operative morbidity, a protracted time course and notable failure rates. Interventional radiologic management comprises mapping, abscess control, and, increasingly, closure techniques. Methods include glues, sealants, collagen, and plugs for both low and high output ECF. Case series have demonstrated success rates ranging from 71-100%. Newer materials, including smooth intestinal submucosa (SIS), may allow treatment of larger, high output, complicated proximal fistulae. This poster reviews indications, fistulography, and an algorithmic approach to catheter-based interventions.

TABLE OF CONTENTS/OUTLINE

1. Pathophysiology
2. Diagnostic Imaging
3. Conventional Treatment
4. Indications/Contraindications
5. Sample cases
6. Outcomes

MSCC33

Case-based Review of Nuclear Medicine: PET/CT Workshop-Cancers of the Abdomen and Pelvis (In Conjunction with SNMMI) (An Interactive Session)

Tuesday, Nov. 29 1:30PM - 3:00PM Room: S406A

GI GU CT NM OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Janis P. O'Malley, MD, Birmingham, AL (*Moderator*) Nothing to Disclose
Katherine A. Zukotynski, MD, Hamilton, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the role of PET/CT in the evaluation of abdominopelvic malignancies. 2) Describe how differences in tumor biology impact tumor assessment with PET. 3) Provide imaging examples specific to different abdominopelvic malignancies.

RC413

Pediatric Series: Abdomen

Tuesday, Nov. 29 3:00PM - 6:00PM Room: S102AB

GI MR PD

AMA PRA Category 1 Credits ™: 2.75
ARRT Category A+ Credits: 3.00

FDA Discussions may include off-label uses.

Participants
Young Hun Choi, MD, Seoul, Korea, Republic Of (*Moderator*) Nothing to Disclose
Geetika Khanna, MD, MS, Iowa City, IA (*Moderator*) Nothing to Disclose
Ethan A. Smith, MD, Saline, MI (*Moderator*) Nothing to Disclose
Shunsuke Nosaka, MD, Tokyo, Japan (*Moderator*) Nothing to Disclose
Jonathan R. Dillman, MD, Cincinnati, IA (*Moderator*) Research Grant, Siemens AG; Research Grant, Guerbet SA; Travel support, Koninklijke Philips NV; Research Grant, Toshiba

Sub-Events

RC413-01 Pediatric MR Urography Applications

Tuesday, Nov. 29 3:00PM - 3:15PM Room: S102AB

Participants
Jonathan R. Dillman, MD, Cincinnati, IA, (jonathan.dillman@cchmc.org) (*Presenter*) Research Grant, Siemens AG; Research Grant, Guerbet SA; Travel support, Koninklijke Philips NV; Research Grant, Toshiba

LEARNING OBJECTIVES

1) To understand state-of-the-art pediatric MR urography techniques. 2)To become familiar with common MRU applications in children and adolescents. 3) To comprehend how MRU can provide added value to the evaluation of the pediatric kidney and urinary tract.

ABSTRACT

LEARNING OBJECTIVES

1) Learn current state-of-the art techniques for the performance of MR urography in children. 2) Learn the various typical clinical applications of MR urography in the pediatric population.

ABSTRACT

MRI of the kidneys and urinary tract, or MR urography (MRU), is a very useful imaging tool in a subset of the pediatric population when standard imaging evaluation (e.g., ultrasound, voiding cystourethrography, renal scintigraphy) is inadequate or unrevealing. This single imaging test can be used to thoroughly assess renal and urinary tract anatomy, differential renal function, and urinary tract drainage. This educational course will present state-of-the art MRU techniques that can be used in children and adolescents. Additionally, common as well as uncommon clinical applications will be discussed using a case-based approach.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Jonathan R. Dillman, MD - 2016 Honored Educator

RC413-02 Non-Invasive MR Imaging Diagnosis of Pediatric Kidney Transplant Rejection

Tuesday, Nov. 29 3:15PM - 3:25PM Room: S102AB

Awards
Trainee Research Prize - Fellow

Participants
Maryam Aghighi, MD, Stanford, CA (*Presenter*) Nothing to Disclose
Laura J. Pisani, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Anne Muehe, MD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Samantha Holdsworth, PhD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Neeraja Kambham, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Waldo Concepcion, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Paul Grimm, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Heike E. Daldrup-Link, MD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

In children with kidney transplants, rejection is the major cause of allograft failure. There is currently no diagnostic tool capable of detecting rejection in vivo. The purpose of this study was to develop a non-invasive imaging test for detection of allograft rejection in pediatric patients.

METHOD AND MATERIALS

The approach relies on administration of the ultrasmall superparamagnetic iron oxide nanoparticle ferumoxytol, with long lasting blood half-life which is phagocytosed by macrophages causing significant signal effects on T2*-weighted MR images. In an IRB-approved single center prospective clinical trial, patients ranging between 10 to 26 years with acute transplant rejection (n = 4), non-rejecting allografts (n = 15) and normal native kidneys (n = 9) underwent multi-echo T2* fast spoiled gradient-echo (FSPGR) MR imaging at 1-14 days post intravenous injection (p.i.) of 5mg Fe/kg ferumoxytol. T2* relaxation times of renal allografts were correlated with the presence or absence of rejection using standard pathology criteria and macrophage semi-quantitative scoring by immunohistology.

RESULTS

Allografts with acute rejection showed prolonged T2* relaxation times compared to normal allografts at 1-24 p.i. (normal: T2* = 8.01 ms, rejection: T2* = 37.88 ms, $p < 0.001$) and, to a lesser extend, at 1-14 days p.i. (normal: 20.97 ms, rejection: 38.92 ms, $p = 0.005$). Histological analyses revealed edema and compressed microvessels of allografts undergoing rejection leading to decreased ferumoxytol enhancement. Allografts with or without acute rejection did not show significant differences in macrophage content on histopathology ($p = 0.44$).

CONCLUSION

A longer T2* on ferumoxytol-enhanced MR images was seen in patients with acute rejection compared with normal transplants. This may be attributable to reduced allograft perfusion and increased edema in rejected transplants as seen on histopathology. While further work is needed to decouple the confounding effects on MR imaging, this study suggests that a change in baseline MR imaging is a promising non-invasive tool for identifying allografts at high risk of rejection.

CLINICAL RELEVANCE/APPLICATION

A non-invasive diagnostic test enabling allograft rejection to be visualized and monitored directly and longitudinally *in vivo* could reduce anesthesia, invasive biopsies, and associated complications and costs. Further studies are ongoing to integrate this technique into clinical care.

RC413-03 Quantitative 3D Ultrasound Imaging in Pediatric Hydronephrosis

Tuesday, Nov. 29 3:25PM - 3:35PM Room: S102AB

Participants
Juan Cerrolaza, PhD, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
Hansel J. Otero, MD, Silver Spring, MD (*Abstract Co-Author*) Nothing to Disclose
Elijah Biggs, BS, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
Amanda M. George, RT, Springfield, VA (*Abstract Co-Author*) Nothing to Disclose
Peter H. Yao, BS, Washington, DC, DC (*Abstract Co-Author*) Nothing to Disclose
Roberto Ardon, Suresnes Cedex, France (*Abstract Co-Author*) Employee, Koninklijke Philips NV
James Jago, Bothell, WA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Craig A. Peters, MD, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
Marius G. Linguraru, DPhil, MS, Washington, DC (*Presenter*) Nothing to Disclose

PURPOSE

After proof of concept in 2DUS, we create the first 3DUS-based computer-aided diagnostic (CAD) tool for the assessment of pediatric hydronephrosis (HN), aiming to identify 3D ultrasound (US)-based thresholds for hydronephrotic kidneys where diuretic nuclear renography (DR) could be safely avoided.

METHOD AND MATERIALS

The retrospective dataset (IRB approved) consists of 20 patients (mean age 10.93 months; range 0-84 months) of variable severity (grade 1 to 4 according to the Society for Fetal Urology HN scale) with concurrent renal 2D, 3DUS and DR (MAG-3) imaging. Mean washout half time (T1/2) was: 16 min. (range 2 to >100 min.). For each volume, segmentation of renal parenchyma (RP) and collecting system (CS) was obtained using a minimally-interactive segmentation tool. A set of 90 3D morphological parameters (including descriptors of the RP and CS size and shape) were automatically extracted using quantitative imaging (QI) analysis techniques. Machine learning theory was used to identify critical cases whose T1/2 was higher than clinically relevant thresholds (20 and 30 min). A best-fit model was derived for each threshold using optimal morphological parameters to categorize the kidneys and receiver operating characteristic curve analysis was performed. For comparison, a similar study was performed using 2DUS-based analysis.

RESULTS

Operating at the optimal point with 100% sensitivity, the accuracy, specificity and area under the curve for the 3DUS-based system were 100%, 100% and 100% for T1/2=20min, and 93%, 67% and 93% for T1/2=30min. This new 3DCAD tool significantly outperformed ($p<0.05$ using McNemar's statistical test) the original 2D system, whose performance on the same data was 65%, 57%, and 86% for T1/2=20min, and 65%, 53% and 93% for T1/2=30min, respectively.

CONCLUSION

QI analysis of renal 3DUS provides accurate and reliable assessment of pediatric HN, identifying T1/2 thresholds non-invasively. This new 3DUS-based technology shows a higher diagnostic power than a previous 2DUS-based version.

CLINICAL RELEVANCE/APPLICATION

QI analysis of the 3D anatomy of the kidney has the potential to provide robust assessment of HN, avoiding unnecessary MAG-3 DR and its associated radiation and clinical cost.

RC413-04 Not Reported Limitations of Contrast-enhanced Voiding Urosonography Due to Premature Destruction of Second-generation Ultrasound Contrast Agents

Tuesday, Nov. 29 3:35PM - 3:45PM Room: S102AB

Participants

Dominik Swieton, MD, PhD, Gdansk, Poland (*Presenter*) Nothing to Disclose
Maciej Piskunowicz, MD, PhD, Gdansk, Poland (*Abstract Co-Author*) Nothing to Disclose
Dorota Rybczynska, Gdansk, Poland (*Abstract Co-Author*) Nothing to Disclose
Arkadiusz Szarmach, Gdansk, Poland (*Abstract Co-Author*) Nothing to Disclose
Edyta Szurowska, MD, PhD, Gdansk, Poland (*Abstract Co-Author*) Nothing to Disclose
Menno Pruijm, Lausanne, Switzerland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Evaluation of contrast-enhanced voiding urosonography (ce-VUS) limitations due to premature destruction of second-generation ultrasound contrast agents (UCA).

METHOD AND MATERIALS

161 children were enrolled in the study (71 female and 90 male), the mean age of 3.5years (range 4 weeks - 16.0 years) who underwent ce-VUS examination between 2011 and 2015.

RESULTS

In 13 children (8%) who underwent ce-VUS we observed the premature destruction of the microbubbles in the urinary bladder, significant for examination efficiency. In all these cases the voiding phase of ce-VUS examination was impossible to be set correctly because of destroyed UCA microbubbles. The phenomenon occurred exclusively in anxious, crying infants and children with restricted voiding.

CONCLUSION

The premature destruction of ultrasound contrast agent is a major factor limiting the efficiency of ce-VUS since applicable voiding phase cannot be reached. Acknowledgments:The study was financed from the means of the National Science Centre granted on the basis of the decision No DEC-2012/05/B/NZ5/01554.

CLINICAL RELEVANCE/APPLICATION

The premature destruction of ultrasound contrast agent during ce-VUS is a significant limitation since it prevents applicable ce-VUS voiding phase evaluation and establishing the vesico-ureteric reflux (VUR) diagnosis. Therefore, the usefulness of ce-VUS with second generation UCA needs to be reevaluated, and special attention must be taken for anxious, constantly crying infants and children with possible voiding problems.

RC413-05 Feed-and-Sleep: Performing a Functional MR Urography (fMRU) in Infants Without Sedation

Tuesday, Nov. 29 3:45PM - 3:55PM Room: S102AB

Participants
Sebastian Werner, Stuttgart, Germany (*Presenter*) Nothing to Disclose
Ilias Tsiflikas, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Matthias Teufel, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Florian Obermayr, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Konstantin Nikolaou, MD, Tuebingen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG; Speakers Bureau, Bracco Group; Speakers Bureau, Bayer AG
Juergen F. Schaefer, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Functional MR urography (fMRU) has established as a comprehensive imaging tool in evaluating malformations of kidneys and urinary tract. However, the utilization of fMRU is limited because of the need for sedation or even general anesthesia in infants, since there are great concerns regarding a possible injury of the developing brain by anesthesia. Therefore, we evaluated the feasibility of fMRU in feed-and-sleep technique.

METHOD AND MATERIALS

We performed feed-and-sleep fMRU in 25 infants (11 boys, median age 104 days, range 37-277 days) with a duplex kidney. Examinations were performed using an optimized MRI-protocol including T2-weighted Half-Fourier-acquisition single-shot turbo spin-echo (HASTE) sequences in transversal, coronal and sagittal plane for morphological imaging and a 15-min dynamic post-contrast scan (50 coronal 3-D-fat-saturated T1-weighted gradient recalled echo (GRE) volumetric interpolated breath-hold examination (VIBE) series. The image quality of examinations was analyzed by two raters in consensus regarding moving artifacts of morphological sequences (1=no; 2= moderate, 3=severe) and visualization of anatomical details of the kidneys and urinary tract (1=high; 2=reduced; 3= no). Further, we analyzed the evaluability of the dynamic urographic sequences with a free available software.

RESULTS

In 22 infants fMRU was performed successfully including evaluation of dynamic urography. Only in 3 infants abortion of examination was necessary due to a severe motion. In 8 infants there were no artifacts observed in transversal and sagittal planes. In the remaining patients, moderate artifacts were noted. Anatomical details of kidneys were visualized with high details in 20/23 infants, whereas only in 3 patients there was no visualization of ureters and ureter ostia possible.

CONCLUSION

We could demonstrate that the feed-and-sleep technique is feasible for fMRU in infants.

CLINICAL RELEVANCE/APPLICATION

Functional MR urography is an important diagnostic tool in CAKUT. Fast sequences offer the possibility of performing this examination in the feed-and-sleep technique.

RC413-06 Adnexal Torsion Revisit: Focused on the Initial CT Findings in Pediatric Patients

Tuesday, Nov. 29 3:55PM - 4:05PM Room: S102AB

Participants
Hyun-Hae Cho, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Sun Wha Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Somi Lee, Taegu, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sun Kyoung You, MD, Daejeon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the CT features of adnexal torsion in the pediatric patients and compared those features between two groups, whether hemorrhagic infarction exist or not.

METHOD AND MATERIALS

Total 31 consecutive pediatric patients (mean age, 12.1 years) were included. The presence of an abnormally located ovary, non-enhancement, hemorrhage, the string of pearls sign, protrusion, eccentric wall thickening, volume of the ipsi- and contralateral ovaries including the volume ratio, and the presence of preexisting lesions were evaluated. The presence of uterine deviation, fallopian tube thickening or dilatation, engorged vessels and vascular knots were evaluated for the CT features of the fallopian tube and uterus. The presence of ascites or hemoperitoneum and peritoneal fat infiltration were recorded for the peritoneal changes.

RESULTS

Among the parameters related with ovary itself, non-enhancement of the involved ovary, hemorrhage, string of pearls sign, protrusion of the torsed mass was noted significantly more frequent in hemorrhagic infarction group than non hemorrhagic infarction group (All $p < 0.05$). Mean volume of the ipsilateral ovary or contralateral ovary didn't show significant difference, but mean ratio of the volume of ovaries noted significantly larger in hemorrhagic infarction group (36.6, $p = 0.032$). The presence of uterine deviation toward the torsed side, fallopian tube thickening was noted significantly more frequent in hemorrhagic infarction group than non hemorrhagic infarction group (All $p < 0.05$).

CONCLUSION

Since the primary signs were not well visualized on the CT scan of pediatric patients, secondary signs including non-enhancement of the twisted ovary with hemorrhage, string of pearls sign, protrusion of the torsed mass, increased volume ratio, uterine deviation, fallopian tube thickening could be helpful enough for diagnosis the adnexal torsion in pediatric patients.

CLINICAL RELEVANCE/APPLICATION

Although CT is usually the initial diagnostic tool through which it may be possible to detect adnexal torsion, to our knowledge, only a few reports concerning the CT features of adnexal torsion have been published (and fewer still have been published on pediatric patients). And often misdiagnosis was made and misinterpretation of imaging results in adnexal torsion is commonplace. Therefore, this study might be helpful for improving the imaging diagnosis of adnexal torsion in pediatric patients.

RC413-07 MR Elastography in Children

Tuesday, Nov. 29 4:05PM - 4:20PM Room: S102AB

Participants
Andrew T. Trout, MD, Cincinnati, OH, (andrew.trout@cchmc.org) (*Presenter*) Advisory Board, Koninklijke Philips NV; Travel support, Koninklijke Philips NV ; Author, Reed Elsevier; Research Grant, Siemens AG

LEARNING OBJECTIVES

1) Explain the basics of MR elastography technique. 2) Describe the current evidence for use of MR elastography in children and young adults. 3) Identfy potential oppotunities to apply MR elastography in clinical practice.

ABSTRACT

This activity will review the basics of performing and interpreting MR elastography (MRE) examinations in pediatric and young adult patients, in the context of disease processes relevant to these populations. Physics of MRE technique will be briefly reviewed and current evidence supporting use of MRE both in adult and pediatric and young adult patients will be discussed. Advanced and research MRE techniques will also be briefly reviewed in regard to potential advantages in the pediatric and young adult population.

RC413-08 Pediatric Hepatobiliary Imaging

Tuesday, Nov. 29 4:30PM - 4:45PM Room: S102AB

Participants
Shunsuke Nosaka, MD, Tokyo, Japan, (nosaka-s@ncchd.go.jp) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the imaging spectrum of hepatobiliary pathology in the pediatric population. 2) Discuss differential diagnosis based on imaging findings.

ABSTRACT

Diagnostic imaging of pediatric hepatobiliary system is usually started with ultrasound (US). US provides fine details of hepatobiliary system when precisely performed. Based on US findings, further imaging study such as hepatobiliary scintigraphy, MRCP, and/or CT will be indicated. An invasive procedure such as percutaneous transhepatic cholangiography is reserved for therapeutic purpose. This educational course will cover a variety of congenital as well as acquired diseases affecting the pediatric hepatobiliary system. In addition, imaging characteristics of common diseases with atypical presentations will be covered.

RC413-09 Supersonic Shear-wave Elastography for Evaluation of the Liver Stiffness in Children: Reproducibility and Effect of Repiration on Measurements

Tuesday, Nov. 29 4:45PM - 4:55PM Room: S102AB

Awards
Student Travel Stipend Award

Participants
Jeong Rye Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hee Mang Yoon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young Ah Cho, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Seong Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ah Young Jung, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate interobserver variation in liver stiffness (LS) measurement by Shear-wave elastography (SWE) and to assess effect of respiration on LS measurement in children with liver diseases.

METHOD AND MATERIALS

This retrospective study was approved by our institutional review board, and written informed consent was waived. A total of 66 children who underwent SWE for LS measurement by two radiologists between April 2015 and August 2015 were included. Two operators (operator 1 and 2) were independently measured LS values from the same location of the liver more than three measurements in each patient. Operator 2 performed LS measurements during free breathing and breath-hold states in each patient. Median LS value of three measurements (LSMED3), four measurements (LSMED4), and five measurements (LSMED5) were calculated in two operators. Reproducibility of the LS measurement and interobsever agreement were determined by using 95% Bland-Altman limits of agreement and intraclass correlation coefficients (ICCs). The effect of the respiration on reproducibility of the LS values was assessed by using the paired t-test.

RESULTS

Interobserver agreement between LSMED3 performed by two radiologists showed ICC value of 0.909 (95 % confidence interval (CI), 0.859-0.943). The 95% limit of agreement between LSMED3 measured by two operators was 3.85 kPa (16.1% of mean LS value). ICC among LSMED3, LSMED4, and LSMED5 was 0.988 (95 % CI, 0.981-0.992) in the operator 1 and 0.990 (95 % CI, 0.985-0.994) in the operator 2. There was a significant difference between LS values measured during breath hold status and free breathing status (P <.001). The Bland–Altman plot for LS measurements showed mean differences between breath hold and free breathing of -13.1 kPa.

CONCLUSION

LS measured by SWE showed almost perfect agreement between two operators and the measurement error was ranged from 3.3-4.4 kPa. Free breathing technique significantly underestimated LS value compared with breath hold technique.

CLINICAL RELEVANCE/APPLICATION

When LS measurements are used for monitoring liver diseases, changes in median LS of 16% or greater should be considered to be beyond the range of measurement error and constant breathing technique should be applied.

RC413-10 Optimal Acquisition Number for Ultrasonographic Shear Wave Velocity Measurements in Children

Tuesday, Nov. 29 4:55PM - 5:05PM Room: S102AB

Participants
Hyun Joo Shin, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Myung-Joon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ha Yan Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yun Ho Roh, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Mi-Jung Lee, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the minimum optimal acquisition number of hepatic shear wave velocities (SWVs) on ultrasound elastography in children with free breathing.

METHOD AND MATERIALS

We prospectively performed hepatic ultrasound elastography (supersonic shear wave imaging, SSI) in healthy children with free breathing. SWVs were measured fifteen times for each child at 4 cm depth of the right lobe using a 1-6 MHz convex transducer. Mean SWVs from the three, five, and seven acquisitions were compared to the mean SWV from fifteen measurements, with the intraclass correlation coefficient (ICC) analyzed with the 1,000 times bootstrap method.

RESULTS

Twenty-two healthy children were included. Nine patients were boys and the age range was 5-10 years with a mean of 7 ± 1.3 years. The mean SWVs from the three (ICC 0.863), five (ICC 0.888) and seven (ICC 0.922) acquisitions demonstrated almost perfect agreement with the reference of fifteen acquisitions (mean, 6.2 ± 1.8 kPa). In m/sec units, the three (ICC 0.870), five (ICC 0.876) and seven (ICC 0.911) acquisitions also demonstrated almost perfect agreement with the fifteen acquisitions (mean, 1.4 ± 0.2 m/sec).

CONCLUSION

Three acquisitions can be enough to measure the hepatic SWVs in children with regular free breathing status using SSI.

CLINICAL RELEVANCE/APPLICATION

The reduced number of SWV acquisitions could shorten examination times and make examinations easier for children without the need for breath-holding, thus resulting in wider application of ultrasound elastography in children.

RC413-11 Magnetic Resonance Enterography (MRE) Surveillance of Asymptomatic Pediatric Crohn's Disease Patients

Tuesday, Nov. 29 5:05PM - 5:15PM Room: S102AB

Awards
Student Travel Stipend Award

Participants
Kaiming Wu, MD, Boston, MA (*Presenter*) Nothing to Disclose
Jess Kaplan, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Christopher J. Moran, MD, Boston, MA (*Abstract Co-Author*) Research Grant, Allergan plc
Esther Israel, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Harland S. Winter, MD, Boston, MA (*Abstract Co-Author*) Consultant, PAREXEL International Corporation Consultant, Johnson & Johnson Consultant, Shire plc Consultant, Salix Pharmaceuticals, Inc Institutional Grant support, Johnson & Johnson Institutional Grant support, AstraZeneca PLC Institutional Grant support, Shire plc
Michael S. Gee, MD, PhD, Jamaica Plain, MA (*Abstract Co-Author*) Nothing to Disclose
Aubrey Katz, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jeffrey Biller, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Magnetic resonance enterography (MRE) has become the primary imaging modality for evaluating disease activity in pediatric Crohn’s disease (CD) patients. Typical standard of practice involves imaging patients when they become symptomatic; the significance of MRE for surveillance of asymptomatic CD patients is not known. The purpose of this study is to analyze MRE studies performed on asymptomatic young CD patients and to identify MRE imaging features associated with future clinical recurrence.

METHOD AND MATERIALS

A retrospective search was performed to identify patients 18 years of age or under with known CD who had MRE performed while asymptomatic on anti-TNFa therapy. All MRE studies were reviewed by an experienced pediatric radiologist blinded to clinical data for presence or absence of four imaging features of activity: wall thickening, T2 hyperintensity, mural hyperenhancement, and vasa recta engorgement (Comb sign), as well as overall assessment of presence of absence of active disease. Two pediatric gastroenterologists reviewed the electronic records of all patients to evaluate for future clinical recurrence, defined as CD-related hospital admission, surgery, or treatment escalation.

RESULTS

37 MRE studies performed in 36 asymptomatic patients were identified, with 10 patients demonstrating clinical recurrence within 6 months of MRE. Overall assessment of disease activity by MRE was observed in a higher proportion of patients with clinical recurrence within 6 months (80%) compared to patients without recurrence (29.6%), a statistically significant association ($p=0.01$, Fisher’s Exact Test). Among individual MRE features, mural hyperenhancement demonstrated the highest accuracy (76%) and was observed in 80% of patients with 6 month clinical recurrence vs 26% without ($p<0.01$).

CONCLUSION

MRE evidence of active inflammation in asymptomatic CD patients on biologic therapy is associated with future clinical recurrence, with mural hyperenhancement having a statistically significant association with clinical recurrence within 6 months. These results suggest a role for imaging in routine surveillance of pediatric CD patients on treatment.

CLINICAL RELEVANCE/APPLICATION

Imaging may play a role in the routine surveillance of asymptomatic pediatric Crohn's disease patients in order to predict future recurrence and provide a temporal window for therapy modification before clinical symptoms recur.

RC413-12 Colonic Findings on MR Enterography Pre-Colectomy in Pediatric IBD-related Colitis

Tuesday, Nov. 29 5:15PM - 5:25PM Room: S102AB

Participants
Shilpa Radhakrishnan, MBBS, DMRD, Chennai, India (*Presenter*) Nothing to Disclose
Natashia M. Seeman, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Sebastian K. King, MBBS,PhD, Melbourne, Australia (*Abstract Co-Author*) Nothing to Disclose
Michelle Falkiner, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Jacob C. Langer, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Mary-Louise C. Greer, MBBS, FRANZCR, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Magnetic resonance enterography (MRE) is increasingly performed pre-colectomy in pediatric inflammatory bowel disease(PIBD)-related colitis, helping distinguish ulcerative colitis (UC) and Crohn's disease, aiding operative planning. While targeting small intestine, MRE provides opportunity to evaluate the colon. The purpose of the study was to assess the accuracy of MRE in detecting colonic disease in PIBD compared with post-colectomy histopathology.

METHOD AND MATERIALS

Research and ethics board approved, clinicopathologic data were captured by retrospective chart review of patients 2-18 years who underwent colectomy for PIBD from 2000-2014. Preoperative MRE were independently reviewed by two pediatric radiologists, with a consensus read, blinded to reports and clinicopathologic data. Subset colonic MRE findings recorded included: disease location and extent, wall thickness, wall T2 signal, enhancement degree and pattern, restricted diffusion, stricture presence and length. These were compared with post-colectomy histopathology reports and final diagnosis incorporating ileocolonoscopy data.

RESULTS

Colectomies were performed in 68 patients (36 male, 32 female), with median age at diagnosis 11 years (range 2-17) and 14 years (range 3-17) at colectomy. Preoperative MRE occurred in 23 patients, with average time to surgery < 1 year. Disease presence and location correlated well with histopathology in 16/23 (70%) MRE, was underestimated in 6 (26%) MRE, with 1 (4%) normal MRE showing UC on histopathology, surgery 1 year post-MRE. In 7 MRE, colonic strictures were reported in various locations, 4 (57%) with fibrotic strictures and 3 (43%) with severe active inflammation but no strictures/fibrosis on histopathology. Limitations related to time between MRE and surgery, and reliability localizing MRE findings with surgical and histopathology specimens, with presence or grade of fibrosis not always recorded on pathology.

CONCLUSION

MRE permits detection and localization of colonic IBD, delineating strictures variably. Minor modification such as rectally-instilled contrast may improve this. By correlating MRE with post-colectomy histopathology, there is opportunity to improve our understanding of PIBD on MRI.

CLINICAL RELEVANCE/APPLICATION

MRE allows us to assess the colon, with minor technique modification likely needed to optimize this, and correlation with post-colectomy histopathology improves our understanding of PIBD on MRI.

RC413-13 Effects of Adaptive Statistical Iterative Reconstruction-V Technique on Radiation Dose Reduction and Image Quality of Pediatric Abdominal CT

Tuesday, Nov. 29 5:25PM - 5:35PM Room: S102AB

Participants
Xin-Xian Zhang, Xu Zhou, China (*Presenter*) Nothing to Disclose
Chenglong Li, Xu Zhou, China (*Abstract Co-Author*) Nothing to Disclose
Tao Xin, Xuzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jiong Li, Xuzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yong Tang, Xuzhou, China (*Abstract Co-Author*) Nothing to Disclose
Qiancheng Li, Xuzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the effects of adaptive statistical iterative reconstruction V technique (ASIR-V) on radiation dose reduction and image quality in pediatric abdominal CT.

METHOD AND MATERIALS

Sixty children were randomized into three groups, 20 cases each. All children were scanned at 9HU (5mm slice thickness) noise index levels of automatic current modulation with 100 kV on 256-row CT scanner. The rotation time was 0.3s and detector width was 120-160mm. The presetting ASIR-V percentage was 30%, 50% and 70% in Group A, Group B and Group C, respectively. The CT number and standard deviation (SD) were measured on t upper abdominal slice, middle abdominal slice and lower abdominal slice. The dose-length product (DLP) was recorded and effective dose (ED) was computed. Statistical analyses were performed using independent sample t test and ANOVA

RESULTS

In Group A, B and C, SD was 10.28 ± 1.03HU, 11.34 ± 0.82HU and 9.34 ± 1.67HU, respectively. And there was no statistically significant difference among three groups ($P>0.05$); SD in the three groups was similar to presetting noise index. DLP (mGy·cm) was 3.69 ± 17.55, 55.73 ± 10.62 and 37.65 ± 10.01, respectively; ED (mSv) was 2.57 ± 0.43, 1.78 ± 0.76 and 1.28 ± 0.75, respectively. ED was declining with ASIR-V percentage increasing, and the difference between any two groups was statistically significant ($P<0.01$).

CONCLUSION

ASIR-V technique can effectively reduce the radiation dose without increasing objective image noise, and is of important value in low-dose pediatric abdominal examination.

CLINICAL RELEVANCE/APPLICATION

Since children are more radio-sensitive than adults, there is a need to utilize adaptive statistical iterative reconstruction V to minimize radiation exposure without sacrificing image quality during CT exams.

RC413-14 Quantitative Analysis of Fatty Pancreas in Obese Children by Ultrasound: Its Correlation with Metabolic Syndrome and HOMA-IR

Tuesday, Nov. 29 5:35PM - 5:45PM Room: S102AB

Participants
Doo-ri Kim, Arail-Dong, Korea, Republic Of (*Presenter*) Nothing to Disclose
Mu Sook Lee, MD, Jeju-si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Guk Myung Choi, Jeju, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ki Soo Kang, Jeju-si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To attempt a quantitative analysis of fatty pancreas by transabdominal ultrasound and evaluate its correlation with metabolic syndrome and insulin resistance (HOMA IR.)

METHOD AND MATERIALS

This retrospective study included 135 obese children who underwent transabdominal ultrasound between January and December 2015. Fatty pancreas was quantitatively analyzed by pancreato-perihepatic fat index (PPHFI) on transabdominal ultrasound. Associations between PPHFI and components of metabolic syndrome, and correlation between PPHFI and HOMA-IR were analyzed. Multivariate logistic regression analysis was used to identify factors independently correlated with metabolic syndrome. The optimal

cutoff value of PPHFI to predict metabolic syndrome was calculated

RESULTS

PPHFI and HOMA-IR were significantly higher in the group with metabolic syndrome than those in the group of non- metabolic syndrome ($p<0.0001$). Each component of metabolic syndrome except fasting glucose level revealed a statistically significant association with PPHFI. PPHFI also showed a strong association with HOMA-IR ($r=0.70$; $p<0.0001$). PPHFI was an independent factor to predict metabolic syndrome (odd ratio, 3.322; $p=0.023$), and the best cutoff value of PPHFI to predict metabolic syndrome was 2.34 with high sensitivity of 0.93

CONCLUSION

Sonographic fatty pancreas which was analyzed by PPHFI may represent a meaningful factor to predict metabolic syndrome and insulin resistance in obese children.

CLINICAL RELEVANCE/APPLICATION

Ultrasonographic quantitative analysis of fatty pancreas might be used as a predictor of metabolic syndrome in obese children.

RC413-15 Pancreatic Imaging in Children

Tuesday, Nov. 29 5:45PM - 6:00PM Room: S102AB

Participants
Michael S. Gee, MD, PhD, Jamaica Plain, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify causes of pancreatitis and focal pancreatic lesions in children and adolescents. 2) Define the role of imaging in diagnosis and characterization of pancreatic pathology in the pediatric population.

ABSTRACT

SSJ07

Gastrointestinal (Hepatocellular Carcinoma)

Tuesday, Nov. 29 3:00PM - 4:00PM Room: E350

GI CT MR OI US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Hero K. Hussain, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose
Steven S. Raman, MD, Santa Monica, CA (*Moderator*) Nothing to Disclose

Sub-Events

SSJ07-01 Prospective Intraindividual Comparison of Non-Contrast MRI and US as a Surveillance Tool for HCC in Patients with Cirrhosis at High Risk of HCC

Tuesday, Nov. 29 3:00PM - 3:10PM Room: E350

Participants
Hye Young Jang, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
So Yeon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Ho Byun, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
So Jung Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyung Jin Won, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jihyun An, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young-Suk Lim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seong Ho Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, DONGKOOK Pharmaceutical Co, Ltd

PURPOSE

To prospectively compare the diagnostic yield of non-contrast MRI including diffusion-weighted imaging (DWI) and US as a surveillance tool for detecting HCCs in patients with cirrhosis at high risk of HCC.

METHOD AND MATERIALS

A prospective surveillance study included 407 consecutive cirrhosis patients with an estimated annual risk of HCC > 5% who underwent one to three, biannual screening examinations with paired liver MRI and US between November 2011 and August 2014. The referral criteria for HCC on non-contrast MRI were defined as a nodule showing one of the following criteria: the presence of intralesion fat, mild to moderate hyperintensity on T2-weighted imaging, or hyperintensity on DWI at b-500 s/mm2. On US, a discrete focal lesion equal or more than 1cm in diameter or suspicious tumor thrombosis was referred for a further work-up for HCC. During image interpretation, radiologists were blinded to the results of the other imaging modality. The confirmation of HCC was based on the results of a histologic examination and/or typical CT images of HCC. Per-lesion sensitivity of HCC and per-exam specificity were compared between non-contrast MRI and US.

RESULTS

In 1100 screening rounds of paired MRI and US, 48 HCCs were diagnosed in 43 patients. Among the 48 HCCs, intralesional fat was detected in 4 HCCs (8.3%), 31 HCCs (64.6%) showed mild to moderate hyperintensity on T2-weighted imaging, and 37 HCC (77.1%) appeared hyperintensity on DWI. Among the 71 positive cases on US, 12 patients were confirmed to have HCC. Using the diagnostic criteria, per lesion sensitivity of non-contrast MRI was 81.3 % (39/48), which was significantly higher that of 25% (12/48) (P<0.001). Non-contrast MRI showed a significantly higher per-exam specificity that US [98.0% (1036/1057) vs. 94.4% (998/1057), P<0.001].

CONCLUSION

In this prospective intraindividual comparison study, non-contrast MRI including DWI outperformed US as a surveillance test for HCC in patients with cirrhosis at high risk of HCC.

CLINICAL RELEVANCE/APPLICATION

In patients with cirrhosis at high risk of HCC, the non-contrast MRI including DWI can be considered to an alternative surveillance tool to US.

SSJ07-02 Diagnostic Accuracy of Prospective Applications of Liver Imaging Reporting and Data System (LI-RADS) on Gadoxetic Acid-Enhanced MRI

Tuesday, Nov. 29 3:10PM - 3:20PM Room: E350

Participants
Yeun Yoon Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Chansik An, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sungwon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myeong-Jin Kim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Bayer AG

PURPOSE

To evaluate the diagnostic accuracy of prospectively applied Liver Imaging Reporting and Data System (LI-RADS, v2014) for hepatocellular carcinoma (HCC) on gadoxetic acid-enhanced liver MRI.

METHOD AND MATERIALS

This study included 528 hepatic observations from 268 patients who met the following criteria: 1) at high risk for HCC, 2) underwent gadoxetic acid-enhanced liver MRI in 2014 at our institution, 3) not previously treated for HCC, and 4) whose radiologic reports were prospectively reported using LI-RADS. Final diagnoses were determined histologically for all non-HCC malignancies (two cholangiocarcinomas [CCs] and four combined HCC-CCs), 110 of 122 HCCs, seven regenerative or dysplastic nodules, and one hemangioma. Fifty benign lesions and 12 HCCs were clinically diagnosed with follow-up imaging. The sensitivities and specificities of LI-RADS categories were calculated with 95% confidence intervals (CIs).

RESULTS

None of the nine (0%) LR-1, one of 22 (4.5%) LR-2, 14 of 35 (40.0%) LR-3, 19 of 27 (70.4%) LR-4, 73 of 75 (97.3%) LR-5, and all of the five (100%) LR-5V observations were HCCs. Two of 75 (2.7%) LR-5 observations were combined HCC-CCs. Of 13 LR-M lesions, only three (23.1%) were non-HCC malignancies and the remainder were HCCs. Three of six (50%) non-HCC malignancies were categorized as LR-4 or LR-5. When LR-5 and LR-5V were considered positive diagnosis for HCC, the sensitivity and specificity were 63.9% (95% CI, 54.8–72.4) and 96.9% (95% CI, 89.2–99.6), respectively. When LR-4, LR-5, and LR-5V were considered positive, the sensitivity and specificity were 79.5% (95% CI, 71.3–86.3) and 84.4% (95% CI, 73.1–92.2), respectively.

CONCLUSION

In high-risk patients for HCC, LR-5 and LR-5V showed a high specificity for diagnosing HCC. However, a significant portion of non-HCC malignancies were categorized as LR-4 or LR-5 and a majority of LR-M lesions were HCCs, which suggests the necessity for modification of criteria for the LR-M category.

CLINICAL RELEVANCE/APPLICATION

LR-M category of LI-RADS v2014 needs improvement to better exclude non-HCC malignancies in high risk patients for HCC and to decrease the misdiagnosis rate of HCCs as non-HCC malignancies.

SSJ07-03 Abdominal Ultrasound Compared to Cross-Sectional Imaging for Surveillance of Hepatocellular Carcinoma in High Risk Patients: Results of 5-year Cohort Follow-up

Tuesday, Nov. 29 3:20PM - 3:30PM Room: E350

Participants
Francois Willemssen, MD, Hoogstraten, Belgium (*Presenter*) Nothing to Disclose
Lievay van Dam, MSc, MD, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Roy S. Dwarkasing, MD, PhD, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Hepatocellular carcinoma (HCC) is the most common primary malignant tumor of the liver and is the third leading cancer-related cause of death. Major risk factors are identified including cirrhosis caused by viral hepatitis B and C infection, and hereditary hemochromatosis. According to European guidelines patients at risk for HCC should be surveyed with abdominal ultrasound (US) every 6 months.

METHOD AND MATERIALS

In our tertiary referral institute, we selected all patients between October 2005-October 2010 from our HCC database. Inclusion criteria were: pathological or histochemical confirmed HCC, abdominal ultrasound and contrast-enhanced computed tomography (CT) or magnetic resonance imaging (MRI) within three months. Number and size of the detected lesions were compared.

RESULTS

In 88 patients included, 83 HCC lesions were described at US evaluation compared to 181 lesions detected using CT or MRI. Lesions found on US had a mean diameter of 60mm (range 5-135mm, median 45mm), on cross-sectional imaging the mean diameter was 56mm (range 5-160mm, median 45mm). In 30 of the 88 (34%) patients US was negative, while cross-sectional imaging detected HCC lesions. In 18 of those 30 cases all lesions were smaller than 25mm (60%). Of all the patients (n=25) with lesions smaller than 25mm, 18 ultrasound examinations were false negative (72%).

CONCLUSION

Surveillance for HCC in high-risk patients using US is inadequate. A significant number of HCC lesions are missed using US surveillance, especially small lesions, resulting in a false negative examination in a third of the cases.

CLINICAL RELEVANCE/APPLICATION

This warrants the question if surveillance for HCC should be performed with advanced cross sectional imaging modalities.

SSJ07-04 Effect of Threshold Growth on Liver Imaging Reporting and Data System Categorization

Tuesday, Nov. 29 3:30PM - 3:40PM Room: E350

Participants
Victoria Chernyak, MD, Bronx, NY (*Presenter*) Nothing to Disclose
Mariya Kobi, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Kate Fruitman, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Alla M. Rozenblit, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;

PURPOSE

Liver Imaging Reporting and Data System (LI-RADS, LR) uses major features (arterial phase hyperenhancement [APHE], "washout" [WO], "capsule", diameter, threshold growth [TG]) to codify probability of an observation being hepatocellular carcinoma. Inclusion of TG in the LI-RADS algorithm was based on expert opinion rather than scientific evidence. The goal of this study was to assess the effect of TG on LR categorization.

METHOD AND MATERIALS

All MR and CT reports created using a standardized LR v2014 template at one tertiary care center between 4/15–2/16 were identified. For each LR3, LR4, and LR5 reported observation, the presence of every LR major feature was recorded retrospectively. Two LR categories were then assigned: one using all LR-v2014 major features and one using a revised system that disregards TG (LR-revised). Categories assigned using LR-v2014 and LR-revised were compared. Some analyses were repeated excluding patients without prior exams (TG not applicable).

RESULTS

136 patients (85 [62%] male, mean age 62 [±10] years) with 297 observations (median diameter 13mm, IQR 9-20mm) were included. Of 297 observations, 204 (69%) had APHE, 186 (63%) had WO, 49 (16%) had "capsule" and 40 (14%) had TG. Of 40 observations with TG, 26 (65%) were new observations ≥10mm, 8 (20%) had diameter increase ≥50% in ≤6 months and 6 (15%) had diameter increase ≥100% in >6 months. LR-v2014 categories were LR3 in 131/297 (44%), LR4 in 87/297 (29%) and LR5 in 79/297 (27%). LR-revised categories were LR3 in 147/297 (50%), LR4 in 78/297 (26%) and LR5 in 72/297 (24%). Assigned categories were discrepant in 22/297 (7%) observations. 7/79 (9%) observations categorized LR5 with LR-v2014 were recategorized LR4 with LR-revised. Of these, all 7 were 10-19 mm and had APHE; 5/7 (71%) were new observations and 2/7 (29%) had diameter increase ≥50% in ≤6 months. When excluding 70 observations without prior exams, 22/227 (10%) categories were discrepant; 7/50 (14%) observations categorized LR5 with LR-v2014 were recategorized LR4 with LR-revised.

CONCLUSION

TG affects LI-RADS category in the minority of cases. Disregarding TG causes a small but meaningful proportion of LR5 observations to be downgraded to LR4.

CLINICAL RELEVANCE/APPLICATION

Removing threshold growth as a major feature to simplify LI-RADS algorithm would not affect final LI-RADS category in most cases but would cause downgrading of a meaningful proportion of LR5 observations.

SSJ07-05 Risk Assessment for Hepatocellular Carcinoma by Using Magnetic Resonance Elastography during Follow-up

Tuesday, Nov. 29 3:40PM - 3:50PM Room: E350

Participants
Shintaro Ichikawa, MD, Chuo-Shi, Japan (*Presenter*) Nothing to Disclose
Utaroh Motosugi, MD, Yamanashi, Japan (*Abstract Co-Author*) Nothing to Disclose
Tetsuya Wakayama, PhD, Hino-shi, Japan (*Abstract Co-Author*) Employee, General Electric Company
Hiroshi Onishi, MD, Yamanashi, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate magnetic resonance elastography (MRE) as a means for predicting the development of hepatocellular carcinoma (HCC) in chronic liver disease.

METHOD AND MATERIALS

We reviewed data from 161 patients with chronic liver disease with the following inclusion criteria: had 2 MRE examinations between days 365–1424 with >12 month interval, no prior history of or development of HCC between the two exams, and available laboratory results. Liver stiffness was classified as low (<3 kPa), moderate (3–4.7 kPa), and high (>4.7 kPa). The classification for change in stiffness between the two MREs is as follows: high on both or high on the first and moderate on the second (group A, n=61), low on both (group C, n=39), and other combinations (group B, n=61). We used Cox analyses and Kaplan-Meyer methods to determine the risk of developing HCC.

RESULTS

Forty-seven patients (29.2%) developed HCC during the follow-up period (45.9% (28/61) of group A, 27.9% (17/61) of group B; 5.1% (2/39) of group C). There was a significant difference in the disease-free survival rates between groups A (54.9%), B (73.9%), and C (87.6%) at 3-years (p=0.0001). The independent risk factors for development of HCC included: belonging to Group A (hazard ratio [HR] versus group C=6.0, P=0.0028; versus group B=2.16, P=0.0268), age (HR = 1.04, P=0.0154), and alanine aminotransferase level (HR=1.02, P =0.0196).

CONCLUSION

Results from MRE can stratify the risk of developing HCC during the follow-up of patients with chronic liver disease.

CLINICAL RELEVANCE/APPLICATION

Patients with chronic liver disease with high liver stiffness (>4.7 kPa) on their first MR elastography are at high risk for developing an HCC, regardless of the results of their second MR elastography. Thus, they should have meticulous follow-up and be screened for HCC development.

SSJ07-06 Evaluation of Texture Analysis Parameters for Response Prediction and Monitoring in Patients with Hepatocellular Carcinoma Undergoing Transarterial Chemoembolization Using Biphasic Contrast-Enhanced CT Image Data: Correlation with Results of Liver Pe

Tuesday, Nov. 29 3:50PM - 4:00PM Room: E350

Participants
Christopher Kloth, Tuebingen, Germany (*Presenter*) Nothing to Disclose
Wolfgang M. Thaiss, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Rainer Kargel, Forchheim, Germany (*Abstract Co-Author*) Employee, Siemens AG
Rainer Grimmer, Forchheim, Germany (*Abstract Co-Author*) Employee, Siemens AG
Gerd Grozinger, MD, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Roland Syha, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose

Dominik Ketelsen, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Konstantin Nikolaou, MD, Tuebingen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG; Speakers Bureau, Bracco Group; Speakers Bureau, Bayer AG
Marius Horger, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To analyze the value of different parameters derived from CT texture analysis (CTTA) image data in hepatocellular carcinoma (HCC) for prediction of response and response evaluation to transarterial chemoembolization (TACE).

METHOD AND MATERIALS

The study group consisted of 56 HCC in 28 patients (27 male; mean age 67.2±10.4) who underwent CECT examinations before and after TACE therapy. The study was approved by the local ethic committee. Mean time between the two CT examinations was 39.93 ± 62.21 days. Standard of reference was perfusion-CT of the liver additionally to arterial and portal-venous post-contrast phases. Patients were assigned into subgroups: no response-NR (n=9), partial response-PR (n=34) and complete response-CR (n=13). CTTA parameters were: heterogeneity/intensity/average/deviation/skewness/contrast of NGTDM (Neighborhood Grey-Tone Difference Matrix). For each parameter mean, entropy and uniformity were calculated.Blood flow(BF), blood volume(BV), arterial liver perfusion(ALP), portal-venous perfusion(PVP) and hepatic perfusion index(HPI) were calculated in the pre- and post-TACE settings by liver perfusion-CT.

RESULTS

Patients with CR showed higher tumor perfusion parameters before TACE and a significant decrease in BF/BV/ALP/HPI after TACE (p=0.002/0.002/0.002/0.003). Patients with PR showed similar results, but only in responding tumor parts. ROC analysis of CTTA parameters yielded predictive cut-off values for CR in the arterial CECT-phase (sensitivity/specificity) for mean intensity (88.9%/69.8%), mean average (88.9%/69.8%) and skewness (90.0%/58.1%) In the portal-venous CECT-phase similar for uniformity of heterogeneity, uniformity of skewness and mean contrast (92.3%/81.8%/92.3%/54.5%/92.3%/95.2%). Significant correlations were registered between changes in mean heterogeneity and BF (p=0.004, r=-0.815), BV (p=0.002, r=-0.851) and ALP (p=0.002, r=-0.851) in the arterial phase in CR and PR.

CONCLUSION

Significant correlations exist between CTTA parameters and those derived from perfusion-CT both in the pre- and post- TACE setting with predictive value for TACE outcome.

CLINICAL RELEVANCE/APPLICATION

Prediction of response to local therapy (TACE) by means of CTTA can be implemented for choosing the best treatment strategy.Improved response monitoring by CTTA is beneficial for optimal patient management and could be a substitute for more sophisticated imaging techniques like perfusion-CT or MRI.

SSJ08

Gastrointestinal (New Ultrasound Techniques)

Tuesday, Nov. 29 3:00PM - 4:00PM Room: E353A

GI US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Anthony E. Samir, MD, Boston, MA (*Moderator*) Consultant, Pfizer Inc Consultant, General Electric Company Consultant, PAREXEL International Corporation Research Grant, Koninklijke Philips NV Research Grant, Siemens AG Research Grant, Toshiba Corporation Research Grant, General Electric Company Research Grant, Samsung Electronics Co, Ltd Research Grant, Analogic Corporation Research support, SuperSonic Imagine Research support, Hitachi, Ltd
Jessica B. Robbins, MD, Madison, WI (*Moderator*) Nothing to Disclose

Sub-Events

SSJ08-01 Characterization of Malignant versus Benign Focal Liver Lesions with Lumason-Enhanced Ultrasound Imaging

Tuesday, Nov. 29 3:00PM - 3:10PM Room: E353A

Participants
Richard G. Barr, MD, PhD, Youngstown, OH (*Presenter*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Toshiba Corporation; Research Grant, Esaote SpA; Research Grant, B and K Ultrasound; Research Grant, Hitachi Aloka Ultrasound
Edward G. Grant, MD, Los Angeles, CA (*Abstract Co-Author*) Research Grant, General Electric Company ; Medical Advisory Board, Nuance Communications, Inc
Dirk-Andre Clevert, MD, Muenchen, Germany (*Abstract Co-Author*) Speaker, Siemens AG; Speaker, Koninklijke Philips NV; Speaker, Bracco Group;
Barry B. Goldberg, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Michelle L. Robbin, MD, Birmingham, AL (*Abstract Co-Author*) Consultant, Koninklijke Philips NV;
Andrew De la Torre, MD, Newark, NJ (*Abstract Co-Author*) Nothing to Disclose
Wui K. Chong, MD, Chapel Hill, NC (*Abstract Co-Author*) Advisory Board, Bracco Group;
Deike H. Strobel, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the diagnostic performance of contrast-enhanced ultrasound (CEUS) with Lumason (sulfur hexafluoride lipid-type A microspheres) to that of unenhanced ultrasound (UEUS) for characterization of malignant versus benign focal liver lesions (FLLs).

METHOD AND MATERIALS

Two multicenter clinical trials of identical design were conducted in adult subjects with at least one FLL requiring work-up for characterization; subjects underwent UEUS followed by CEUS with 2.4 mL Lumason. UEUS and CEUS images were evaluated by on-site investigators and 3 off-site, blinded readers unaffiliated with the enrolment centers and blinded to any clinical data. Diagnostic performance of UEUS and CEUS for FLL characterization was determined using tissue pathology/histology (when FLL biopsy could be performed), or 6-month follow-up with contrast-enhanced CT or MRI as truth standard.

RESULTS

A total of 499 subjects were included in the 2 trials. Per truth standard, 256 lesions were benign (n=116 hemangioma, n=64 focal nodular hyperplasia, n=76 other) and 243 were malignant (n=131 hepatocellular carcinoma, n=78 metastases, n=34 other). For the off-site reads, the pooled sensitivity, specificity, and accuracy were 43.6%, 34.0%, 38.7%, respectively for UEUS and 72.4%, 80.5%, 76.6%, respectively for CEUS ($p<.05$). For on-site reads, sensitivity, specificity, and accuracy were 37.0%, 21.5%, 29.1%, respectively for UEUS and 89.3%, 84.0%, 86.6%, respectively for CEUS ($p<.05$). No serious adverse events related to Lumason administration were reported.

CONCLUSION

Overall, Lumason-enhanced ultrasound imaging provided an improvement from UEUS for characterization of FLLs.

CLINICAL RELEVANCE/APPLICATION

The results suggest that CEUS with 2.4 mL of Lumason is safe and may be useful to improve characterization of focal liver lesions when UEUS is inconclusive.

SSJ08-02 Characterization of Focal Liver Masses: A Multicentre Study Comparing Contrast Enhanced Ultrasound (CEUS) to Grayscale/Doppler Ultrasound, Computed Tomography and Magnetic Resonance Imaging

Tuesday, Nov. 29 3:10PM - 3:20PM Room: E353A

Awards
Student Travel Stipend Award

Participants
David P. Burrowes, MD, Calgary, AB (*Presenter*) Nothing to Disclose
Alexandra Medellin-Kowalewski, MD, Calgary, AB (*Abstract Co-Author*) Nothing to Disclose
Alison C. Harris, MBChB, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose

Laurent Milot, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
Stephanie R. Wilson, MD, Calgary, AB (*Abstract Co-Author*) Equipment support, Siemens AG; Equipment support, Koninklijke Philips NV

PURPOSE

In light of recent FDA approval of a microbubble for liver CEUS in the USA, we propose that CEUS is superior to grayscale ultrasound and equivalent to institutional CT and MR for characterization of focal liver masses.

METHOD AND MATERIALS

This prospective study comprises 224 patients, from 5 geographically separate centres, presenting for evaluation of a focal liver mass (12 adenoma, 8 cholangiocarcinoma, 55 FNH, 41 hemangioma, 71 HCC, 25 metastasis, 12 other). All had US/CEUS and CT and/or MR.CEUS was performed with Definity (Lantheus, Billerica MA) on standard US systems. They included a continuous cine of wash-in to peak enhancement, and still portal venous and delayed images to 5 minutes. CT and MR were performed as standard care with institutional protocols. Pre-contrast, arterial phase and portal venous phase images were included.Three separate electronic blind read files; one for each of CEUS (including grayscale and Doppler images), CT and MR were created and read blindly by four radiologists, two for CEUS and two for CT/MR utilizing a Microsoft Access based questionnaire regarding the arterial, portal venous and delayed phase enhancement of each lesion. Readers also provided a preference for malignancy or benignancy, a final diagnosis as well as a confidence levelResults of the blind read were compared with the truth standard from pathology, long-term stability or expert consensus.

RESULTS

Our results show that CEUS is superior to grayscale/Doppler ultrasound and at least equivalent to CT and MR both in determining the malignancy of a lesion and in diagnostic accuracy, with an increase in confidence from a mean of 1.6 for grayscale/Doppler to 3.9 on CEUS on a 5 point scale. Sensitivity, specificity and accuracy of CEUS are 95%, 82%, 67%, of grayscale/Doppler are 81%, 56% 40%, of CT are 89%, 75%, 62% and of MR are 85%, 79%, 62% respectively.

CONCLUSION

CEUS is superior to grayscale ultrasound both for determination of malignancy and when assigning a final diagnosis for a focal liver mass. Additionally, CEUS is equivalent, and in select cases performs better, in the characterization of focal liver lesions than institutional CT and MRI.

CLINICAL RELEVANCE/APPLICATION

In the evaluation of a focal liver mass, CEUS is a necessary adjuvant to grayscale/Doppler ultrasound and is equivalent to CT and MR in its ability to predict malignancy and provide a diagnosis.

SSJ08-03 Relationship between Liver Tissue Stiffness and Histopathological Findings Analyzed by Shear Wave Eastography in Patients with Non-alcoholic Fatty Liver Disease

Tuesday, Nov. 29 3:20PM - 3:30PM Room: E353A

Participants
HIROHITO TAKEUCHI, Tokyo, Japan (*Presenter*) Nothing to Disclose
Katsutoshi Sugimoto, MD, PhD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshiyuki Kobayashi, Toyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Fuminori Moriyasu, MD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Takao Itoi, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Shear wave elastography (SWE) is validated in chronic hepatitis C and B; however, limited data are available in Non-Alcoholic Fatty Liver Disease (NAFLD). This study is aimed to assess the accuracy and the efficacy of SWE for the detection of fibrosis in patients with NAFLD and to evaluate the effect of other histologic parameters on SWE measurement.

METHOD AND MATERIALS

Written informed consent was obtained from all subjects, and the local ethics committee approved the study. Seventy-one patients with histologically proven NAFLD (mean age, 50.8 years ± 15.7) were examined. All patients underwent SWE (AixplorerTM; SuperSonic Imagine) and FIB4 index (based on age, aspartate aminotransferase [AST] and alanine aminotransferase [ALT] levels, and platelet counts). SWE measurements were compared to the histologic features based on of NAFLD activity score and FIB4 index.

RESULTS

The area under the ROC curve (AUC) for the diagnosis of hepatic fibrosis stages 3 or higher was 0.821 (optimal cutoff value, 13.1 kPa; sensitivity, 62.5%; specificity, 57.4%) for SWE, as was 0.822 (optimal cutoff value, 1.41; sensitivity, 71.9%; specificity, 53.9%) for FIB4 index, respectively. Median liver stiffness values measured using SWE showed a stepwise increase with increasing hepatic fibrosis stage ($P<0.001$), inflammation score ($P=0.018$), and ballooning score ($P<0.001$), and showed a stepwise decrease with increase hepatic steatosis stage ($P=0.046$).

CONCLUSION

SWE is a promising imaging modality for assessing the presence or absence of advanced fibrosis in patients with NAFLD. The effect of steatosis on SWE measurements may be controversial.

CLINICAL RELEVANCE/APPLICATION

SWE is a rapid and noninvasive method of detecting fibrosis in patients with nonalcoholic fatty liver disease.

SSJ08-04 Noninvasive Evaluation of Liver Fibrosis using Two-dimensional Shear Wave Elastography: A Comparison with Different Serum Fibrosis Indices in Chronic Hepatitis B

Tuesday, Nov. 29 3:30PM - 3:40PM Room: E353A

Participants
Hong Ding, MD, Shanghai, China (*Presenter*) Nothing to Disclose
Yuan Zhuang, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Hong Han, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Wenping Wang, MD, PhD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To explore the value of 2D-SWE in assessing the extent of liver fibrosis with chronic hepatitis B (CHB) and to compare its diagnostic accuracy with different fibrosis indices involving aminotransferase/platelet ratio index (APRI), fibrosis index based on the 4 factors (FIB-4), King's score and Forns index.

METHOD AND MATERIALS

A total of 384 subjects (304 with CHB and 80 controls) who underwent partial hepatectomy were enrolled and divided into five groups (S0~S4) according to Scheuer scoring system histologically. All patients were examined with 2D-SWE to obtain liver stiffness measurements (LSMs), which were compared with the histological findings and analyzed with factors including age, gender and several blood markers that might influence the value of LSMs.

RESULTS

The intraclass correlation coefficient of five LSMs with 2D-SWE was 0.948. The average LSMs were 5.74±1.10 kPa for fibrosis S0 (n=10), 6.53±0.96 kPa for S1 (n=30), 7.94±0.89 kPa for S2 (n=50), 9.40±1.31 kPa for S3 (n=47), and 14.52±3.55 kPa for S4 (n=167). The multiple comparisons of LSMs showed significant statistical difference between every two fibrotic groups expect between S0 and S1 groups. For the prediction of S≥2 and S=4, the optimal cut-off values of LSMs were 7.6 kPa and 10.4 kPa, with a sensitivity of 92.0% and 94.6% and a specificity of 90.0% and 94.9%, respectively. All these methods correlated with fibrosis stages statistically ($p<0.05$) and the correlation coefficients between pathological stages with LSMs, APRI, FIB-4, King's score and Forns index were 0.875, 0.409, 0.397, 0.428 and 0.452, respectively. The AUROC in diagnosing fibrosis S≥2 were 0.970, 0.771, 0.727, 0.787, and 0.765, respectively; and the AUROC were 0.986, 0.703, 0.712, 0.716, and 0.740 for diagnosing S=4, respectively. Liver fibrosis stages, inflammatory activity grades and the level of gamma glutamyltranspeptidas (GGT), albalanine aminotransferase (ALT), and aspartate aminotransferase (AST) significantly correlated with LSMs(β=0.618, 0.015, 0.079, -0.083 and 0.146, respectively; $p<0.05$).

CONCLUSION

2D-SWE could be used to predict significant fibrosis (S≥2) and cirrhosis (S=4) in CHB patients with notable higher diagnostic accuracy than serum fibrosis models. In terms of LSM associated with hepatic fibrosis, the confounding factors including inflammatory activity, and the level of GGT, ALT, and AST that independently influence the value of LSMs with 2D-SWE.

CLINICAL RELEVANCE/APPLICATION

N/A

SSJ08-05 Initial Experience Using a Telerobotic Ultrasound System to Perform Adult Abdominal Examinations

Tuesday, Nov. 29 3:40PM - 3:50PM Room: E353A

Awards
Student Travel Stipend Award

Participants
Scott J. Adams, Saskatoon, SK (*Presenter*) Nothing to Disclose
Brent E. Burbridge, MD, FRCPC, Saskatoon, SK (*Abstract Co-Author*) Nothing to Disclose
Ivar Mendez, MD,PhD, Saskatoon, SK (*Abstract Co-Author*) Nothing to Disclose
Paul S. Babyn, MD, Saskatoon, SK (*Abstract Co-Author*) Nothing to Disclose
Leanne Langford, Saskatoon, SK (*Abstract Co-Author*) Nothing to Disclose
Vincent Vergara, MD, Saskatoon, SK (*Abstract Co-Author*) Nothing to Disclose
Andreea Badea, BSC, Saskatoon, SK (*Abstract Co-Author*) Nothing to Disclose
Rhonda Bryce, MD, Saskatoon, SK (*Abstract Co-Author*) Nothing to Disclose
Luis Bustamante, Saskatoon, SK (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the feasibility of performing adult abdominal examinations using a telerobotic ultrasound system in which radiologists/sonographers can control fine movements of a transducer and all ultrasound settings from a remote location.

METHOD AND MATERIALS

Eighteen patients prospectively underwent a conventional sonography examination (using EPIQ 5, Philips or LOGIQ E9, GE Healthcare) followed by a telerobotic sonography examination (using the MELODY System, AdEchoTech; SonixTablet, BK Ultrasound; and TE30 All-in-One HD Videoconferencing Endpoint, Huawei Technologies) according to a standardized abdominal imaging protocol. For telerobotic examinations, patients located at an imaging clinic were scanned remotely by a sonographer 2.75 km away. Conventional examinations were read independently from telerobotic examinations. We assessed the ability of the system to generate images of diagnostic quality and acceptability of the system to patients and sonographers.

RESULTS

92% of organs visualized on conventional examinations were sufficiently visualized on telerobotic examinations. Five pathological findings were identified on both telerobotic and conventional examinations, three findings were identified using only conventional sonography and two findings were identified using only telerobotic sonography. A paired sample t-test showed no significant difference between the two modalities in measurements of the liver, spleen, and diameter of the proximal aorta; however, telerobotic assessments overestimated distal aorta and common bile duct diameters and underestimated kidney lengths (p-values <0.05). All patients strongly agreed or somewhat agreed that they would be willing to have another telerobotic examination.

CONCLUSION

A telerobotic ultrasound system is feasible for performing abdominal ultrasound examinations at a distant location with minimal training and set-up requirements and a moderate learning curve. Telerobotic sonography may open up the possibility of establishing remote ultrasound clinics for communities which lack skilled sonographers and radiologists, thereby improving access to care.

CLINICAL RELEVANCE/APPLICATION

A telerobotic ultrasound system is feasible for performing abdominal ultrasound examinations at a distant location with minimal training and set-up requirements and may improve access to care.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Paul S. Babyn, MD - 2012 Honored Educator

SSJ08-06 Differentiation of Inflammatory from Fibrotic Bowel Strictures Among Patients with Crohn's Disease through Analysis of Time-intensity Curves Obtained after Microbubble Contrast Agent Injection

Tuesday, Nov. 29 3:50PM - 4:00PM Room: E353A

Participants
Emilio Quaia, MD, Edinburgh, United Kingdom (*Presenter*) Nothing to Disclose
Antonio Giulio Gennari, MD, Trieste, Italy (*Abstract Co-Author*) Nothing to Disclose
Michele Pontello, Trieste, Italy (*Abstract Co-Author*) Nothing to Disclose
Federica Arban, Trieste, Italy (*Abstract Co-Author*) Nothing to Disclose
Maria A. Cova, MD, Trieste, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess whether the analysis of time-intensity curves obtained after sulphur hexafluoride-filled microbubble contrast agent injection could differentiate inflammatory from fibrotic strictures among patients with Crohn’s disease (CD).

METHOD AND MATERIALS

Sixty-five consecutive patients (40 male and 25 female; mean age ± SD, 42.2 years ± 12.22) with a diagnosis of CD were included. Inclusion criteria were: (1) CD involving the terminal ileal loop as shown by endoscopy with serial deep mucosal biopsies or cross sectional imaging with a thickness of the terminal ileal loop >3mm; (2) availability of the histologic score based on mucosal ulceration (grade 0–3), edema (grade 0–3), and quantity (grade 0–3) and depth (grade 0–4) of neutrophilic infiltration; (3) availability of mural fibrosis diagnosis when abnormal depositions of collagens were identified in the edges of mucosal ulceration; (4) at least 12 weeks of clinical follow-up in CD diagnosed no more than 2 years before the study. In each patient the terminal ileal loop was scanned by a convex-array probe (2–5 MHz) before and after sulfur hexafluoride-filled microbubble injection. The digital cine-clips registered after microbubble injection during the first-pass dynamic enhancement was quantified in lineary units by a dedicated software through manually-drawn regions of interest (ROIs) encompassing the anterior bowel wall. Time-intensity curves from patients with inflammatory and fibrotic stenosis were compared. The peak enhancement, rise time, time to peak, area under the time-intensity curve (AUC), AUC during wash-in (AUCWI), and AUC during wash-out (AUCWO) were compared between patients with inflammatory or fibrotic strictures.

RESULTS

Inflammatory (n=40) vs fibrotic stenoses (n=25) differed in the AUC (234274 ± 293293 vs 89787 ± 53819; P = <0.05), AUCWI (53256 ± 53871 vs 30993 ± 19454; P = <0.05), AUCWO (150910 ± 177859 vs 61930 ± 36181; P = <0.05) and peak enhancement (11556 ± 11298 vs 6252 ± 5504; P<.05).

CONCLUSION

The quantitative analysis of small bowel wall contrast enhancement after microbubble contrast agent injection may differentiate inflammatory from fibrotic ileal stenosis in patients with CD.

CLINICAL RELEVANCE/APPLICATION

Contrast-enhanced ultrasound provides an early identification of those patients with a fibrotic ileal stricture who deserve surgical resection from those patients with an inflammatory stricture who deserve pharmacologic treatment.

SSJ09

Gastrointestinal (Diffuse Liver Disease and HCC)

Tuesday, Nov. 29 3:00PM - 4:00PM Room: E353C

CT GI MR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Shahid M. Hussain, MD,PhD, Omaha, NE (*Moderator*) Nothing to Disclose
Myeong-Jin Kim, MD, PhD, Seoul, Korea, Republic Of (*Moderator*) Research Grant, Bayer AG

Sub-Events

SSJ09-01 The Optimal Measurement Number of Shear Wave Elastography(SWE) for Different Liver Fibrosis Stages

Tuesday, Nov. 29 3:00PM - 3:10PM Room: E353C

Participants
Qian Li, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose
Manish Dhyani, MBBS, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Atul K. Bhan, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Xi Zhang, PhD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose
Anthony E. Samir, MD, Boston, MA (*Abstract Co-Author*) Consultant, Pfizer Inc Consultant, General Electric Company Consultant, PAREXEL International Corporation Research Grant, Koninklijke Philips NV Research Grant, Siemens AG Research Grant, Toshiba Corporation Research Grant, General Electric Company Research Grant, Samsung Electronics Co, Ltd Research Grant, Analogic Corporation Research support, SuperSonic Imagine Research support, Hitachi, Ltd

PURPOSE

To explore the optimal minimum number of SWE measurements in liver fibrosis with different stages.

METHOD AND MATERIALS

218 consecutive patients who underwent SWE before their scheduled liver biopsy (age 18–78 years; mean 48 years; men 96, women 122) were enrolled in this study between August 2013 and January 2015. Ten SWE values were obtained at the right upper lobe of the liver through an intercostal approach in suspended respiration. A single sub-special pathologist reviewed all biopsy specimens as per the METAVIR criteria. Median values using a different number of measurements (2-9) were chosen from the ten measurements randomly for each subject. Receiver operating characteristic (ROC) curves were constructed for distinguishing ≥F2 fibrosis for 10 measurements, and then sequentially, for measurement numbers below 10. The variability in intra-subject SWE measurements was calculated by comparing difference of individual measurements from the median value for each subject, and its relationship with measurement numbers was analyzed.

RESULTS

Study population fibrosis stages were F0=86, F1=80, F2=22, F3=22, F4=8. For all subjects, the areas under the ROC curve (AUROC) of the 10 measurements in differentiation of stage F2 or greater and stage F4 were 0.81 (95%CI: 0.69-0.94) and 0.847 (95%CI: 0.72-0.96) respectively. The minimum measurement numbers in differentiation of corresponding fibrosis stages were 7 (AUC=0.79, 95%CI: 0.67-0.916, P=0.17) and 6 (AUC=0.82, 95%CI: 0.71-0.94, P=0.53) respectively. As shown in Figure 1, in both groups (F0 or 1 vs. ≥F2), the variability of measurements did not change much with the increase of the measurement number (r=0.53, P=0.14), especially between 6-10, but the variability is much higher in stage F2 or greater.

CONCLUSION

Our study indicates that, in the patients with variety of hepatic diseases, the optimal minimum numbers of SWE measurements were 7 for differentiation of ≥F2 fibrosis and 6 for F4. There was no statistically significant variability in intra-subject SWE measurements using 6-10 measurement numbers, which implies the optimal measurement numbers obtained in this study are reliable.

CLINICAL RELEVANCE/APPLICATION

Standardization of number of measurements needed for SWE assessment of fibrosis stage is essential for SWE clinical workflow. More measurements will decrease variability on a per subject basis, however time, labor, cost-effectiveness and reliability are very important factors.

SSJ09-02 Gd-EOB-DTPA-Enhanced MR Relaxometry for the Detection and Staging of Liver Fibrosis

Tuesday, Nov. 29 3:10PM - 3:20PM Room: E353C

Awards
Trainee Research Prize - Resident

Participants
Michael Haimerl, Regensburg, Germany (*Presenter*) Nothing to Disclose
Kirsten Utpatel, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Claudia Fellner, MD, PhD, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Marcel D. Nickel, Erlangen, Germany (*Abstract Co-Author*) Employee, Siemens AG
Christian R. Stroszczynski, MD, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Wiggermann, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To examine the diagnostic performance of gadoxetic-acid (Gd-EOB-DTPA)-enhanced T1 relaxometry in the staging of hepatic fibrosis using histopathologic examination as the reference standard.

METHOD AND MATERIALS

Sixty–five patients (41 men and 24 women; mean age, 55.9 +/- 14.8) with histologically proven liver fibrosis (LF) who underwent Gd-EOB-DTPA–enhanced MR including T1 MR–relaxometry were analyzed. The fibrosis stage was assessed according to the METAVIR score (fibrosis scores range: F0, no fibrosis to F4, cirrhosis). For the T1 relaxometry, a transverse 3D VIBE sequence (TR 5.79 ms, TE 2.46 ms, α 1°, 7°, 14°) with inline T1 calculation was acquired prior to and 20 minutes after Gd-EOB-DTPA administration following the acquisition of a B1 map for inline correction of the B1 inhomogeneities. The reduction rates of the T1 relaxation time (rrT1) between the pre- and postcontrast images were calculated, and the optimal cutoff values for the fibrosis stages were determined with receiver operating characteristic (ROC) curve analyses.

RESULTS

The rrT1 decreased with the severity of liver fibrosis with the following mean values (%): stage F0, 69.4±2.6; stage F1, 59.1±3.7; stage F2, 55.3±4.6; stage F3, 42.2±0.10; and stage F4, 28.8±8.2. Regression analysis revealed a significant correlation of the rrT1 with the stage of liver fibrosis ($r=-0.906$, $p<0.001$). T1 relaxometry performed well in the staging of liver fibrosis with AUCs of 1.0 for the stages of F1 and greater, 0.92 for the stages of F2 and greater, 0.98 for the stages of F3 and greater, and 0.96 for stage F4.

CONCLUSION

Gd-EOB-DTPA–enhanced T1 relaxometry is a reliable tool for the staging of hepatic fibrosis. The results of the ROC analyses demonstrated the high accuracy in the detection of the initial stages of hepatic fibrosis.

CLINICAL RELEVANCE/APPLICATION

Our study supports the conclusion that measuring T1 relaxation times via Gd-EOB-DTPA-enhanced MRI may be incorporated into the clinical routine as a liver imaging screening test for the detection of silent disease and the non-invasive definition of the stage of liver fibrosis.

SSJ09-03 Role of Shear Wave Sono-Elastography of Liver in Monitoring Patients of Non-Alcoholic Fatty Liver Disease (NAFLD): Comparison with Magnetic Resonance Imaging- A Prospective Study

Tuesday, Nov. 29 3:20PM - 3:30PM Room: E353C

Awards
Student Travel Stipend Award

Participants
Nikhil Makhija, MBBS, New Delhi, India (*Presenter*) Nothing to Disclose
Madhusudhan Kumble Seetharama, MD, FRCR, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Deepnarayan Srivastava, Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Raju Sharma, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Shivanand R. Gamanagatti, MBBS, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Naval K. Vikram, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To measure liver stiffness (LS) by Shear-wave sono-elastography (SWE) in patients of non-alcoholic fatty liver disease (NAFLD) before and after intervention and to compare it with hepatic fat fraction (FF) measured by Magnetic Resonance Spectroscopy (MRS)

METHOD AND MATERIALS

41 adult treatment-naive patients (mean age: 39yrs, male:female–22:19 of NAFLD were included in this prospective study after obtaining approval from Institutional Ethics Committee and informed patient consent. Known diabetics, alcohol users (>20g/day) and patients on chronic drug intake were excluded. After initial clinical (body mass index-BMI) and biochemical (liver function tests-LFT, lipid profile) evaluation, MRS and SWE were done for all patients and mean hepatic fat fraction (FF) and mean liver stiffness (LS) were obtained. Following dietary and lifestyle changes and oral Vitamin E for six months repeat clinico-biochemical tests, MRI and SWE were done. Based on compliance to intervention, patients were categorized into good compliance and poor compliance groups. The FF and LS before and after treatment in both groups were compared.

RESULTS

30 patients had good and 11 had poor compliance to intervention. Baseline mean LS did not show significant correlation with mean MRS FF ($r=0.19$, $p>0.05$). After intervention, in both the groups, mean LS and mean MRS FF did not show significant correlation.In the group with good compliance, there was significant reduction in BMI which showed moderate correlation ($r=0.45$, $p<0.05$) with change in MRS FF. LS also showed significant reduction ($p<0.05$).In the group with poor compliance, there was significant increase in BMI which showed good correlation ($r=0.79$, $p<0.05$) with increase in mean MRS. LS did not show significant change ($p>0.05$).The change in mean LS showed no correlation either with mean MRS FF ($p> 0.05$) or with BMI after treatment.

CONCLUSION

LS measured by SWE does not show correlation with MRS FF and is not useful in monitoring of NAFLD.

CLINICAL RELEVANCE/APPLICATION

Change in gray scale USG, BMI and biochemical parameters do not accurately represent change in liver fat content. Although MRI is useful as a non-invasive modality to diagnose and quantify liver fat as well as its monitoring, its use in follow-up is expensive. SWE, however, cannot be used in monitoring changes in liver fat content after interventional regimens.

SSJ09-04 Maximum Value Measured by Two-Dimensional Shear Wave Elastography Helps in Differentiating Malignancy From Benign Focal Liver Lesions

Tuesday, Nov. 29 3:30PM - 3:40PM Room: E353C

Participants
Wenshuo Tian, Guangzhou, China (*Presenter*) Nothing to Disclose
Xiaoyan Xie, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Lu-Yao Zhou, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Manxia Lin, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Fu-Shun Pan, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic efficacy of two-dimensional shear wave elastography (2D SWE) in differentiating malignancy from benign focal liver lesions (FLL).

METHOD AND MATERIALS

Institutional review board approval and written informed consent was obtained. The maximum, minimum, mean, and the standard deviation of 2D SWE measurements, expressed in kPa (Emax, Emin, Emean, Esd), were underwent in 221 patients with 229 FLLs. Receiver operating characteristic (ROC) curve analysis was performed to evaluate the diagnostic performance of 2D SWE. Mann-Whitney U test was used to assess the inter-group differences.

RESULTS

Emax, Emin, Emean, Esd was significantly higher in 164 malignant lesions than that in 65 benign lesions (P<0.001). For identification of malignant FLL, the area under ROC curves for Emax was 0.920 (Emin 0.710, Emean 0.879, Esd 0.915). Emax was 96.21±35.40 for 19 intrahepatic cholangiocarcinomas (ICC) and 90.32±54.71 for 35 liver metastatic lesions, which was significantly higher than 61.83±28.87 for 103 hepatocellular carcinomas (HCC), respectively (P<0.0001, P=0.0237). Emax was 38.72±18.65 for 15 focal nodular hyperplasias, which was significantly higher than 20.56±10.74 for 37 hemangiomas (P=0.0009). Emax of adjacent liver parenchyma of HCC and ICC were significantly higher than that of the other three lesion types (P<0.005).

CONCLUSION

Emax of FLL and adjacent liver parenchyma could help in differentiating malignancy from benign FLLs.

CLINICAL RELEVANCE/APPLICATION

Maximum value measured by two-dimensional shear wave elastography of focal liver lesion and adjacent liver parenchyma may be considered for differential malignant from benign lesions.

SSJ09-05 Lack of Standardized Terminology and Definitions for Major Imaging Features of HCC among Clinical Practice Guidelines Released by Medical Societies

Tuesday, Nov. 29 3:40PM - 3:50PM Room: E353C

Participants
Adrija Mamidipalli, MBBS, San Diego, CA (*Presenter*) Nothing to Disclose
Saya Igarashi, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Ryan L. Brunsing, MD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;

PURPOSE

Multiple medical societies have published clinical practice guidelines that include algorithms for non-invasive imaging-based diagnosis of HCC in patients with cirrhosis using multiphasic contrast-enhanced MRI/CT. The purpose of this structured review of the literature was to extract and compare the terminology and definitions endorsed by these guidelines for the following major imaging features of HCC: arterial phase hyperenhancement (APHE), "washout"(WO), "capsule" (C), and diameter (D). Liver Imaging Reporting and Data System (LI-RADS) was not included in this review

METHOD AND MATERIALS

We identified 38 guidelines published since 1995, cited in PubMed, and containing imaging criteria for HCC. Each guideline was reviewed by 2 independent readers. Terms and definitions describing APHE, WO, C, and D were recorded. If for a given feature no term was used, "term not used" was recorded and the next feature assessed. If a term was used but no definition provided, all citations supporting that term were similarly reviewed and all definitions relating to the term were recorded. If no definition was provided within either the guideline or citations, "no definition used" was recorded

RESULTS

There was >95% inter-reader agreement in identifying terms and definitions. Of 38 guidelines reviewed; 78%, 68%, 13%, and 42% contained terms while only 8%, 13%, 3%, and 3% contained definitions for APHE, WO, C, and D, respectively. Terms used for APHE and WO were variable with only 53% incorporating the language "arterial-phase enhancement" or "washout". There were 43 unique citations supporting undefined terms, yielding an additional 13 definitions each for APHE/WO and 4 each for C/D. While both APHE and WO were usually described using lesion signal/attenuation relative to the surrounding liver parenchyma, details on contrast phase and measurement technique were inconsistent. The few definitions for C and D used ambiguous language and clear definitions could not be extracted

CONCLUSION

Imaging guidelines for the non-invasive diagnosis of HCC use variable terms for key imaging features. Definitions usually are not provided. When provided, definitions are inconsistent between guidelines and/or ambiguous

CLINICAL RELEVANCE/APPLICATION

Lack of standardized and defined terminology for imaging features used in the non-invasive diagnosis of HCC complicates the interpretation and comparison of the HCC literature

SSJ09-06 Prediction of Microvascular Invasion in Hepatocellular Carcinoma: Preoperative Gd-EOB-DTPA-Dynamic Enhanced MRI and Histopathologic Correlation

Tuesday, Nov. 29 3:50PM - 4:00PM Room: E353C

Awards
Student Travel Stipend Award

Participants
Mengqi Huang, MD, Guang zhou, China (*Presenter*) Nothing to Disclose
Zhi Dong, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Keguo Zheng, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Ping Xu, BMedSc, GuangZhou, China (*Abstract Co-Author*) Nothing to Disclose
Shiting Feng, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

We aimed to prospectively investigate the imaging features on the preoperative Gd-EOB-DTPA-dynamic enhanced MRI correlate with the present of microvascular invasion(MVI) in hepatocellular carcinoma(HCC).

METHOD AND MATERIALS

A total of 66 HCC lesions in 60 patients with preoperative Gd-EOB-DTPA-dynamic enhanced MRI were prospectively analyzed. Tumor size, signal homogeneity, tumor capsule, tumor margin, peritumor enhancement in mid-arterial phase, peritumor hypointense in hepatobiliary phase, signal intensity ratio on DWI and apparent diffusion coefficients (ADCs), T1 relaxation times and the reduction rate between pre- and post-contrast enhancement images were assessed. Correlation between these factors and presence of MVI were determined and the prediction model was established.

RESULTS

Histopathologic findings revealed 17 of 66 HCC had MVI. The univariate analysis showed the tumor size(p=0.003), margin(p=0.013),peritumor enhancement(p=0.001)and hypointense in hepatobiliary phase(p=0.004) were associated with MVI. However,the multiple logistic regression indicated that the tumor size, margin and peritumor enhancement were predictors of present of MVI(α=0.01). The R^2 of this prediction model was 0.353,and the sensitivity and specificity were 52.9% and 93.0%,respectively.

CONCLUSION

Tumor size, margin and peritumor enhancement in the preoperative Gd-EOB-DTPA-dynamic enhanced MRI can predict MVI of HCC with low sensitivity but high specificity.

CLINICAL RELEVANCE/APPLICATION

Preoperative Gd-EOB-DTPA- dynamic enhanced MRI can help to predict MVI of HCC, though are not sensitive but have high specificity.

RC408

Trauma Imaging Pitfalls

Tuesday, Nov. 29 4:30PM - 6:00PM Room: N228

GI MK ER

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC408A Abdomen (Solid Organs and Vessels)

Participants
Felipe Munera, MD, Miami, FL, (fmunera@med.miami.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1. Identify common pitfalls in interpretation of abdominal trauma CT studies - focus on solid organs and vascular structures. 2. Optimize CT acquisition techniques to reduce likelihood of missing potentially significant injuries. 3. Develop a search pattern that includes organs and structures where important lesions are commonly missed. 4. Describe strategies to improve detection of easily missed injuries

RC408B Diaphragm

Participants
Michael N. Patlas, MD, FRCPC, Hamilton, ON, (patlas@hhsc.ca) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To describe direct and indirect signs of blunt and penetrating diaphragmatic injury. 2) To highlight factors affecting detection of diaphragmatic injury. 3) To discuss pitfalls in diagnosis of diaphragmatic injury.

ABSTRACT

The traumatic diaphragmatic injury is an uncommon entity. Blunt diaphragmatic injury is undiagnosed at initial presentation in 7-66%. Penetrating diaphragmatic injury can be occult in 7% of cases. Diaphragmatic injury does not resolve spontaneously and can cause disastrous complications. The misinterpretation in patients with diaphragmatic injury may be caused by suboptimal technique, failure to review portion of examination e.g. MPRs, or satisfaction of search error. Potential pitfalls in interpretation include congenital diaphragmatic hernias and atraumatic defects simulating diaphragmatic injury.

RC408C Bowel/Pelvis

Participants
Stephan W. Anderson, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC408D Extremities

Participants
O. C. West, MD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Find upper extremity injuries that are difficult detect on screening radiographs. 2) Employ search patterns that may improve detection of easily missed injuries.

ABSTRACT

Summary of upper extremity pitfalls: Posterior shoulder dislocation; Supracondylar fracture (anterior humeral line); Monteggia fracture-dislocation (radio-capitellar line); Proximal radius including vertical head fracture (external oblique view), impacted neck fracture, flipped radial head fracture-dislocation, Galeazzi fracture-dislocation – beware the lateral radiograph.Imaging joints requires 3 radiographic projections. The 3rd view varies: Axillary view of shoulder and External oblique of elbow. The wrist needs 4 views: PA, lateral, external oblique and "Scaphoid" view (ulnar deviated PA view).Words to live by: watch for the least obvious of multiple injuries.

Active Handout:O. Clark West

http://abstract.rsna.org/uploads/2016/16000641/ACTIVE RC408D.pdf

RC409

Pitfalls in Abdominal Imaging

Tuesday, Nov. 29 4:30PM - 6:00PM Room: E451B

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

Sub-Events

RC409A Pitfalls in Hepatobiliary Imaging

Participants
Antonio Luna, MD, Jaen, Spain (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the most common pitfalls in hepatobiliary imaging. 2) Differentiate them from pathological conditions using a multimodality approach with CT and MRI.

ABSTRACT

RC409B Pitfalls in Pancreas Imaging

Participants
Zhen J. Wang, MD, Hillsborough, CA (*Presenter*) Stockholder, Nextrast, Inc

LEARNING OBJECTIVES

1) Become familiar with the pitfalls in pancreas imaging techniques. 2) Learn the pitfalls in imaging evaluation of benign pancreatic diseases. 3) Review the pitfalls in imaging evaluation of pancreatic malignancies.

ABSTRACT

RC409C Pitfalls in Bowel Imaging

Participants
Benjamin M. Yeh, MD, San Francisco, CA, (ben.yeh@ucsf.edu) (*Presenter*) Research Grant, General Electric Company; Author with royalties, Oxford University Press; Shareholder, Nextrast, Inc;

LEARNING OBJECTIVES

1) Understand critical imaging features associated with the most common bowel emergencies. 2) Be able to tailor exams to suit specific clinical imaging scenarios, depending on patient history and clinical question. 3) Be familiar with common artifacts that can obscure or mimic clinical disease in and adjacent to bowel. 4) Understand how physiology, contrast material, and imaging technique affect cross-sectional imaging of bowel. 5) Provide cogent differential diagnoses based on CT and MR findings to direct patient care.

ABSTRACT

Imaging of the bowel and interpretation of radiological bowel images is arguably the most technically challenging aspect of abdominal imaging, with a high rate of missed diagnostic findings and misinterpretations. The bowel is highly changeable in appearance from scan to scan, and moment to moment. Bowel appearance depends not only on the disease state, but also lumen contents, timing of intravenous contrast material, and many technical image-related factors. Understanding of the mesenteric and bowel anatomy, normal and diseased bowel physiology and vascular flow, and the interaction of contrast agents, is critical to the accurate interpretation of bowel disease. In this talk we will discuss common pitfalls of technique and imaging. In addition, we will explore controversies regarding imaging technique which have become more pressing in recent years, including when to use positive versus neutral oral contrast agents versus no oral contrast in different clinical scenarios.

Active Handout:Benjamin M. Yeh

http://abstract.rsna.org/uploads/2016/16001267/RC409C PitfallsInBowelImaging.v03syllabus.pdf

RC409D Pitfalls in Post-op Imaging

Participants
Kumaresan Sandrasegaran, MD, Carmel, IN, (ksandras@iupui.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the postoperative anatomy after pancreatic and bowel surgery. 2) To differentiate between expected anatomy and postoperative complications. 3) To differentiate between expected post-op anatomy and tumor recurrence.

ABSTRACT

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Kumaresan Sandrasegaran, MD - 2013 Honored Educator
Kumaresan Sandrasegaran, MD - 2014 Honored Educator
Kumaresan Sandrasegaran, MD - 2016 Honored Educator

RC422

Imaging for Personalized Medicine: Abdomen

Tuesday, Nov. 29 4:30PM - 6:00PM Room: S102C

GI RO PH

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Kristy K. Brock, PhD, Houston, TX (*Moderator*) License agreement, RaySearch Laboratories AB; Development agreement, Varian Medical Systems, Inc;

ABSTRACT

The use of imaging and other biomarkers to increase the efficacy of treatment and decrease the risk of toxicity increased in the abdomen. Functional imaging and serum-based biomarkers can enable a more detailed understanding of the tumor, its characteristics, and early indications of its response to therapy. In addition, they can also be utilized to assess an individual patients risk for toxicity, enabling a personalize approach to radiotherapy. These advanced imaging techniques can be combined with anatomical information to generate high precision treatment plans which can be adapted over the course of treatment to account for identified uncertainties, changes, and deviations which may compromise the delivery of the intended treatment or identify the ability to re-optimize treatment to improve the therapeutic ration. In this session, technical and clinical concepts will be described to design and deliver personalized radiotherapy in the abdomen. Technical concepts will include incorporation of multi-modality imaging for treatment planning, image guidance at treatment, and functional and anatomical adaption. Clinical concepts will include functional targeting, clinical goals, and toxicity risks.

Sub-Events

RC422A IGRT and Anatomical Adaptation

Participants
Kristy K. Brock, PhD, Houston, TX (*Presenter*) License agreement, RaySearch Laboratories AB; Development agreement, Varian Medical Systems, Inc;

LEARNING OBJECTIVES

1) Describe the processes necessary for the safe and accurate integration of multi-modality imaging for treatment planning. 2) Understand the role of image guidance for abdominal radiotherapy. 3) Illustrate methods to perform functional and anatomical adaptation in the abdomen.

ABSTRACT

The use of imaging and other biomarkers to increase the efficacy of treatment and decrease the risk of toxicity increased in the abdomen. Functional imaging and serum-based biomarkers can enable a more detailed understanding of the tumor, its characteristics, and early indications of its response to therapy. In addition, they can also be utilized to assess an individual patients risk for toxicity, enabling a personalize approach to radiotherapy. These advanced imaging techniques can be combined with anatomical information to generate high precision treatment plans which can be adapted over the course of treatment to account for identified uncertainties, changes, and deviations which may compromise the delivery of the intended treatment or identify the ability to re-optimize treatment to improve the therapeutic ration. In this session, technical and clinical concepts will be described to design and deliver personalized radiotherapy in the abdomen. Technical concepts will include incorporation of multi-modality imaging for treatment planning, image guidance at treatment, and functional and anatomical adaption. Clinical concepts will include functional targeting, clinical goals, and toxicity risks.

RC422B Functional Targeting, Clinical Goals, and Toxicity Risks

Participants
Cullen M. Taniguchi, MD, PhD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review methods to obtain, process and analyze tissue and serum based biomarkers for abdominal tumors. 2) Describe current dose/fractionation regimens as well as normal tissue constraints utilized in treating abdominal tumors. 3) Explain potential advantages of assessing treatment response with MRI and quantitative PET/SPECT (PERCIST) imaging over CT based response (RECIST) in abdominal tumors.

ABSTRACT

In order to deliver personalized radiation therapy in abdominal tumors, it is important to understand the methods used to obtain, analyze, and interpret serum and tissue based biomarkers. Most research to date has focused on identifying specific biomarkers used to personalize systemic or targeted therapies. Radiation-specific biomarkers are emerging and may eventually be used to determine whether radiation is indicated or identify specific radiation sensitizers for use in abdominal tumors. Radiation therapy planning has historically used computed tomography (CT)-based imaging. Molecular imaging using hybrid positron emission tomography (PET)/CT scanning or single-photon emission computed tomography (SPECT) imaging and functional magnetic resonance imaging (MRI) has provided new insights into the precise identification of gross tumor volume (GTV) and clinical tumor volume (CTV) and has provided response information during and after therapy. The effective use of PET/SPECT and MRI in clinical practice, however, requires an appreciation of the unique challenges inherent to these modalities. Fundamental physical issues of limited spatial resolution relative to the biological process, partial volume effects, image misregistration, motion management, and edge delineation must be carefully considered and can differ by agent or the method applied. Integration of PET/SPECT and MRI imaging into multicenter clinical trials and clinical practice can be particularly challenging due to differences in imaging protocols, machines, and anatomy. Imaging protocols that clearly outline scan and fusion parameters are crucial. Further,

interpretation of tumor response should be standardized, and scans should be obtained at consistent time intervals. In addition, it is important to consider novel tracers of tumor biology (e.g. hypoxia, proliferation, apoptosis) beyond the commonly used radiotracers. In this session, we will discuss these applications and challenges as well as provide guidance on how to integrate PET/SPECT/MRI into radiation treatment planning and assessing treatment response. Finally, we will evaluate common dose and fractionation regimens as well as established dose constraints used in treating abdominal tumors with conventional and stereotactic body radiation therapy.

RC450

Targeted Treatment and Imaging of Liver Cancers: Basic to Advanced Techniques in Minimally-Invasive Therapies and Imaging

Tuesday, Nov. 29 4:30PM - 6:00PM Room: S403B

GI OI IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Jinha Park, MD, PhD, Duarte, CA (*Presenter*) Speakers Bureau, Bayer AG;
Steven S. Raman, MD, Santa Monica, CA (*Presenter*) Nothing to Disclose
John J. Park, MD, PhD, Duarte, CA, (johnpark@coh.org) (*Presenter*) Proctor, Sirtex Medical Ltd; Advisory Board, Guerbet SA; Speakers Bureau, Medtronic plc
Marcelo S. Guimaraes, MD, Charleston, SC, (guimarae@musc.edu) (*Presenter*) Consultant, Cook Group Incorporated ; Consultant, Baylis Medical Company; Consultant, Terumo Corporation; Patent holder, Cook Group Incorporated
Andrew C. Price, MD, Gilbert, AZ, (Andrew.Price@bannerhealth.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the role of the interventional radiologist in the treatment and management of patients with primary and metastatic liver cancer as part of the multidisciplinary team. 2) Learn best practice techniques in the treatment of liver cancers, with emphasis on both locoregional and focal therapeutic approaches, and indications for treatment. 3) Explore various tips and tricks for each treatment modality and learn how to avoid complications through good patient selection, choosing the appropriate techniques, and knowing what common mistakes to avoid. 4) Learn about newer and developing techniques and devices, their potential roles and indications, and potential pitfalls. 5) Explore advanced imaging modalities in the detection of tumors and for monitoring treatment response.

ABSTRACT

Primary and metastatic liver disease may benefit from combined techniques such as bland/chemoembolization and liver ablation. The presentation will provide the rationale for the association of techniques, patient selection, tips and tricks, equipment and supplies necessary, protective techniques and how to avoid complications. Also, it will be discussed the results and current literature to support the association of techniques.

ED005-WE

Gastrointestinal Wednesday Case of the Day

Wednesday, Nov. 30 6:00AM - 11:59PM Room: Case of Day, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

Participants

Christine M. Peterson, MD, Hummelstown, PA (*Presenter*) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Constantine A. Raptis, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Rex A. Parker III, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Elizabeth B. Maddox, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Christopher Molloy, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Andrew P. Robbins, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Andrew L. Warren, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Vincent M. Mellnick, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Oscar Garcia-Fraga, MD, Hershey, PA (*Abstract Co-Author*) Nothing to Disclose
Kelly Tung, MD,MS, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) Each GI case of the day will be taken from disorders of the luminal GI tract as well as the liver, spleen, pancreas, and biliary system. The findings may be uncommon manifestations of common diseases or common manifestations of uncommon diseases.

Honored Educators

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Perry J. Pickhardt, MD - 2014 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

RC509

GI Fluoroscopy: Don't Bury 'em Yet!

Wednesday, Nov. 30 8:30AM - 10:00AM Room: E450B

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

Sub-Events

RC509A Post-op Assessment of Esophagus and Stomach

Participants
Cheri L. Canon, MD, Birmingham, AL, (ccanon@uabmc.edu) (*Presenter*) Author with royalties, The McGraw-Hill Companies

LEARNING OBJECTIVES

1) Protocol fluoroscopic examination for safe evaluation and diagnosis. 2) Identify normal postoperative anatomy of the esophagus and stomach. 3) Diagnose radiographic complications in these patients.

ABSTRACT

Fluoroscopic evaluation of postoperative patients continues to grow in volume and complexity. In many cases, the fluoroscopic approach is superior to CT and requires the radiologist to have a fundamental understanding of the surgical anatomy. This presentation will review the approach and diagnosis of patients after undergoing surgery of the upper GI tract (esophagus and stomach).Safe fluoroscopic technique will be discussed. Normal postoperative anatomy and surgical complications will be reviewed.

RC509B Imaging the Non-operative Esophagus and Stomach

Participants
Laura R. Carucci, MD, Midlothian, VA, (laura.carucci@vcuhealth.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the continued importance of fluoroscopic evaluation of the esophagus and stomach. 2) Describe examination techniques for the esophagus and stomach. 3) Review the radiologic diagnosis of pathologic conditions involving the esophagus and stomach.

ABSTRACT

Despite an overall trend towards a decreasing number of fluoroscopic procedures, the number of esophagography studies has increased in recent years. Fluoroscopy remains the primary modality for evaluation the esophagus. In addition, fluoroscopy provides a noninvasive means to evaluate for benign and malignant gastric pathology. Radiologists should be able to perform and interpret esophagography and upper GI studies. A spectrum of benign and malignant processes that may affect the esophagus and stomach will be discussed.

RC509C Large Bowel

Participants
Christine O. Menias, MD, Chicago, IL, (menias.christine@mayo.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review role of Contrast Enemas in case-based format. 2) Highlight common indications for Fluoroscopy. 3) Review cases in the pre-operative and post-operative colon. 4) Emphasize imaging features that should not be overlooked.

ABSTRACT

Honored Educators

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Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

RC509D Defecography: Pearls and Pitfalls

Participants
Dean D. Maglinte, MD, Indianapolis, IN, (dmaglint@iupui.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To define the role of fluoroscopic defecography in the evaluation of anorectal dysfunction and pelvic organ prolapse. 2) To demonstrate how it should be done to avoid technical and interpretive pitalls. 3) To illustrate how to report a clinically relevant functional pelvic floor examination.

ABSTRACT

Despite advances in other imaging methods, fluoroscopic defecography has remained a practical cost effective procedure in the evaluation of anorectal and pelvic floor dysfunction. Dynamic cystocolpodefecograpohy (DCP) has evolved from a method of evaluating the anorectum for functional disorders to it's current status as a functional method of evaluating the global pelvic floor for defecatory disorders and pelvic organ prolapse (POP). It provides the maximum stress to the pelvic floor resulting in levator ani relaxation accompanied by rectal emptying needed to diagnose defecatory disorders and organ specific quantificative information on POP.

RC510

Liver Doppler, Contrast and Elastography

Wednesday, Nov. 30 8:30AM - 10:00AM Room: E353C

GI US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

LEARNING OBJECTIVES

1) Understand the normal anatomy, anatomic variants of the hepatic vasculature. 2) Identify the normal Doppler flow profiles of the hepatic vasculature. 3) Understand the hemodynamic principles of portal hypertension and how they impact the Doppler waveforms of the hepatic arteries, portal veins and hepatic veins. 4) Understand the role of ultrasound in the evaluation of variceal pathways. 4) Indications when to use contrast enhanced ultrasound (CEUS) in focal liver diseases. 5) Kinetics of US contrast agents 6) Learning about the importance of the three contrast phases, how CEUS performs in detecting and characterizing focal liver lesions. 7) Learning about the potential value as well as the limitations of CEUS in liver disease. 8) Learning how CEUS performs when compared to B-mode, color Doppler, CT and MRT imaging. 9) Understand the concept of liver fibrosis grading and the implications for healthcare management. 10) Review the basis for the assessment of liver fibrosis using elastography, with emphasis on the different techniques. 11) Understand the differences in the techniques and the variability in measurement assessment. 12) Achieve and overview of the need and position of this technique in clinical care.

Sub-Events

RC510A Imaging and Doppler of Portal Hypertension

Participants
Myron A. Pozniak, MD, Madison, WI, (mpozniak@uwhealth.org) (*Presenter*) Stockholder, Cellectar Biosciences, Inc; Support, General Electric Company

LEARNING OBJECTIVES

1) Understand the normal anatomy, anatomic variants of the hepatic vasculature. 2) Identify the normal Doppler flow profiles of the hepatic vasculature. 3) Understand the hemodynamic principles of portal hypertension and how they impact the Doppler waveforms of the hepatic arteries, portal veins and hepatic veins. 4) Understand the role of ultrasound in the evaluation of variceal pathways.

ABSTRACT

Active Handout:Myron Andrew Pozniak

http://abstract.rsna.org/uploads/2016/16000408/ACTIVE RC510A PH talk .pdf

RC510B Contrast Ultrasound of the Liver

Participants
Hans-Peter Weskott, MD, Hannover, Germany, (weskotthp@t-online.de) (*Presenter*) Speaker, General Electric Company; Speaker, Bracco Group

LEARNING OBJECTIVES

1) Indications when to use contrast enhanced ultrasound (CEUS) in focal liver diseases. 2) Kinetics of US contrast agents 3) Learning about the importance of the three contrast phases, how CEUS performs in detecting and characterizing focal liver lesions. 4) Learning about the potential value as well as the limitations of CEUS in liver disease. 5) Learning how CEUS performs when compared to B-mode, color Doppler, CT and MRT imaging.

ABSTRACT

In patients with favorable scanning conditions CEUS is at least as sensitive as contrast enhanced CT (CECT) and in most cases MRI in detecting malignant liver lesions. Due to its high temporal resolution, even a hyper-enhancement of a few seconds can be seen, thus improving the characterization of focal liver lesions. A majority of malignant lesions can therefore be characterized as iso- or hyper-enhancing. During the arterial phase the tumor`s vessel architecture and direction of contrast filling helps in characterizing a lesions character. Metastases and intrahepatic cholangiocarcinoma wash out at the end of the arterial or early portal venous phase, while HCC may wash out later. When using high spatial resolution contrast modes washed out lesions down to 3mm in size can be detected. CEUS characterizes focal liver lesions with a much higher diagnostic confidence than conventional US and is comparable to CT and MRI. CEUS also improves intraoperative tumor detection and characterization. Using time intensity analysis a change in contrast enhancement and kinetics helps in estimating tumor response to chemotherapy. CEUS is also used to monitor local ablation therapy and is a useful imaging tool to detect early tumor recurrence.

RC510C Liver Elastography

Participants
Paul S. Sidhu, MRCP, FRCR, London, United Kingdom, (paulsidhu@nhs.net) (*Presenter*) Speaker, Koninklijke Philips NV; Speaker, Bracco Group; Speaker, Hitachi, Ltd; Speaker, Siemens AG

LEARNING OBJECTIVES

1) Understand the concept of liver fibrosis grading and the implications for healthcare management. 2) Review the basis for the

1) Understand the concept of liver fibrosis grading and the implications for healthcare management. 2) Review the basis for the assessment of liver fibrosis using elastography, with emphasis on the different techniques. 3) Understand the differences in the techniques and the variability in measurement assessment. 4) Achieve and overview of the need and position of this technique in clinical care.

ABSTRACT

Liver fibrosis and cirrhosis from many causes is an important cause of long term morbidity and mortlaity. Most cases are a consequence of chronic viral disease (Hepatitis B and C) with alcoholic lever disease an important ethiological factor. The degree of liver fibrosis, and the presence of established cirrhosis confer differnet mamangement stratergies, with imaging playing an important role in the non-invasive assessment of patents with chronic liver disease. Fibrosis grading traditionally performed using the Metavir or Ishak scoring system is essentially a hiistological grading system. Ultimately the possibility to avoid a liver biopsy is the aim, if a non-invasive technique can stage the grade of fibrosis, establishing correct patient management. Liver ultrasound elastography is a developing technique that offers this possibility, with varying methods of aassessment ranging form strain methods and shear wave methods. These techniques will be explained, the status of the current standing of the techniques will be summarised, and the level of technology offered by differnet machines will be reviewed. An overall summary of the current status and the implications for clinical practice will be discussed.

RC517

Emerging Technology: Elastography - Opportunities and Challenges

Wednesday, Nov. 30 8:30AM - 10:00AM Room: S505AB

GI MR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Juergen K. Willmann, MD, Stanford, CA, (willmann@stanford.edu) (*Moderator*) Research Consultant, Bracco Group; Research Grant, Siemens AG; Research Grant, Bracco Group; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company; Advisory Board, Lantheus Medical Imaging, Inc; Advisory Board, Bracco Group

LEARNING OBJECTIVES

1) To understand how elastography measurements are integrated into the management of patients with chronic liver disease. 2) To learn imaging techniques and protocols of ultrasound and MR elastography. 3) To compare US and MR elastography in assessing liver fibrosis. 4) To review emerging clinical indications of US and MR elastography. 5) To understand limitations of current elastography techniques.

Sub-Events

RC517A Elastography of the Liver: What the Clinician Wants to Know

Participants
Mindie Nguyen, MD, Stanford, CA (*Presenter*) Consultant, Intercept Pharmaceuticals, Inc; Consultant, Johnson & Johnson; Consultant, Gilead Sciences, Inc; Consultant, Alynam Pharmaceuticals, Inc; Consultant, Dynavax Technologies Corporation; Research Grant, Johnson & Johnson; Research Grant, Gilead Sciences, Inc; Research Grant, Bristol-Myers Squibb Company

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC517B Ultrasound Elastography: How and When?

Participants
Juergen K. Willmann, MD, Stanford, CA, (willmann@stanford.edu) (*Presenter*) Research Consultant, Bracco Group; Research Grant, Siemens AG; Research Grant, Bracco Group; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company; Advisory Board, Lantheus Medical Imaging, Inc; Advisory Board, Bracco Group

LEARNING OBJECTIVES

1) Understand the clinical indications of ultrasound elastography (USE). 2) Learn about the various techniques and imaging protocols of USE. 3) Review the diagnostic accuracy of USE in the assessment of elasticity in liver fibrosis and other clincal applications in the body. 4) Compare USE with MR elastography. 5) Understand current limitations of USE.

ABSTRACT

Ultrasound elastography (USE) is a general term for various techniques available for objectively and quantitatively assessing tissue stiffness using ultrasonic techniques, creating noninvasive images of mechanical characteristics of tissues. Elastography is based on the fact that the elasticity of a tissue is changed by pathological or physiological processes. For example, cancer or fibrosis associated with various disease processes including chronic liver disease or chronic pancreatitis result in increased tissue stiffness.Recently, various USE techniques have been cleared by the FDA and all major ultrasound companies offer different approaches of measuring tissue stiffness on their ultrasound machines.The objective of this talk is to familiarize the audience with the clinical indications, imaging techniques and protocols, interpretation, diagnostic accuracy, and limitations of the various USE technique for assessment of tissue stiffness, with special focus on assessment of fibrosis in chronic liver disease.

RC517C MR Elastography: How and When?

Participants
Richard L. Ehman, MD, Rochester, MN (*Presenter*) CEO, Resoundant, Inc; Stockholder, Resoundant, Inc;

LEARNING OBJECTIVES

View learning objectives under the main course title.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Richard L. Ehman, MD - 2016 Honored Educator

MSES42

Essentials of GI Imaging

Wednesday, Nov. 30 10:30AM - 12:00PM Room: S100AB

GI OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

MSES42A Hepatobiliary Agents: The Basics

Participants
Giuseppe Brancatelli, MD, Palermo, Italy, (gbranca@yahoo.com) (*Presenter*) Speaker, Bayer AG

LEARNING OBJECTIVES

1) Describe the mechanism of action of hepatobiliary agents. 2) Understand the added value of hepatobiliary agents in the characterization of focal liver lesions. 3) Identify the most common pitfalls and limitations of hepatobiliary agents.

ABSTRACT

MSES42B Sonography of Focal Liver Lesions

Participants
Mitchell E. Tublin, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand historical role of ultrasound in identifying and characterizing hypoechoic and echogenic liver lesions. 2) Describe features characteristic of classic and typical "atypical" hemangiomas. 3) Utilize a cost effective imaging algorithm for management of echogenic lesions identifiied at ultrasound based upon ultrasound features and clinical history. 4) Describe how ultrasound contrast (microbubble) enhancement patterns of differeing liver lesions increase study specificity.

ABSTRACT

MSES42C Pancreatic Cancer: Detection and Staging

Participants
Nikolaos Kartalis, MD,PhD, Stockholm, Sweden, (nikolaos.kartalis@karolinska.se) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To explain the role of CT and MRI in the evaluation of patients with pancreatic cancer. 2) To describe important technical aspects of CT and MRI protocols in these patients. 3) To identify imaging features in regard to the stage and extent of pancreatic cancer, including features that indicate non-resectability.

MSES42D Imaging Rectal Carcinoma

Participants
Regina G. Beets-Tan, MD, PhD, Amsterdam, Netherlands (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1. To understand the relevant role of Imaging in rectal cancer. 2. To know the clinical management of rectal cancer and how MR findings influence treatment choice 3. To know the accuracy and pitfalls in interpretation of staging and restaging MRI 4. To learn about new treatment options and the role of imaging

ABSTRACT

SSK06

Gastrointestinal (Quantitative Imaging)

Wednesday, Nov. 30 10:30AM - 12:00PM Room: E353A

GI BQ CT MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Dushyant V. Sahani, MD, Boston, MA (*Moderator*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc
Alvin C. Silva, MD, Scottsdale, AZ (*Moderator*) Nothing to Disclose

Sub-Events

SSK06-01 Hepatic Perfusion CT Yields Early Imaging Biomarkers for Treatment Response of Sorafenib on Hepatocellular Carcinoma

Participants
Yuko Nakamura, MD, Bethesda, MD (*Presenter*) Nothing to Disclose
Toru Higaki, PhD, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Wataru Fukumoto, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Chikako Fujioka, RT, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Masao Kiguchi, RT, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuo Awai, MD, Hiroshima, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation; Research Grant, Hitachi, Ltd; Research Grant, Bayer AG; Research Grant, Eisai Co, Ltd; Medical Advisor, General Electric Company; ; ; ; ;
Akira Taniguchi, RT, Tokyo, Japan (*Abstract Co-Author*) Employee, Toshiba Corporation
Makoto Iida, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Sorafenib inhibits excessive angiogenesis of abnormal arteries seen in advanced hepatocellular carcinoma (HCC). Hepatic perfusion CT facilitates the quantitative evaluation of hepatic arterial- and portal venous perfusion. We investigated whether perfusion CT performed before- and 1 week after sorafenib administration yields imaging biomarkers for the survival of HCC patients.

METHOD AND MATERIALS

We evaluated 51 HCC patients (11 women, 40 men, mean age 68.9 years, mean survival 250 days) who underwent perfusion CT before- and 1 week after sorafenib therapy. Serum alpha-fetoprotein (sAFP) and des-γ-carboxyprothrombin were recorded before sorafenib administration. We measured arterial and portal perfusion in their hepatic tumor and liver parenchyma [(AP)(PP)tumor], [(AP)(PP)liver] before and after sorafenib administration. The perfusion ratio was calculated by dividing the post- by the pre-sorafenib value. The effect of each value on the overall survival rate was analyzed with the Cox proportional hazards model; statistically significant parameters were subjected to receiver operating characteristic (ROC) analysis based on 250-day survival after sorafenib administration to determine the overall survival rate with the Kaplan-Meier method.

RESULTS

By univariate Cox regression analysis, sAFP and pre-sorafenib APtumor were significantly associated with the overall survival rate (p=0.04 and 0.03, respectively). The APtumor ratio tended to be associated with the overall survival rate (p=0.06). The optimal cut-off value for sAFP, pre-sorafenib APtumor, and the APtumor ratio was 133ng/mL, 82.1 mL/min/100 mL, and 1.1 by ROC analysis, respectively. By the Kaplan-Meier method the overall survival rate was higher in patients with sAFP<=133 ng/mL, with pre-sorafenib APtumor >82.1 mL/min/100 mL, and with APtumor ratio<=1.1 (log rank, p=0.01, 0.03, and 0.03, respectively).

CONCLUSION

Not only sAFP, but also pre-sorafenib APtumor, and the APtumor ratio were significantly associated with the overall survival rate, suggesting that early evaluation by hepatic perfusion CT yields imaging biomarkers for predicting overall survival in HCC patients treated with sorafenib.

CLINICAL RELEVANCE/APPLICATION

On hepatic perfusion CT scans, pre-sorafenib APtumor and the APtumor ratio are promising imaging biomarkers for predicting the overall survival rate in sorafenib-treated HCC patients.

SSK06-02 Early Treatment Response Evaluation after Yttrium-90 Radioembolization of Hepatocellular Carcinoma with Quantitative CT Analysis

Wednesday, Nov. 30 10:40AM - 10:50AM Room: E353A

Participants
Sungwon Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jin-Young Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Do-Young Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jong Yun Won, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myeong-Jin Kim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Bayer AG

PURPOSE

To evaluate quantitative computed tomography (CT) perfusion analysis for assessment of early treatment response after Yttrium-

90 transarterial radioembolization (TARE) in patients with hepatocellular carcinoma (HCC).

METHOD AND MATERIALS

Dynamic contrast-enhanced CT was performed before and 4 weeks after transarterial radioembolization in 45 patients (35 men and 10 women; mean age, 61 years) with HCC. Enhancement maps of the liver were made by subtracting precontrast images from delayed phase images before and after the TARE. The portion of the liver which enhances less than the mean enhancement plus one standard deviation of the normal liver parenchyma was segmented out. The difference between remaining over-threshold areas of the tumoral and peritumoral enhancement before and after TARE was divided by the initial tumor area (the increased area of delayed enhancement per tumor size; IDEPT). The difference between nonenhancing areas within tumors (INPT) before and after TARE per tumor size was also computed. All processes were performed in a quantitative method by in-house programming written by Matlab. Kaplan-Meier curves were plotted to illustrate tumor recurrence rates.

RESULTS

Post-treated HCCs with IDEPT over 25% showed significantly longer recurrence-free periods than those with IDEPT less than 25% (P = .0184). The hazard ratio of the tumor recurrence was 8.42 (P = .045) for IDEPT <25% group versus IDEPT >25% group. HCCs with high INPT had a tendency to have longer recurrence-free periods but, did not reach statistically significant difference.

CONCLUSION

Quantitative analysis of the tumor and peritumoral delayed enhancement difference before and 4 weeks after TARE seems to predict tumor recurrence-free periods in patients with HCCs. In early follow up, the increased necrotic area may not predict the potential for recurrence.

CLINICAL RELEVANCE/APPLICATION

Early treatment response evaluation after Yttrium-90 radioembolization can help physicians to determine whether the patients need an early additional treatment or not.

SSK06-03 The Role of Volume Perfusion Computed Tomography (VPCT) for Evaluation of HCC Response to Sorafenib

Wednesday, Nov. 30 10:50AM - 11:00AM Room: E353A

Participants
Wolfgang M. Thaiss, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Sascha Kaufmann, Tuebingen, Germany (*Presenter*) Nothing to Disclose
Christopher Kloth, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Sven Schneeweiss, MD, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Bitzer, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Ulrich Lauer, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Konstantin Nikolaou, MD, Tuebingen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG; Speakers Bureau, Bracco Group; Speakers Bureau, Bayer AG
Marius Horger, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the impact of sorafenib on perfusion parameters of tumors and uninvolved liver parenchyma by volume perfusion computed tomography (VPCT) and to assess interim therapy response in patients with advanced Hepatocellular Carcinoma (HCC).

METHOD AND MATERIALS

VPCT was performed in 29 HCC patients (70.6y, SD 10) before initiation of sorafenib therapy and after therapy. Changes in tumor and liver parenchyma perfusion measurements were assessed between baseline (BL) and follow-up (FU, mean 3 months, range 2-4) and compared to mRECIST response criteria. Response to sorafenib was classified by FU as response (R, time to progression >6 months) or non-response (nonR, time to progression <6 months).VPCT was performed for 40-sec using 80 kV, 100/120 mAs, 64x0.6 mm collimation, 26 consecutive measurements, i.v. injection (50 ml iodinated contrast), flow rate (5 ml/s). Blood flow (BF), blood volume (BV), arterial liver perfusion (ALP), portal-venous perfusion (PVP) and the hepatic perfusion index (HPI) were registered both in tumor and non-involved liver parenchyma. Permeability was additionally assessed for HCCs.Paired t-test was used for FU and unpaired t-test for group comparisons, p-values were adjusted for multiple testing.

RESULTS

One patient was lost in FU. 14 were R and 14 were nonR according to mRECIST. Time to progression was 114.1d (SD 40.2) in the nonR group and 295.4d (SD 108, p<0.0001) for the R group (one complete remission).Perfusion parameters did not vary between groups at BL. Significant differences existed for all perfusion parameters between nonR and R at FU (e.g. BF mean nonR: 44.6 mL/100mL/min (SD 10.3), FU 48.7 (SD 17.8); BF mean R: 47.6 mL/100mL/min (SD 25.8), FU 29.4 (13.6); n.s. at BL, p=0.00013 at FU) and for R between BL and FU (p=0.0035 for BF). Permeability decreased in R (36.4 mL/min (SD 28), FU 26.6 (SD 12.6), p=0.011) and varied significantly to nonR (p=0.00013).No significant differences existed for normal liver parenchyma neither for time or group factor.

CONCLUSION

Perfusion parameters were significantly different in HCC patients that responded (mRECIST) to sorafenib treatment both between baseline and follow-up as well as compared to non-responders at follow-up.

CLINICAL RELEVANCE/APPLICATION

VPCT perfusion parameters accurately assess the impact of sorafenib therapy on HCCs and may predict progression after initial follow-up after 3 months. Lager studies are needed for confirmation.

SSK06-04 CT Perfusion of Colorectal Cancer: Impact of 4D Volume Coverage on Quantitative Analysis

Wednesday, Nov. 30 11:00AM - 11:10AM Room: E353A

Awards
Student Travel Stipend Award

Participants
Hongliang Sun, MD, Beijing, China (*Presenter*) Nothing to Disclose
Yanyan Xu, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Wu Wang, MD, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
ying hou, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the feasibility of CT perfusion imaging in adaptive 4-dimensional(4D)-volume mode in patients with colorectal cancer (CRC), and to compare quantitative measurements between 2-dimensional regions of interest (2D-ROI) and 3-dimensional volumes of interest (3D-VOI).

METHOD AND MATERIALS

Sixty patients with biopsy-proven CRCs were enrolled in this study. They underwent CT perfusion imaging in a 4D-volume mode with 320-slice CT. Quantitative perfusion analysis (artery flow [AF], blood volume [BV], flow extraction product [KTrans]) were performed by using modified Patlak mode in 2D-ROI and 3D-VOI, respectively. The differences of perfusion quantitative parameters in 2D-ROIs and 3D-VOIs were analyzed by using paired samples t test or Wilcoxon signed ranks test. Intra- and inter-observer agreement for 2D-ROIs and 3D-VOIs analysis was evaluated using the intraclass correlation coefficient (ICC) and Bland-Altman analysis.

RESULTS

No significant differences were found between the values of perfusion quantitative parameters based on 2D-ROIs and 3D-VOIs analysis. Intra- and inter-observer reproducibility in 2D-ROIs and 3D-VOIs were relatively good to excellent, respectively. The intra-observer 95% limits of consistency of perfusion parameters(AF, BV, KTrans) were (-33.9～13.5)%、(-62.8～77)%、(-87.1～73.3)% with 2D-ROIs, respectively; (-33.5～11.8)%、(-44.7～50.6)%、(-64.5～48.5)% with 3D-VOIs, respectively; The inter-observer 95% limits of consistency of perfusion parameters(AF, BV, Ktrans) were (-49.2～13.9)%、(-57.6～48.4)%、(-71.9～72.3)% with 2D-ROIs, respectively; (-39.6～11.3)%、(-42.6～37.1)%、(-64.7～61.9)% with 3D-VOIs, respectively.

CONCLUSION

There were no statistically differences between 2D-ROI and 3D-VOI analysis of colorectal cancer CT perfusion parameters. However, the 3D-VOI analysis appropriately improves intra- and inter-observer consistency, reflecting perfusion parameters more accurately and repeatedly.

CLINICAL RELEVANCE/APPLICATION

Considerable colorectal cancer heterogeneity was found in both qualitative and quantitative analysis with the use of 4D volume perfusion techniques for both imaging and perfusion parameters analysis.

SSK06-05 Study of Intra-Patient Variability and Reproducibility of Quantitative Tumor Perfusion Parameters Evaluated with Dynamic Contrast-enhanced Ultrasonography

Wednesday, Nov. 30 11:10AM - 11:20AM Room: E353A

Participants
Nathalie B. Lassau, MD, PhD, Villejuif, France (*Presenter*) Speaker, Toshiba Corporation; Speaker, Bracco Group
Benedicte Coiffier, Vilejuif, France (*Abstract Co-Author*) Nothing to Disclose
Laura Faivre, Villejuif, France (*Abstract Co-Author*) Nothing to Disclose
Bernard Asselain, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Stephanie Pitre-Champagnat, Villejuif, France (*Abstract Co-Author*) Nothing to Disclose
Serge Koscielny, Villejuif, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Dynamic Contrast Enhanced Ultrasonography (DCE-US) is a functional imaging technique enabling quantitative assessment of solid tumor perfusion in metastatic patients treated with antiangiogenic therapies. A multicentric study including 539 patients validated the area under the curve parameter (AUC) as correlated to freedom from progression and overall survival.The objective of this prospective monocentric study was to evaluate the intra-patient variability and reproducibility of DCE-US criteria by comparing the two perfusion curves obtained for a same patient on the same metastasis during 2 visits performed the same day, before and after lunch.

METHOD AND MATERIALS

For each patient, two DCE-US examinations were performed at baseline, day 15 and day 30, one before and one after lunch. A 3-minute perfusion curve was recorded just after injection of Sonovue to determine seven perfusion criteria. DCE-US examinations were analyzed by pairs: pre and post prandial. Log transformed values were used to determine the variability of the two measures (coefficient of variation CV) and their reproducibility (Spearman correlation coefficient).

RESULTS

Sixty patients with cancer (23 colon, 36 kidney and 1 breast), treated by Axitinib (26), Sunitinib (27) and other anti-angiogenic treatments (7) were included. Thirty had hepatic and 30 extra-hepatic metastatic target lesions. A total of 312 DCE-US were performed. Data with a quality from 1 to 5 were available for 128 pairs of DCE-US examinations: 45 at baseline, 45 at day 15 and 38 at day 30. Pre and post prandial values were not significantly different. Three parameters were associated with a correlation coefficient above 0.8 ($p<0.0001$): AUC ($r=0.88$), area under the wash-out AUWO ($r=0.88$) and area under the wash-in AUWI ($r=0.82$). For AUC and AUWO, the range of individual variations (value after/value before lunch) was less than 2 log with parameter

values ranging over about 4 logs (CV=61% and 64% respectively). Variability was independent of the site of metastases.

CONCLUSION

This study showed that AUC and AUWO are the two most reproducible and reliable DCE-US parameters.

CLINICAL RELEVANCE/APPLICATION

AUC and AUWO are two reliable and reproducible DCE-US parameters, and relevant for the evaluation of the response to TKI treatments.

SSK06-06 Reproducibility of mRECIST in Measurement and Response Assessment for Hepatocellular Carcinoma with Transarterial Chemoembolization: Intraobserver and Interobserver Reproducibility among Multiple Readers

Wednesday, Nov. 30 11:20AM - 11:30AM Room: E353A

Participants
Ga-Eun Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ga Ram Kang, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Joon-Il Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Moon Hyung Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung Eun Rha, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Soon Nam Oh, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Michael Y. Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung Eun Jung, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Young Byun, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this retrospective study was to evaluate the reproducibility of Modified Response Evaluation Criteria in Solid Tumors (mRECIST) for hepatocellular carcinoma (HCC) in patients who underwent transarterial chemoemobolization (TACE) as a first-line treatment.

METHOD AND MATERIALS

97 patients who underwent TACE (60 conventional TACE and 37 drug-eluting beads embolization) as a first-line treatment for HCC from January 2010 to December 2014 were enrolled. Four readers (two experts in mRECIST and two non-experts) with varying degree of experience underwent the education for mRECIST first, and then evaluated the pair of contrast enhanced dynamic CT of the liver scanned within one or two months before and after TACE. They independently measured the longest diameter of target lesions (up to three hepatic lesions). and categorized the responses of target lesion by comparing sum of longest diameters (SLD) on pre- and post-TACE. They also categorized the response of non-target lesions, assessed the presence of new lesions and decided overall responses according to mRECIST. Repeated image review and size measurement were performed two or more weeks later after first review by all four readers. To assess the intra- and interobserver reproducibility of SLD, Lin's concordance correlation coefficients (ρc) were used. The kappa statistics (κ) were used to compare the agreement of response categorization of target lesions and overall responses.

RESULTS

Results For concordance correlation coefficient of SLD, intraobserver reproducibilities were very good (ρc > 0.9) and interobserver reproducibilities were acceptable to very good (ρc = 0.8756 - 0.9756) in all four readers. In kappa statistics, intraobserever agreements of response categorization were moderate to very good (κ = 0.564-0.656) for non-experts and very good (κ = 0.853 - 0.989) for experts for both target lesions and overall responses. Most of interobserver agreements for response categorization between any two readers were within good range (κ = 0.6-0.8).

CONCLUSION

mRECIST demonstrates acceptable intra- and interobserver reproducibilities for HCC patients treated with TACE. Intraobserver reproducibilities were better for experts in mRECIST than non-experts, even though satisfactory level in both cases.

CLINICAL RELEVANCE/APPLICATION

Response evaluation for HCC after TACE by mRECIST is robust and can be used in daily practice and multicenter studies involved by multiple radiologists..

SSK06-07 Differentiation of Malignant Thrombus from Bland Thrombus of the Portal Vein in Patient with Cirrhosis: Application of Intravoxel Incoherent Motion Diffusion-Weighted MR Imaging

Wednesday, Nov. 30 11:30AM - 11:40AM Room: E353A

Participants
Jeong Min Choi, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Eun-Suk Cho, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Junyoung Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yun Jung Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Malignant thrombus of the portal vein (PV) shows internal blood flow. On the other hand, bland thrombus does not have intra-thrombus blood flow. Our purpose of this study was to demonstrate the presence of blood flow within the malignant thrombus using intravoxel incoherent motion (IVIM) diffusion-weighted (DW) MR imaging and investigate the utility of IVIM in distinguishing bland thrombus from malignant thrombus of the PV in patients with cirrhosis or hepatocellular carcinoma.

METHOD AND MATERIALS

Forty three patients with PV thrombosis (malignant thrombus n = 29 and bland thrombus n = 14) examined with gadoxetic acid-

enhanced MR imaging including IVIM were enrolled. IVIM DW imaging was acquired with free-breathing axial single-shot echo-planar two-dimensional imaging sequence and the following eight b values: 0, 25, 50, 75, 100, 200, 500 and 800 sec/mm2. Diffusion coefficient (*D*), pseudo-diffusion coefficient (*D**), and perfusion fraction (*f*) were calculated with bi-exponential model using Matlab software and were compared between malignant and bland thrombi using unpaired t-test.

RESULTS

*D** of malignant thrombus (mean = 67.51 x 10-3mm2/sec) was significantly higher than that of bland thrombus (9.31 x 10-3mm2/sec, $p < 0.001$). However, there was no significant difference in *f* between malignant (18.47 %) and bland thrombi (18.46 %). *D* of bland thrombus (1.35 x 10-3mm2/sec) was significantly higher than that of malignant thrombus (1.03 x 10-3mm2/sec, p = 0.014). However, the mean *D* difference between the two thrombi was relatively small.

CONCLUSION

Increased pseudo-diffusion coefficient (*D**) of malignant thrombus suggests higher intra-thrombus micro-perfusion, which might be due to blood flow by arterial neovascularization within the malignant thrombus. Therefore, IVIM DW imaging appears to be a promising method for the discrimination between bland and malignant PV thrombi.

CLINICAL RELEVANCE/APPLICATION

Malignant thrombus had higher pseudo-diffusion coefficient, which might be due to increased intra-thrombus blood flow by neovascularization. IVIM imaging can discriminate bland thrombus from malignant thrombus.

SSK06-08 Functional Imaging of Small Bowel: Quantitative Perfusion Analysis with Dynamic Contrast Enhanced MRI in Vascular Assessment of Chrohn's Localizations to Distinguish Fibrotic from Active Disease

Wednesday, Nov. 30 11:40AM - 11:50AM Room: E353A

Participants
Sophie Lombardi, Vimercate, Italy (*Presenter*) Nothing to Disclose
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Cammillo R. Talei Franzesi, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Pietro A. Bonaffini, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Chiara Trattenero, MD, Sirone, Italy (*Abstract Co-Author*) Nothing to Disclose
Sandro Sironi, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To differentiate Crohn's disease small bowel activity (fibrotic from acitve disease) by measurement of quantitative perfusion kinetics parameters obtained from dynamic contrast-enhanced magnetic resonance imaging.

METHOD AND MATERIALS

We analyzed 43 patients with known biopsy proven CD,who underwent MR-enterography, performed on 1.5T MRI system (Achieva, Philips), using a phased array sense body multi-coil, after oral administration of 1,5-2 of PEG solution. MRE protocol included T1 weighted, sSShT2, sBTFE and gadolinium enhanced THRIVE sequences acquired on coronal and axial planes. Dedicated workstation was used to generate colour permeability maps, and after the placing of Region of Interest (ROI) on bowel site involved by CD localization the following parameters were calculated and statistically analyzed: Relative Arterial, Venous and Late enhancement (RAE, RVE, RLE), Maximum Enhancement (ME) and Time To Peak (TTP).

RESULTS

Quantitative perfusion analysis showed a good correlation with local degree of Crohn’s inflammation activity, showing significant differences ($p < 0.001$) between inflamed and fibrotic bowel wall vascularity for all the evalueted parameters, obtaining higher values in active Crohn’s disease bowel site. Twenty-nine out of 43 patients showed active disease (reference standard disease activity on morphologic sequences: wall bowel thickness, hyper-enhancement and layered enhancement)
with following perfusion parameters: RAE (%) 116.1, RVE (%) 125.3, RLE (%)127.1, ME (%) 1054.7, TTP (sec) 157; the same parameters calculated in patients with mural fibrosis were: REA 56.4, RVE 81.2, RLE 85.4, ME 809.6, TTP 203.4.

CONCLUSION

Evaluation of perfusion kinetics parameters of small bowel CD lesions, by dynamic contrast perfusion-MR analysis, represents a feasible and routinely appliable complementary diagnostic tool that enables quantitative evaluation of local inflammation activity in CD patients.

CLINICAL RELEVANCE/APPLICATION

MRI sequences combined with quantitative dynamic contrast enhanced analysis can add functional information, related to bowel vascularity, useful to differentiate active from chronic lesion in CD.

SSK06-09 Texture Analysis on MRI of Low Rectal Cancer Improves Evaluation of Tumor Response and Outcome after Combined Chemoradiation Therapy

Wednesday, Nov. 30 11:50AM - 12:00PM Room: E353A

Awards
Student Travel Stipend Award

Participants
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Philippe Rouanet, Montpellier, France (*Abstract Co-Author*) Nothing to Disclose
Christophe Cassinotto, MD, Pessac, France (*Abstract Co-Author*) Nothing to Disclose
Frederic Bibeau, Montpellier, France (*Abstract Co-Author*) Nothing to Disclose

Caroline Reinhold, MD, MSc, Montreal, QC (*Abstract Co-Author*) Consultant, GlaxoSmithKline plc
Benoit P. Gallix, MD, PhD, Montpellier, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate texture analysis (TA) on magnetic resonance images for predicting pathological tumor response grade (TRG) and disease-free survival (DFS) in patients with locally advanced rectal tumors who underwent combined chemoradiation therapy (CRT) before mesorectal excision.

METHOD AND MATERIALS

Institutional review board approval was obtained for this observational retrospective study. Fifty-two patients were included. TA was performed using TexRAD® software on single-slices T2-weighted-images before and after CRT. The tumor volume reduction ratio, TA parameters and their changes were compared with the TRG and DFS. Receiver operating characteristic (ROC) curve analyses were performed and the 3 strongest parameters were incorporated into a multivariate regression model to identify predictive factors for response and their odds-ratios (OR). A score combining these 3 factors was built and optimal cutoff value for predicting response was assessed with ROC curve analysis. DFS was estimated with the Kaplan-Meier statistic and compared between groups with the log-rank test.

RESULTS

The strongest independent predictive factors for TRG were the decrease in volume (AUC=.84;.72-.96), the decrease in mean value(ssf=0) (AUC=.82;.69-.94) and the post-CRT entropy(ssf=4) (AUC=.80;.66-.93). In multivariate analysis, the predictive factors of TRG=3 or 4 were a decrease in volume>70%(OR=9.5,P=.033), decrease in mean value(ssf=0)>15%(OR=7.2,P=.037) and a post-CRT entropy(ssf=4)<5.74(OR=21.62,P=.002). A score ranging from 0 to 6 was built. AUC of the score for predicting good response was .92(.84-.99) with a sensitivity of 84% and a specificity of 80% for a cutoff value of 3. The mean follow-up of survivors at the time of analysis was 76 months±48(SD). Patients with a score>3 had a higher DFS (P=.005).

CONCLUSION

A score combining changes in signal intensity, entropy and volumes offer the best performances to predict TRG and outcome in rectal cancer.

CLINICAL RELEVANCE/APPLICATION

MRI Texture analysis performed on rectal cancer before and after CRT allows prediction of tumor response and patients DFS.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Stephanie Nougaret, MD - 2013 Honored Educator
Caroline Reinhold, MD, MSc - 2013 Honored Educator
Caroline Reinhold, MD, MSc - 2014 Honored Educator

SSK07

Gastrointestinal (Pancreas)

Wednesday, Nov. 30 10:30AM - 12:00PM Room: E353B

CT GI MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Koenraad J. Mortele, MD, Boston, MA (*Moderator*) Nothing to Disclose
Aliya Qayyum, MBBS, Houston, TX (*Moderator*) Spouse, Founder, In Context Reporting

Sub-Events

SSK07-01 Comparison Between MRI with MRCP and EUS for Differentiating Malignant from Benign Intraductal Papillary Mucinous Neoplasms and Mucinous Cystic Neoplasms of the Pancreas: Focusing on Mural Nodule

Participants
Jiyoung Hwang, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Young Kon Kim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ji Hye Min, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seong Sook Hong, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyun-Joo Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yun Woo Chang, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study was to compare the diagnostic performance between contrast-enhanced MRI with MRCP and EUS for differentiating malignant from benign intraductal papillary mucinous neoplasms (IPMN) and mucinous cystic neoplasms (MCN) of pancreas,especially focusing on mural nodule.

METHOD AND MATERIALS

This retrospective study included a total of 55 patients with surgically confirmed 48 IPMNs (12 malignant, 36 benign) and 7 MCNs (2 malignant, 5 benign) who underwent both gadoxetic acid-enhanced MRI with MRCP and EUS.Two observers independently evaluated MR images, and another observer reviewed EUS images, and recorded their confidence for malignancy of the pancreatic IPMN and MCN. Diagnostic performance (ROC curve analysis), accuracy, sensitivity, specificity, positive predictive values (PPV), and negative predictive value (NPV) were evaluated. For feature of mural nodule, comparison between the malignant and benign groups at each modality was also evaluated.

RESULTS

The area under ROC curve values of MRI for predicting malignancy of the pancreatic IPMN and MCN were significantly higher than that of EUS (0.676 and 0.652 for MRI vs 0.543 for EUS; $p < 0.05$). The diagnostic accuracies (72.7%), specificity (78.1% and 80.5%), PPV (47.1% and 46.7%), and NPV (84.2% and 82.5%) of MRI in two observers were higher than those (56.4%, 58.5%, 29.2% and 77.4%, respectively) of EUS. There was no difference between the sensitivity of MRI and EUS (57.1% and 50.0% for MRI vs 50.0% for EUS). In term of mural nodule, the ability to predict malignancy were better in MRI (42.9% in malignant group vs 9.8% in benign group, $p < 0.05$) than in EUS (50.0% in malignant group vs 36.6% in benign group, $p > 0.05$).

CONCLUSION

Compared with EUS, contrast-enhanced MRI with MRCP shows better diagnostic performance with better specificity for prediction of malignancy of the pancreatic IPMN and MCN.

CLINICAL RELEVANCE/APPLICATION

Because MR imaging with MRCP showed better diagnostic accuracy and specificity for prediction of malignancy of the pancreatic IPMN and MCN compared with EUS, MRI is recommended as primary diagnostic test in surveillance of the pancreatic IPMN and MCN. Cautious interpretation is need during evaluation of the pancreatic IPMN and MCN with EUS, particularly in presence of mural nodule.

SSK07-02 Mechanisms of Main Pancreatic Duct Dilatation in Pancreatic Neuroendocrine Tumors: Radiopathologic Correlation

Wednesday, Nov. 30 10:40AM - 10:50AM Room: E353B

Participants
Maxime Ronot, MD, Clichy, France (*Presenter*) Nothing to Disclose
Alex Faccinetto, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Jerome Cros, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Alain Sauvanet, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Marie-Pierre Vullierme, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Valerie Vilgrain, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To elucidate the mechanisms of main pancreatic duct (MPD) dilatation observed in patients with pancreatic neuroendocrine tumors (PNETs) by performing radiopathologic correlations of resected tumors.

METHOD AND MATERIALS

From 2006 to 2016 all consecutive patients with surgically proven PNET and MPD dilatation seen on pre-operative contrast-enhanced MRI were included. MR images were independently reviewed by two radiologists. Readers noted tumor size, tumor size-MPD ratio, and tumor signal and enhancement (hypo, iso or hyper compared with adjacent pancreatic parenchyma). Histopathologic analysis of the tumors included fibrosis quantification, microvessel density [MVD], and serotonin antibodies.

RESULTS

The study included 17 patients (12 men, mean 51yo. [36-79]). The primary site of PNETs was the body (53%), and head (47%). All PNETs were non-hyperfunctioning. Pathological analysis identified two groups of PNETs: sclerosing (n=11), and non-sclerosing (n=6). Sclerosing tumors were smaller (mean 12 vs. 41m,; p=0.002), with smaller size-MPD ratio (median 1.4 [0.3–3.6] vs. 4.9 [3.7-7.0], p=0.002). Sclerosing tumors had significantly lower Ki-67 (mean 1.7±0.4% vs. 5.2±1.0%, p=0.008). All but one sclerosing tumors strongly expressed serotonin, while none of the non-sclerosing did. Sclerosing tumors harboured a more abundant fibrous stroma (60 vs. 39%, p=0.04) They had comparable MVD (mean 190±17 vs. 150±23 vessel/mm2, p=0.20). Most (83%) non-sclerosing PNETs were hypointense on T1-w images while most sclerosing PNETs were isointense (64%, p=0.131). Four (67%) non-sclerosing PNETs were hyperintense on T2-w images while only one sclerosing PNETs was (9%, p=0.039). The MPD size was not different (median 8.5 [6–10] vs. 7mm [4.5-25], p=0.92).On pancreatic phase, 30% and 36% of sclerosing and non-sclerosing tumors were hypervascular (p=1.00). On portal venous phase images, these proportions rose to 50% and 73%, respectively (p=0.60).

CONCLUSION

A main pancreatic duct dilatation is observed either in large tumors due to tumor compression or in smaller low-proliferative sclerosing tumor, and is expained by local fibrotic deposition due to serotonin overexpression. Imaging helps differentiate both subgroups.

CLINICAL RELEVANCE/APPLICATION

In patients with PNETs, MPD dilatation is not always due to tumor invasion, but may be explained by marked focal peritumoral fibrosis due to particular tumor phenotype. This may have consequence on patient management.

SSK07-03 Subtype Differentiation of Pancreatic Neoplasm Using Biexponential Diffusion-Weighted Imaging Models

Wednesday, Nov. 30 10:50AM - 11:00AM Room: E353B

Participants
Zhen Li, MD, PhD, Wuhan, China (*Presenter*) Nothing to Disclose
Yao Hu, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Lili Liang, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the utility of biexponential Diffusion-weighted imaging models MRI for pancreatic neoplasm subtypes compared with focal pancreatitis and normal pancreas tissues.

METHOD AND MATERIALS

The study cohort consisted of 203 patients who underwent a 3-T MRI scanner (GE Healthcare 750 discovery, USA) with diffusion-weighted imaging at 12 b values（0~1000 sec/mm2） and were found to have 77 pathologically-proven pancreatic neoplasm. Fifteen focal pancreatitis (FP) cases and 21 normal pancreas (NP) were enrolled as control. An isotropic apparent diffusion coefficient (ADC) was calculated from DWI by using monoexponential model.Pseudo-ADC (ADCfast), true ADC (ADCslow), and perfusion fraction (f) were calculated from DWI by using biexponential model. All parameters were compared by one-way analysis of variance. Multiple comparisons between groups were accomplished using LSD test.

RESULTS

The 77 pancreatic neoplasm cases were including 38 pancreatic cancer (PC), 14 pancreatic mucinouscystadenoma (PMC), 14 pancreatic serous cystadenoma(PSC) and 11 solid pseudopaillary neoplasm (SPN). Monoexponential model can be used to differentiate PC VS PMC, PSC, SPN(P<0.001, P<0.001, P=0. 02, respectively); PMC VS SPN, FP, NP (all P<0.001); PSC VS SPN, FP, NP(all P<0.001) ; SPN VS NP(P=0. 01),but not able to differentiate PMC VS PSC,PC vs FP,(all P>0.05). Biexponential model can be used to differentiate PC vs SPN(ADCslow P=0.001, ADCfast P=0.027, respectively), PC vs PMC, PSC, (ADCslow P<0.001, P=0.001, respectively), PMC and FP(ADCslow P<0.001, ADCfast P=0. 004,respectively), PSC VS FP(ADCslow P<0.001, ADCfast P=0. 001 respectively), PC vs FP(ADCfast P=0. 03), PMC VS SPN (ADCfast P=0.004), PSC vs SPN (ADCfast P=0.001), but it may be not able to differentiate PMC VS PSC(P>0.05). There were no significant differences in f values between the pancreatic diseases(P>0.05) except between PC and NP(p=0.037).

CONCLUSION

Monoexponential diffusion-weighted imaging models combined biexponential models can provide more parameters in differentiation of pancreatic diaeases, especially the biexponential models maybe better than monoexponential models.

CLINICAL RELEVANCE/APPLICATION

Compared with monoexponential DWI models, biexponential DWI models may be more helpful to differentiate pancreatic neoplasm, and it can provide more information for clinical.

SSK07-04 Prediction of Pancreatic Neuroendocrine Tumor Grade on CT Images using A Software Based Texture Analysis

Wednesday, Nov. 30 11:00AM - 11:10AM Room: E353B

Awards
Student Travel Stipend Award

Participants
Rodrigo Canellas, MD, Cambridge, MA (*Presenter*) Nothing to Disclose

Sreejita Bhowmik, MBBS, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
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Kristine S. Burk, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Shaunagh McDermott, FFR(RCSI), Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Dushyant V. Sahani, MD, Boston, MA (*Abstract Co-Author*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc

PURPOSE

The purpose of our study is to investigate the role of computed tomography texture analysis (CTTA) in predicting the grade of pancreatic neuroendocrine tumors (pNETs).

METHOD AND MATERIALS

In this IRB approved retrospective study, CECT scans in 59 patients with surgically verified pancreatic NETs were included for analysis. Tumors were graded based on mitotic count and Ki-67 index (2010 WHO classification). Assessments of pNETs textural features were made using commercial CTTA software (TexRAD Ltd). CTTA generated filtered and unfiltered images were assessed to quantify heterogeneity using a set of predefined histogram-based texture parameters. Mann-Whitney U test and binary logistic regression was applied through all the filters to assess their effects on the likelihood of a lesion to be grade 2 or 3 (based on the 2010 WHO classification). ROC curves were used to identify accuracy of the predictive models.

RESULTS

Out of the 59 scans, there were 31 lesions low grade and 28 intermediate/ high grade. Statistical significance difference between mean values in both groups was only found for the texture parameter Skewness, using no filtration (p=0.036). When no filter was used (SSF=0), the model combining the 6 texture parameters (Mean, Mpp, Entropy, SD, Skewness and Kurtosis) achieved an AUC equal to 0.771 (p<.001); using fine filtration (SSF=2) the AUC for the same model was 0.745 (p=0.001); for SSF=3, AUC was 0.783 (p<.001); for SSF=4, AUC was 0.854 (p<.001); for SSF=5, AUC was 0.794 (p<0.001); for SSF=6, AUC was 0.799 (p<.001). The model combining all parameters and filters had an AUC equal to 0.726 (p<.001). All the predictive models were statistically significant (p<0.05).

CONCLUSION

CTTA parameters can enable predicting the grade of pancreatic NETs with high accuracy (85.4%).

CLINICAL RELEVANCE/APPLICATION

The management of small pancreatic neuroendocrine tumors is evolving. Since CTTA can help predicting the tumor grade, it can potentially serve as image biomarker to guide the management of small or incidental pNET.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Dushyant V. Sahani, MD - 2012 Honored Educator
Dushyant V. Sahani, MD - 2015 Honored Educator
Dushyant V. Sahani, MD - 2016 Honored Educator

SSK07-05 Sarcopenia Assessed by Computed Tomography is a Predictor of Pancreatic Fistula Occurrence after Pancreatoduodenectomy

Wednesday, Nov. 30 11:10AM - 11:20AM Room: E353B

Participants
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Giulio C. Vitali, Geneva, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Michela Assalino, Geneva, Switzerland (*Abstract Co-Author*) Nothing to Disclose
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Sylvain Terraz, MD, Geneva, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Alex Andres, Geneva, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Thierry Berney, Geneva, Switzerland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the predictive value of sarcopenia assessed by computed tomography (CT) for the development of pancreatic anastomosis leak after pancreatoduodenectomy (PD)

METHOD AND MATERIALS

This study was IRB aproved. All patients undergoing PD at our institution since 2000 were included. The surface of skeletal muscles was segmented on preoperative CT at the level of L3-L4 disc space. Patients were grouped according to the presence or not of sarcopenia as defined by a skeletal muscle index <52.4 cm2/m2 for men and <38.9 cm2/m2 for women. Post-operative pancreatic fistulas (POPF) were scored according to the ISGPF definition. A Cox-Mantel model was used to identify factors associated with POPF, and calculate a predictive score. The score was validated using the Hosmer-Lemeshow test and by determining an optimism-corrected area under ROC curve. Optimism was assessed by 1000 iterations.

RESULTS

A total of 183 patients met inclusion criteria (109 male [60%], mean age 66±11 yo), of whom 164 (90%) had PD for malignant disease, and 154 (84%) were found to be sarcopenic. POPF occurred in 50 patients with sarcopenia, and 1 without (32% vs. 3.4%; p < 0.001). Grade B or C POPF occurred in 33 vs. 1 patients (21% vs. 3.4%; p = 0.020). There was no significant difference in hospital stay, occurrence of Clavien > 2 complications or perioperative mortality. Three factors were independently associated with POPF: sarcopenia, absence of pancreas fibrosis, and peri-operative blood loss > 500 mL. The derived score was calculated as

follow: 3 x sarcopenia + 3 x absence of fibrosis + 1 x blood loss. The score was well calibrated (Hosmer-Lemeshow test, p = 0.123). The optimism-corrected area under the ROC curve was 0.79. Five-year survival rate was significantly higher in non-sarcopenic patients (58% vs. 35%; p = 0.040).

CONCLUSION

Sarcopenia is a strong predictor of the occurrence of pancreatic fistula after pancreatoduodenectomy. It is easily assessable on preoperative CT. It is a potentially reversible condition, and every effort should be undertaken to correct it before surgery.

CLINICAL RELEVANCE/APPLICATION

Imaging may help identify sarcopenic patients and trigger the call for their reconditioning before pancreatoduodenectomy.

SSK07-06 Incremental Role of MRI for Determination of Preoperative Resectability and Prediction of Survival in Patients with Pancreas Ductal Adenocarcinoma

Wednesday, Nov. 30 11:20AM - 11:30AM Room: E353B

Participants
Hye Jin Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Mi-Suk Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yong Eun Chung, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin-Young Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joonseok Lim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Chansik An, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Song-Ee Baek, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myeong-Jin Kim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Bayer AG
Jin Young Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

We investigated the additional effect of contrast enhanced MRI on overall survival and recurrence free survival of pancreas ductal adenocarcinoma (PDA) patients initially assessed by CT.

METHOD AND MATERIALS

This study was approved by the institutional review board, and the requirement to obtain informed consent was waived. We performed a retrospective study of data from 342 patients diagnosed with potentially operable PDA categorized with resectable, borderline resectable, and undetermined state due to liver lesions that are too small to characterize at CT from January 2005 to December 2012. Of these patients, 250 underwent additional evaluation with MRI (CT+MR group). The 92 patients who did not undergo MR imaging are referred to as the CT group. The characteristics of the two groups were compared using a chi-square test and a t test for categorical and continuous variables, respectively. Multivariable analyses were performed using a Cox-proportional hazard model.

RESULTS

The CT and CT+MR groups were comparable in most baseline characteristics. Preoperative resectability was changed from resectable or borderline resectable to unresectable state in 27 patients (12.1%) and from undetermined to unresectable state in 8 patients (30.8%) who underwent MR evaluation after CT, respectively. On multivariate analyses, the patients with curative surgical treatment had a significantly lower overall mortality (HR, 0.37; 95% CI, 0.27-0.44) than those without surgical treatment. The overall survival rate of the CT+MR group with resectability change by MR imaging was significantly lower than that of the CT+MR group without resectability change and the CT group (p = .002), with 4-year survival rates of 8.7%, 21,7%, and 26.1%, and respectively.

CONCLUSION

Among patients who underwent CT analysis of a potentially resectable PDA, additional evaluation by MR imaging led to the change in operability in 14% of patients and decreased overall survival rate.

CLINICAL RELEVANCE/APPLICATION

Our study showed that the additional MR imaging showed change of preoperative resectability in a significant proportion of patients and decreased overall survival of patients who initially were assessed to have potentially operable PDA by CT.

SSK07-07 Focal Tumor-like Autoimmune Pancreatitis: The Added Diagnostic Value of Contrast-enhanced Ultrasound

Wednesday, Nov. 30 11:30AM - 11:40AM Room: E353B

Participants
Wenping Wang, MD, PhD, Shanghai, China (*Presenter*) Nothing to Disclose
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Feng Mao, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Zhengbiao Ji, MD, shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Bei-Jian Huang, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Jiaying Cao, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Focal tumor-like autoimmune pancreatitis (AIP) is less common than diffuse AIP and manifests as a focal mass. It is still a challenge to make differentiate diagnose from pancreatic ductal adenocarcinomas (PDA) before surgery. The purpose of current study is to analyse contrast-enhanced ultrasound (CEUS) features of histologically proven focal tumor-like AIP, in comparison to PDA.

METHOD AND MATERIALS

The present study was approved by the institutional ethics committee and informed consent was waived. Twelve patients with

histologically proved focal tumor-like AIP lesions and 25 patients with histologically proved PDA lesions were retrospectively analyzed. The CEUS features of pancreatic lesions were compared to the surrounding normal pancreatic parenchyma. Two radiologists assessed the CEUS enhancement pattern in consensus.

RESULTS

All focal tumor-like AIP and PDA lesions were hypoechoic on BMUS. Most of AIP lesions (83.3%, 10/12) and PDA lesions (80%, 20/25) were located on the head of pancreas. On CEUS, all AIP lesions were isoenhanced both in arterial phase and late phase. In contrast, all PDA lesions showed hypoenhancment in the arterial phase as the most distinctive feature ($P < 0.01$).

CONCLUSION

CEUS of the pancreas has the potential to provide complementary information for improved differentiate diagnosis, particularly when used for characterization of focal tumor-like AIP to avoid surgery. The differential diagnosis to the typically hypovascularised pancreatic adenocarcinoma was always possible.

CLINICAL RELEVANCE/APPLICATION

CEUS can successfully visualize fine vessels in pancreatic lesions and may play a vital important role in the depiction and differential diagnosis of pancreatic tumors.

SSK07-08 Intravoxel Incoherent Motion MR Imaging for Assessment of Chronic Pancreatitis

Wednesday, Nov. 30 11:40AM - 11:50AM Room: E353B

Participants
Nobuhiro Fujita, MD, PhD, Fukuoka, Japan (*Presenter*) Nothing to Disclose
Akihiro Nishie, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshiki Asayama, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Kousei Ishigami, MD, Iowa City, IA (*Abstract Co-Author*) Nothing to Disclose
Yasuhiro Ushijima, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroshi Honda, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Yukihisa Takayama, MD, Fukuoka, Japan (*Abstract Co-Author*) Research Grant, FUJIFILM Holdings Corporation
Daisuke Okamoto, MD, Fukuoka City, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the usefulness of intravoxel incoherent motion (IVIM) MR imaging parameters in patients with chronic pancreatitis (CP) with a special focus on its early stage.

METHOD AND MATERIALS

A total of 35 patients with early CP (eCP, n=24) and CP (n=11) were assessed with IVIM imaging using 8 b-values (0–1000 s/mm2) at 3T. Patients were diagnosed as eCP or CP based on the diagnostic criteria proposed by the Japan Pancreas Society and the Japanese Society of Gastroenterology. eCP was diagnosed by the presence of clinical symptoms plus mild changes of endoscopic ultrasonography (EUS) findings without characteristic imaging findings of CP such as stone in pancreatic ducts, multiple calcification or irregular dilatation of main pancreatic duct. For a comparison, a control group of 49 patients without CP was also enrolled. The perfusion fraction (f), true diffusion coefficient (D), pseudo-diffusion coefficient (D*) and apparent diffusion coefficient (ADC) of pancreatic parenchyma were calculated by fitting the bi-exponential model. These measurements were compared between three groups by Kruskal-Wallis test.

RESULTS

Compared with control group, patients with eCP and CP showed lower f (27.87 ± 9.02 in eCP, 22.04 ± 3.86 in CP and 32.53 ± 9.20 in control group; p=0.039 and p<0.001, respectively) and higher D (1.03 ± 0.18 in eCP, 1.11 ± 0.28 in CP and 0.88 ± 0.19 in control group; p=0.003 and p=0.004, respectively). Patients with CP showed lower D* than patients with eCP and control group (29.97 ± 25.69 in CP, 61.95 ± 31.41 in eCP and 50.12 ± 25.43 in control group; p=0.005 and p=0.017, respectively). ADC was not different between three groups.

CONCLUSION

Pancreas f decreased and D increased in eCP and CP compared to control group. D* decreased in CP compared to eCP and control group. IVIM MR imaging may be useful to detection of eCP and in monitoring patients with CP.

CLINICAL RELEVANCE/APPLICATION

IVIM MR imaging, by combining three parameters, may contribute to diagnosis, treatment decision and monitoring in CP. It could be recommended as a non-invasive imaging modality for evaluating CP.

SSK07-09 Estimating the Risk of Type 2 Diabetes with Non-Contrast Enhanced Abdominal CT: Model Development and Initial Validation

Wednesday, Nov. 30 11:50AM - 12:00PM Room: E353B

Participants
Bing-Qing Dong, MD, Nanjing, China (*Presenter*) Nothing to Disclose
Shenghong Ju, MD, PhD, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To establish a risk score model to predict the development of type 2 diabetes mellitus by using non-contrast enhanced abdominal computed tomography (CT) features.

METHOD AND MATERIALS

This retrospective study was approved by the local institutional review board, and informed consent was waived. Inpatients who underwent non-contrast enhanced abdominal CT in a tertiary teaching hospital from July 2014 to April 2015 (training cohort,

n=2075) and from May 2015 to February 2016 (validation cohort, n=2229) were included. CT features including liver steatosis, pancreatic steatosis, subcutaneous and visceral adipose tissue area, abdominal perimeter, abdominal aortic calcification and CT attenuation value of psoas major muscle were measured. In training cohort, a risk score model was constructed by using CT features which were independently associated with T2DM, identified by multiple logistic regression analysis. The model was further validated using the receiver operating characteristic (ROC) analysis in the validation cohort.

RESULTS

In the training cohort, the risk score model was constructed on the basis of five independent risk factors, including liver steatosis (odds ratio [OR] = 1.697; 95% confidence interval [CI]: 1.399, 2.060), abdominal perimeter(OR = 1.034; 95% CI: 1.024, 1.044), abdominal aortic calcification (OR = 1.149; 95% CI: 1.081, 1.222), CT attenuation value of psoas major muscle(OR = 0.976; 95% CI: 0.966, 0.987) and subcutaneous adipose tissue area(OR = 0.266; 95% CI: 0.086, 0.824). The area under the receiver operating characteristic curve (AUC) of the model was 0.678. When the model was applied to the validation cohort, the AUC was 0.683.

CONCLUSION

A risk score model, constructed on the basis of simple non-contrast enhanced abdominal CT, has the potential to estimate the risk of developing T2DM. However, future follow-up validation of this risk model is necessary.

CLINICAL RELEVANCE/APPLICATION

The risk score model, developed based on non-contrast enhanced abdominal CT, has the potential to predict the risk of developing T2DM for clinical purpose.

SSK08

Genitourinary (Abdominal DECT)

Wednesday, Nov. 30 10:30AM - 12:00PM Room: E450B

CT GI GU OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Benjamin M. Yeh, MD, San Francisco, CA (*Moderator*) Research Grant, General Electric Company; Author with royalties, Oxford University Press; Shareholder, Nextrast, Inc;
Avinash R. Kambadakone, MD, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

SSK08-01 Iodine Threshold for Discrimination of Papillary Renal Cell Carcinomas from Complex Cyst Using a Rapid kV-switching Dual Energy CT

Participants
Desmin Milner, MD, Birmingham, AL (*Presenter*) Nothing to Disclose
Jessica G. Zarzour, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Roberto C. Valentin, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Janelle West, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Bradford Jackson, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Desiree E. Morgan, MD, Birmingham, AL (*Abstract Co-Author*) Consultant, General Electric Company; Research Grant, General Electric Company
Soroush Rais-Bahrami, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Jennifer Gordestsky, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Determine the iodine content threshold to discriminate papillary renal cell carcinomas (pRCC) from complex cysts (CCs) using rapid kV-switching dual energy CT (rsDECT).

METHOD AND MATERIALS

IRB approved retrospective study of consecutive patients with pathologic diagnosis of renal cell carcinoma that underwent rsDECT from 2011-2015 at a tertiary care center. Control group included patients with complex cysts on DECT. Iodine content (IC) and other rsDECT variables for each papillary renal cell carcinoma (pRCC, n=27) were recorded on rsDECT workstation for arterial (n=15) and nephrographic phase (n=12), then compared to IC for clear cell renal cell carcinomas (ccRCC, n=46) and complex cysts (CC, n=54). An optimal iodine content threshold was estimated using logistic regressions and Youden's J based on maximum specificity and sensitivity. ROC curves were generated for each of the measurements.

RESULTS

Tumor IC threshold of 1.28 mg/cc was the optimal cutoff value to discriminate between pRCCs and CCs for nephrographic phase (sens 1.0, spec 0.96, PPV 0.92, and NPV 1.0; AUC 0.997, acc 0.97, p<0.0001). Statistically significant difference in mean IC for pRCC and CC was present for nephrographic phase (1.90 mg/cc and 0.82 mg/cc, respectively, p<0.0001). Tumor IC threshold of 1.22 mg/cc was the optimal cutoff value to discriminate between pRCCs and CCs in the arterial phase (sens 0.67, spec 0.97, PPV 0.91, NPV 0.85, AUC 0.76, acc 0.84, p=0.006). The optimal threshold to discriminate between cc RCCs and pRCCs was 1.85 mg/cc in the arterial phase (sens 0.87, spec 0.92, PPV 0.87, NPV 0.92, p<0001) and 2.71 mg/cc in the nephrographic phase (sens 1.0, spec 1.0, PPV 1.0, NPV 1.0, p<0.0001).

CONCLUSION

rsDECT accurately discriminates between papillary RCC and complex cysts in a post contrast acquisition. Iodine content threshold has higher sens, spec, PPV, NPV and accuracy when measured in the nephrographic phase. Our thresholds differ from previously published work primarily observed with dual source DECT.

CLINICAL RELEVANCE/APPLICATION

A reliable iodine content threshold for renal lesions evaluated by rsDECT in a single post contrast acquisition has direct implications for patient care as it can eliminate the need for additional studies and guide management for these patients.

SSK08-02 A Preliminary Study of Spectral CT Imaging in Gastrointestinal Stromal Tumor Risk Classification

Wednesday, Nov. 30 10:40AM - 10:50AM Room: E450B

Participants
Xueling Zhang, Lanzhou, China (*Presenter*) Nothing to Disclose
Junlin Zhou, Lanzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the value of spectral CT imaging in gastrointestinal stromal tumor (GIST) risk classification.

METHOD AND MATERIALS

41 patients with GIST were retrospectively reviewed, of which 13 were high risk, 12 were medium , 11 were low and 5 were very

low risk (low and very low risk were divided into low-risk group), all the patients underwent plain and triple phases contrast enhanced CT with spectral CT imaging mode. Quantative parameters including CT value of 70keV monochromatic images. the slope of spectral curve and normalized iodine concentration(NIC) were measured and calculated. Data were compared with one-way ANOVA and rank sum test when it is heterogeneity of variance.

RESULTS

1, the CT value of 70 keV monochromatic images was negatively correlated with GIST risk (high to low) in arterial phase (r =-0.173), positively correlated with GIST risk (r = 0.552) in delay phase and no correlation with the GIST risk in venous phase. 2, the slope of spectral curve had significant difference in delay phase(2.94±0.33,2.50±0.29,3.41±1.33, c2= 6.641,P= 0.036), no significant difference in arterial phase and venous phase. 3, the NIC values for different risk of GIST were significant different in triple phases(F=3.646, c2=6.046, F=57.233, P=0.035, P=0.049, P<0.001), and correlated with GIST risk (from high to low) (r = -0.564)in delay phase.

CONCLUSION

Spectral CT imaging has distinct image findings of gastrointestinal stromal tumor (GIST) risk classification and can be used as a preoperative reference.

CLINICAL RELEVANCE/APPLICATION

CT spectral imaging has distinct imaging finding of gastric stromal tumors of different risk classifications, and may help the differential diagnosis and the preoperative therapy selection.

SSK08-03 Quantitative Spectral CT in Differentiation of Clear Cell Renal Cell Carcinoma and Fat Poor Renal Angiomyolipoma

Wednesday, Nov. 30 10:50AM - 11:00AM Room: E450B

Participants
Xiaotong Yang, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Yi Liu, MD, PhD, Shenyang, China (*Presenter*) Nothing to Disclose

PURPOSE

To explore the value of CT spectral imaging in differentiation of clear cell renal carcinoma (ccRCC) and fat poor renal angiomyolipoma (RAML) in the cortex phase (CP) and nephpographic phase (NP).

METHOD AND MATERIALS

In this institutional review board-approved study, we retrospectively analysed the data of spectral CT in 38 cases of ccRCCs and 9 cases of RAMLs. The monochromatic images and spectral curve were measured to get the iodine concentration (IC), normalized iodine concentration (NIC) and slope of spectral curve in the CP and NP. The independent sample t-test was used to compare the slope of spectral curve, ICs and NICs of the two kinds of lesions. The prediction parameters and diagnostic threshold were compared by drawing receiver operating characteristic curve (ROC). P<0.05 was considered to indicate a significant difference.

RESULTS

The ICs and NICs of RAML were lower than those of ccRCC in the CP and NP (p<0.05), and the slope of spectral curve of ccRCC was significant higher than RAML in the CP and NP (8.66±2.53 versus 4.87±2.50 in CP, 4.86±1.17 versus 3.32±1.30 in the NP, p<0.05). The areas under ROC curve of NIC in CP and NP was the largest: 0.901 and 0.893, respectively. ROC curves indicated that NIC< 0.389 in CP and NIC< 0.694 in NP could differentiate ccRCC from fat poor RAML, Sensitivity: 73.5% and 91.2%, Specificity: 100% and 75%, respectively.

CONCLUSION

CT spectral imaging with multiple parameter quantitative analysis may help to increase the accuracy of differentiating ccRCC from fat poor RAML.

CLINICAL RELEVANCE/APPLICATION

Quantitative spectral CT could be a valuable method to enhancement the differential diagnosis ability of ccRCC from fat poor RAML. It is important for the planning of therapeutic.

SSK08-04 Photon-counting CT Assessment of Complex Renal Lesions: First Clinical Experience

Wednesday, Nov. 30 11:00AM - 11:10AM Room: E450B

Participants
Ashkan A. Malayeri, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Rolf Symons, MD, Washington, DC (*Presenter*) Nothing to Disclose
Amir Pourmorteza, PhD, Bethesda, MD (*Abstract Co-Author*) Researcher, Siemens AG
Mohammad Hadi Bagheri, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Rabindra Gautam, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
W. Marston Linehan, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
David A. Bluemke, MD, PhD, Bethesda, MD (*Abstract Co-Author*) Research support, Siemens AG

PURPOSE

Renal cell carcinoma (RCC) is may be multifocal and identification of neoplasm often relies on determining changes in size of complex lesions. Accurate assessment of renal lesions in VHL patients is critical to determine lesion growth and possible indication for surgical intervention. The aim of this study was to determine the performance of a photon-counting detector (PCD) CT compared with an energy-integrating detector (EID) CT in assessment of renal lesions in VHL patients.

METHOD AND MATERIALS

This study used a hybrid (dual-source) whole-body prototype CT system (Siemens Healthcare, Germany), which consists of an EID

and a PCD. Seven VHL patients (mean age ± standard deviation: 58.9±6.6 years) were prospectively enrolled between 11/2015 and 01/2016. Radiation dose-matched three-phase spiral EID and PCD scans were acquired at vendor recommended guidelines (tube voltage/current 120 kVp/20 mAs for average 75 kg patient). Images were reconstructed with sinogram-affirmed iterative reconstruction (SAFIRE strength 2), 2 mm slice thickness, and 1 mm increment. The maximum diameter of renal lesions was assessed by an independent radiologist blinded to the detector. Correlation between EID and PCD renal lesion measurements was assessed with the intra-class correlation coefficient (ICC) and Bland-Altman analysis.

RESULTS

In total, 200 renal lesions were measured (157 simple cysts, 31 complex cysts, and 12 solid masses). Reproducibility of measurements between EID and PCD was excellent (ICC = 0.97, 95% confidence interval 0.96-0.98, P<0.001). Bland-Altman analysis showed narrow limits of agreement without significant bias (mean difference: 0.4 mm, 95% limits of agreement: [-2.7,3.7 mm]).

CONCLUSION

Photon-counting CT provides excellent reproducibility of renal lesion measurements in VHL patients compared with conventional EID CT.

CLINICAL RELEVANCE/APPLICATION

Photon-counting CT can be used to accurately measure renal lesions in VHL patients. The spectral information of PCD can be used for additional virtual-non contrast images and iodine concentration maps.

SSK08-05 Iodine Concentration and Normalized Iodine Concentration in Diagnosis of the Inflammatory and Metastatic Lymph Nodes in Colorectal Cancer

Wednesday, Nov. 30 11:10AM - 11:20AM Room: E450B

Participants
Xuejun Yang, kunming, China (*Abstract Co-Author*) Nothing to Disclose
Wei Zhao, Kunming, China (*Abstract Co-Author*) Nothing to Disclose
Yaying Yang, Kunming, China (*Presenter*) Nothing to Disclose
Lin Xu, Shiyan, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To explore the value of iodine concentration and normalized iodine concentration in dual-energy CT in the differential diagnosis of the inflammatory and metastatic lymph nodes in colorectal cancer.

METHOD AND MATERIALS

35 patients had pathologically confirmed colorectal cancer underwent arterial and venous phase contrast-enhanced dual energy CT scan. Iodine concentration, normalized iodine concentration and enhanced CT value of the inflammatory and metastatic lymph nodes were measured in Liver VNC software And compared by using independent sample t-test. Sensitivity, specificity and receiver operating characteristic curve (ROC) was performed for diagnosing metastatic lymph nodes in colorectal cancer.

RESULTS

35 patients had105 local lymph nodes, including 56 metastatic lymph nodes, 49 reactive hyperplasia lymph nodes. Contrast enhanced CT value of metastastic and of reactive hyperplasia lymph nodes in the arterial and venous phase were 32.67±11.99 HU, 38.30±14.65 HU and 35.48±13.55 HU, 37.08±15.57 HU, respectively. The responding iodine concentration were 1.58±0.81 mg/ml, 3.17±1.07 mg/ml and 1.85±0.90 mg/ml, 3.56±1.38 mg/ml; and normalized iodine concentration were 0.12±0.06, 0.24±0.75 and 0.33±0.20, 0.62±0.24; respectively. The arterial and venous phase iodine content and normalized iodine concentration and arterial phase enhanced CT value had statistical differences($p<0.000$) in the two kinds of lymph nodes. There were no statistical differences ($p>0.05$) for the venous phase enhanced CT value. Normalized iodine concentration was the most valuable in the diagnosis of metastatic lymph nodes with sensitivity, specificity and AUC of 88.9%, 73.2%, 0.895 and 80.6%, 82.1%, 0.877.

CONCLUSION

Iodine concentration and normalized iodine concentration can be used in the differential diagnosis of the inflammatory and metastatic lymph nodes in colorectal cancer. The diagnostic value of the normalized iodine concentration was superior to enhanced CT value and iodine concentration to differentiate inflammatory from metastatic lymph nodes.

CLINICAL RELEVANCE/APPLICATION

Iodine concentration and normalized iodine concentration can be used in the differential diagnosis of the inflammatory and metastatic lymph nodes in colorectal cancer.

SSK08-06 Choi Criteria and Iodine Quantification with Single Source Dual Energy CT (ssDECT) in the Evaluation of Treatment Response of Neuroendocrine Tumor Liver Metastases

Wednesday, Nov. 30 11:20AM - 11:30AM Room: E450B

Awards
Student Travel Stipend Award

Participants
Andrea Agostini, MD, Fermo, Italy (*Presenter*) Nothing to Disclose
Alessandra Borgheresi, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Usman Mahmood, MS, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Andrea Giovagnoni, MD, Ancona, Italy (*Abstract Co-Author*) Nothing to Disclose
Lorenzo Mannelli, MD, PhD, New York, NY (*Abstract Co-Author*) Speaker, Bracco Group; Speaker, General Electric Company

PURPOSE

To correlate the iodine quantification with single source dual energy CT (ssDECT) and Choi Criteria, for the evaluation of treatment response in liver metastases of neuroendocrine tumors.

METHOD AND MATERIALS

The present study was approved by the local IRB. Patients treated for liver metastatic neuroendocrine tumors (NET) with at least two ssDECT exams between March 2015 and March 2016 were included. ssDECT images were acquired in the arterial phase after administration of iodinated contrast material (Iohexol 300mg/mL) and bolus-tracking. Scanning parameters: 80/140 kVp fast switching; fixed mA; pitch 0.984:1; kernel standard; matrix 512x512; slice thickness/spacing: 5/5mm. A radiologist segmented hypervascular liver lesions >10mm using the GSI MD analysis on Advantage Workstation VolumeShare 7 (GE Healthcare) and measured maximum diameter, volume, and iodine concentration in the first and last ssDECT exams in two consecutive exams. Lesion density was measured on monochromatic 70 keV images. Iodine quantity (iodine concentration x volume), and differences among diameters, volumes, iodine concentrations, iodine quantities, and lesion densities were calculated for each lesion. Choi response was calculated for each lesion. Non parametric statistical tests were used and $p<0.05$ were considered significant.

RESULTS

We included 9 patients (M/F=2/1, mean age 62 years), for a total of 33 lesions. Patients were treated with systemic therapy (n=5) or combined systemic and locoregional therapy (n=4). 8 lesions had Choi partial response (PR), 13 lesions had stable disease (SD) while 12 lesions had progressive disease (PD). Choi response significantly stratified the absolute and percentage differences in iodine quantity for each lesion (Kruskal-Wallis p=0.003). We found significant correlation between percentage differences in iodine quantity maximum diameters (Spearman's Rho 0.580, p=0.0004), while the Spearman's Rho among percentage differences of iodine quantities and volumes was of 0.759 ($p<0.0001$).

CONCLUSION

Changes in iodine quantity of liver NET metastases correlate with Choi response, and changes in lesion diameters and volumes.

CLINICAL RELEVANCE/APPLICATION

Iodine quantification can be used as a marker of response in neuroendocrine tumor liver metastases

SSK08-07 Comparison of Single Source-dual Energy CT (SS-DECT) Imaging with 140 kVp Conventional MDCT in Hypervascular Liver Lesions in Cirrhosis

Wednesday, Nov. 30 11:30AM - 11:40AM Room: E450B

Participants
Ritu M. Kakkar, MBBS, DMRD, Mumbai, India (*Abstract Co-Author*) Nothing to Disclose
Shrinivas B. Desai, MD, Mumbai, India (*Presenter*) Nothing to Disclose
Sameer S. Soneji, DMRD, Mumbai, India (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Compare Single source-dual energy CT (SS-DECT) imaging with 140 kVp conventional MDCT in hypervascular liver lesions in cirrhotic patients .
Determine whether there is improved detection of hypervascular liver lesions using SS-DECT

METHOD AND MATERIALS

30 cirrhotic patients (21:9 = M:F) with known or suspected liver lesions underwent SS-DECT during the late hepatic arterial phase using fast kV switching dual energy acquisition technology of GE. Conventional polychromatic images at 140 kVp and monochromatic images at 70 keV were reconstructed in the late hepatic arterial phase from the single spectral CT acquisition and evaluated . Virtual Monochromatic Spectral (VMS) image sets were created at 70 keV .ROIs were placed on tumor and the background liver .AD (Relative Attenuation Difference, CNR (contrast-to-noise ratio), SNR (signal-to-noise ratio) ,image noise and quality were also graded on a 5 point system by two experienced radiologists Averaged values of the image noise and image quality were calculated and compared. Statistical analysis was carried out using Mann-Whitney Rank Sum Test and paired t-test wherever applicable

RESULTS

Total of 45 lesions were detected on 70 keV image sets when 140 kVp image sets detected only 38 lesions. The mean attenuation difference at 140 kVp and at 70 keV was 69.5±11 and 91.7±9.1 HU. The difference in mean signal-to-noise ratio at 140 kVp and at 70 keV was 5.7±1.3 and 7.0±1.3 HU respectively. The difference in mean contrast-to-noise ratio at 140 kVp and at 70 keV was 3.0±0.6 and 4.5±0.9 HU respectively. The difference in mean image quality at 140 kVp and at 70 keV was 3.4±0.7 HU rated as good and 2.2±0.4 HU rated as poor respectively. The difference in mean image noise at 140 kVp and at 70 keV was 2.0±0.2 HU rated as minimal and 3.7±0.5 HU rated as moderate respectively. All the parameters used for evaluation were found to be statistically significant ($p < 0.01$).

CONCLUSION

Single source-dual energy MDCT offers improved detection and diagnosis of hypervascular liver lesions by increasing the image contrast and conspicuity at an acceptable level of increase in image noise and decreased image quality.

CLINICAL RELEVANCE/APPLICATION

Higher detection rates of hypervascular liver lesions can be achieved at low keV images (70 keV) images in comparison to 140 kVp conventional MDCT

SSK08-08 Dual Energy CT Workflow: Multicenter Consensus on Standardization of GU Exams

Wednesday, Nov. 30 11:40AM - 11:50AM Room: E450B

Participants
Bhavik N. Patel, MD,MBA, Durham, NC (*Presenter*) Nothing to Disclose
Lauren F. Alexander, MD, Atlanta, GA (*Abstract Co-Author*) Spouse, Stockholder, Abbott Laboratories; Spouse, Stockholder, AbbVie

Inc; Spouse, Stockholder, General Electric Company
Brian C. Allen, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Lincoln L. Berland, MD, Birmingham, AL (*Abstract Co-Author*) Consultant, Nuance Communications, Inc;
Amir Borhani, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Achille Mileto, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Courtney A. Coursey Moreno, MD, Suwanee, GA (*Abstract Co-Author*) Nothing to Disclose
Desiree E. Morgan, MD, Birmingham, AL (*Abstract Co-Author*) Consultant, General Electric Company; Research Grant, General Electric Company
Dushyant V. Sahani, MD, Boston, MA (*Abstract Co-Author*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc
William P. Shuman, MD, Seattle, WA (*Abstract Co-Author*) Research Grant, General Electric Company
Eric P. Tamm, MD, Houston, TX (*Abstract Co-Author*) Institutional Research Grant, General Electric Company
Mitchell E. Tublin, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Benjamin M. Yeh, MD, San Francisco, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Author with royalties, Oxford University Press; Shareholder, Nextrast, Inc;
Daniele Marin, MD, Durham, NC (*Abstract Co-Author*) Research support, Siemens AG

PURPOSE

To standardize workflow for dual energy computed tomography (DECT) involving renal cell carcinoma (RCC), genitourinary (CTU), and renal stone exams.

METHOD AND MATERIALS

9 institutions (1 ssDECT, 4 dsDECT, 4 both) with 32 participants (average # yrs. (range) in practice and DECT experience 12.3 (1-35) and 4.6 (1-14), respectively) filled out a single survey (n=9). A five-point agreement scale (0,1,2,3,4 – contra-, not, mildly, moderately, strongly indicated, respectively) and utilization scale (0 – not performing and shouldn't; 1- performing but not clinically useful; 2 – performing but not sure if clinically useful; 3 – not performing it but would like to; 4 – performing and clinically useful) were used. Consensus was considered with a score of 2.5 or higher. Survey results were discussed over three separate live webinar sessions.

RESULTS

5/9 (56%) institutions exclude large patients from DECT, 2 (40%) use weight, 2 (40%) use transverse dimension, and 1 (20%) uses both. 7/9 (78%) use 2.5 mm slice thickness for interpretation in the axial plane. 7/9 (78%) use 50 keV for low and 70 keV for medium monochromatic reconstructed images. 5/6 (56%) use the same order when viewing DECT exams, while 4/9 (44%) use an exam dependent approach. DECT for RCC exams is indicated (AS 3.44; US 3.33) in the arterial phase (AS 3.33; US 2.78) but not in the venous phase (AS 2.44; US 2.22). DECT for CTU is indicated (AS 3.33; US 3.22) in the nephrographic phase (AS 3.11; US 2.89). Virtual unenhanced (VUE) reconstructed images cannot replace a true enhanced exam (AS 2.78; US 2.78). DECT for renal stone exams is indicated (AS 3.00) though most centers are not performing it (US 1.89).

CONCLUSION

There is strong agreement that DECT is indicated and should be performed during the arterial phase for RCC exams and nephrographic phase for CTU. There is a role for DECT for renal stone exams but most centers are not performing it. VUE cannot replace true unenhanced exams.

CLINICAL RELEVANCE/APPLICATION

Despite the advances in the technology, there is not widespread adoption of DECT into practice. Workflow standardization is essential to guide implementation of DECT into practice.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Courtney A. Coursey Moreno, MD - 2016 Honored Educator
Dushyant V. Sahani, MD - 2012 Honored Educator
Dushyant V. Sahani, MD - 2015 Honored Educator
Dushyant V. Sahani, MD - 2016 Honored Educator

SSK08-09 Implementation of a Volume-mode Dual Energy CT Protocol for Hepatocellular Carcinoma: Prospective 4-readers Study for Selection of the Most Valuable Post-processing Options and Comparison with Subtraction

Wednesday, Nov. 30 11:50AM - 12:00PM Room: E450B

Participants
Luis S. Guimaraes, MD, Toronto, ON (*Presenter*) Nothing to Disclose
Seng Thipphavong, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Sarah A. Johnson, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Christin Farrell, Toronto, ON (*Abstract Co-Author*) Employee, Toshiba Corporation
Azadeh Khalatbari, MD, MSc, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Patrik Rogalla, MD, Toronto, ON (*Abstract Co-Author*) Research Grant, Toshiba Corporation; Speakers Bureau, Bayer AG

PURPOSE

To determine the best post-processing options in the arterial and delayed phases for dual energy (DE) CT in patients with hepatocellular carcinoma (HCC), as well as the added value of subtraction (St).

METHOD AND MATERIALS

Arterial and delayed phases were performed in DE volume mode in patients with HCC. 120 kV equivalent (120 Eq), 100 kV equivalent

(100 Eq), "Best CNR" (BCNR) and "Enhanced" (ENH) blending, monochromatic images (arterial phase: 55, 60, 65 keV; delayed phase: 70 keV), iodine maps (IM) and St images were reconstructed.Four abdominal radiologists blindly rated IQ (5=excellent) and ranked the 4 preferred series for IQ and LC (1=preferred). Quantitative assessment [contrast-to-noise-ratio (CNR), lesion-to-liver contrast (LLC) and lesion-to-liver CNR (LLCNR)] was performed for nodules >1 cm.

RESULTS

This ongoing study included 27 patients with 95 hypervascular and 90 hypodense lesions. All readers was rated IQ as 4/5 in >91%. Readers ranked the series with unequal preference ($p \leq 0.05$).For the arterial phase IQ, for all readers, BCNR ranked 1st or 2nd in terms of percentage of ratings 1 or 2 for preference (59.3%, 48.2%, 62.7% and 70.4%, readers 1-4). For LC, IMs ranked 1st in 55.6% for readers 1 and 4. St ranked 4th (7.4%) and 2nd (51.9%), respectively. Excluding IM and St, readers 1 and 3 preferred the 80 kv or 55 keV images (together rated as best or 2nd in 88.9% and 96% respectively). Readers 2 and 4 preferred 100 Eq series (51.9% and 18.5%, respectively).For the delayed phase, series that were either the 1st or 2nd more frequently chosen as the best or 2nd best were BCNR for IQ (by 3 readers - 92.6%, 48.2%, 85.2% and 40.7%, readers 1-4) and ENH for LC (also by 3 readers – 66.7%, 25.9%, 51.9% and 48.2%, readers 1-4).Arterial phase series with the best LLC and LLCNR averages were 55 keV (LLC=88.3) and 100 Eq (LLCNR=5.2). For the delayed phase, 1st for LLCNR (2.2) was BCNR, 1st for LLC was 80 kV (31.5).

CONCLUSION

Despite the idiosyncrasy of radiologists' preferences, BCNR provides the best overall image quality. For lesion conspicuity, the best series are IMs, 80 kv, 55 kev and 100 Eq images for the arterial phase and ENH for the delayed phase. Subtraction does not seem to add value.

CLINICAL RELEVANCE/APPLICATION

The identification of the most valuable post-processing DE options permits reduction of post-processing times, which may allow for the feasibility of widespread implementation of HCC DE protocols.

SSK19

Vascular Interventional (Chemoembolization and Radioembolization)

Wednesday, Nov. 30 10:30AM - 12:00PM Room: E351

GI IR NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Juan C. Camacho, MD, Charleston, SC (*Moderator*) Nothing to Disclose
Ronald S. Arellano, MD, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

SSK19-01 The Effect and Safety of Preoperative Hepatic and Regional Arterial Chemotherapy (PHRAC) for Stage II and III Colorectal Cancer-Multicenter Clinical Trial Results

Participants
Bo Zhou, Shanghai, China (*Presenter*) Nothing to Disclose
Zhiping Yan, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Jianhua Wang, MD, PhD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Jianmin Xu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate whether preoperative hepatic and regional arterial chemotherapy is able to prevent liver metastasis and improve overall survival in patients receiving curative colorectal cancer resection.

METHOD AND MATERIALS

Patients in five medical centers with stage II or stage III colorectal cancer (CRC) were randomly assigned to receive preoperative hepatic and regional arterial chemotherapy (PHRAC group, n = 341) or surgery alone (control group, n = 347). The primary endpoint was disease-free survival (DFS), whereas secondary Outcomes include Cumulative incidence of liver metastasis (LM), overall survival (OS) and Safety. Clinical trial Number: NCT00643877.

RESULTS

There were no significant differences in baseline characteristics between PHRAC and Control groups. The 5y-DFS was 75% in PHRAC group vs 61% in control group (P<0.001). Three years liver metastasis (LM) was 7% in PHRAC group vs 15% in control (P<0.001). And 5-LM was 8% vs 18% (P<0.001). The 3y OS was 89% in PHRAC group and 79% in control, 5y OS was 81% vs 72%, HR 0.59 (95%CI 0.42-0.84,P=0.003). Subgroup analysis, 3y-DFS was 89% and 5y-DFS was 84% for patients with stage II CRC in PHRAC, while 3y-DFS was 80% and 5y-DFS was 74% in control, HR 0.64(95%CI 0.39-1.04,P=0.068). There was also no significant difference between the 2 groups in LM and OS for patients with stage II CRC. In stage III patients, 3y-DFS was 72% and 5y-DFS was 68% in PHRAC, while 3y-DFS was 62% and 5y-DFS was 51% in control, HR 0.62(95%CI 0.41-0.92,P=0.017). Three years LM was 9% and 5y-LM was 11% in PHRAC, while 3y-LM was 21% and 5y-DFS was 25% in control, HR 0.37(95%CI 0.19-0.71,P=0.002). Three years OS was 86% and 5y-OS was 75% in PHRAC, while 3y-OS was 74% and 5y-OS was 64% in control, HR 0.57(95%CI 0.35-0.94,P=0.023). Toxicities, such as hepatic toxicity and leukocyte decreasing, were mild and could be cured with medicine.

CONCLUSION

Preoperative hepatic and regional arterial chemotherapy, in combination with surgical resection, could be able to reduce and delay the occurrence of liver metastasis and therefore improve survival rate in patients with stage III colorectal cancer.

CLINICAL RELEVANCE/APPLICATION

Preoperative hepatic and regional arterial chemotherapy, in combination with surgical resection, could be able to reduce and delay the occurrence of liver metastasis

SSK19-02 Initial Study of the Rheological Impact of a Balloon-occulsion Approach for Magnetic Resonance Navigation Liver Chemoembolization on 8 Pigs

Wednesday, Nov. 30 10:40AM - 10:50AM Room: E351

Participants
Alexandre Bigot, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Ning Li, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Maxime Gerard, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Francois Michaud, BSC, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Samuel Kadoury, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Gilles P. Soulez, MD, Montreal, QC (*Presenter*) Speaker, Bracco Group Speaker, Siemens AG Research Grant, Siemens AG Research Grant, Bracco Group Research Grant, Cook Group Incorporated Research Grant, Object Research Systems Inc
Sylvain Martel, Montreal, ON (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Magnetic Resonance Navigation (MRN) is an interventional MRI technique which aims to navigate magnetic therapeutic beads using the imaging gradients of the scanner. Our targeted application is liver chemoembolization for hepatocellular carcinoma using an implantable port catheter system. We currently investigate a balloon-occlusion approach in order to greatly reduce the hepatic blood flow and the systolic-diastolic flow variation.

METHOD AND MATERIALS

We collected physiological and rheological data and evaluated the impact of a balloon catheter placed in the proper hepatic artery on eight pigs (mean weight ± SD = 31.9 ± 2.03 kg). Measurements were performed with an electromagnetic probe placed on the common hepatic artery for 4 pigs and with Doppler Ultrasound for 4 pigs. The experimental protocol was approved by the Institutional Animal Care and Use Committee of the Research Center of Centre Hospitalier de l'Universite de Montreal.

RESULTS

Average diameter of proper hepatic artery is 4.67 ± 0.65 mm and average distance between the tip of the catheter and the first bifurcation is 17.6 ± 8.48 mm. The average blood velocity in normal conditions is 40.5 ± 26.5 cm/s and drops to 6.09 ± 5.19 cm/s when the balloon is inflated. This represents a reduction of 84%. In addition, we found that the average systole-diastole range decreases from 48.2 ± 31.8 cm/s to 11.5 ± 12.5 cm/s with and without the inflated balloon respectively. These velocities under flow occlusion should be compatible with MRN of 250 µm-diameter magnetic drug eluting beads with a magnetization of 60 emu/g and a propulsion gradient of 40 mT/m.

CONCLUSION

A balloon-occluded approach enables reduction the blood flow and elimination the pulsatile behavior of the blood in the liver. Future experiments will be focused on evaluating in vitro that the magnetic performance of the MRI and magnetic beads are sufficient to achieve balloon-occlusion MRN using a clinical MRI scanner.

CLINICAL RELEVANCE/APPLICATION

Magnetic Resonance Navigation has a great potential in the planning and treatment of HCC. Combining this technology with an implantable port catheter chamber could enable the development of less invasive chemoembolization treatments and therefore improve patient care.

SSK19-03 Does Stratified or Total Serum Bilirubin Predict Survival for Patients Undergoing Drug Eluting Bead Chemoembolization?

Wednesday, Nov. 30 10:50AM - 11:00AM Room: E351

Awards
Student Travel Stipend Award

Participants
Francis Kang, MD, Aurora, CO (*Presenter*) Nothing to Disclose
David T. Johnson, MD, PhD, Centennial, CO (*Abstract Co-Author*) Nothing to Disclose
Robert K. Ryu, MD, Chicago, IL (*Abstract Co-Author*) Consultant, Cook Group Incorporated Stockholder, EndoVention Inc Consultant, IORAD

PURPOSE

Increased total serum bilirubin has been commonly cited as an independent risk factor that affects overall survival in patients undergoing drug eluting bead transarterial chemoembolization (DEB-TACE) for hepatocellular carcinoma (HCC). This study aims to determine and compare overall survival rates based on stratification of total bilirubin levels in patients undergoing DEB-TACE for HCC.

METHOD AND MATERIALS

A retrospective cohort analysis was performed on all HCC patients who underwent DEB-TACE for HCC from November 2008-March 2015. The overall survival was stratified by total serum bilirubin groups (< 2.0, 2.0-2.4, 2.5-2.9, 3.0-3.4, 3.5-3.9, and > 3.9). The survival analysis was carried out comparing each group to a control group (total bilirubin < 2.0). Multivariable linear regression using a Cox model was used to evaluate the effect of various prognostic factors on overall survival. Survival distribution across all groups was compared using a Wilcoxon test.

RESULTS

407 patients underwent DEB-TACE for HCC in the time period assessed. The median overall survivals for the six total bilirubin groups were 48, 47, 81, 47, 32, and 77 months respectively. Survival distributions were compared amongst all groups using the Wilcoxon test; there was no significant difference (P = 0.527). The survival analysis showed an increase of 7.7%, decrease of 3.9%, increase of 48%, 54%, and decrease of 38% in mortality risk for total bilirubin groups 2.0-2.4, 2.5-2.9, 3.0-3.4, 3.5-3.9, and > 3.9 respectively. However, the results were not statistically significant (P > 0.05). The only prognostic factors which were independent predictors of overall survival ECOG performance status (HR 1.38, 95% CI 1.10-1.72, P = 0.005), AFP (HR 1.55, 95% CI 1.30-1.84, P < 0.000001), length of hospital stay after DEB-TACE (HR 1.24, 95% CI 1.10-1.41, P = 0.0007), and segmental or lobar treatment (HR 1.75, 95% CI 1.08-2.85, P = 0.023).

CONCLUSION

In this cohort, bilirubin was not predictive of poor outcome. In fact, there was a trend to increased survival in patients with the highest bilirubin. In this population, the total serum bilirubin alone was insufficient to predict survival or candidacy of patients with HCC for DEB-TACE.

CLINICAL RELEVANCE/APPLICATION

Elevated total bilirubin should not be a contraindication for patients undergoing DEB-TACE for HCC.

SSK19-04 Liver Transplant Outcomes after Locoregional Therapy for Hepatocellular Carcinoma: A Large Single-Center Experience

Wednesday, Nov. 30 11:00AM - 11:10AM Room: E351

Awards
Student Travel Stipend Award

Participants

Tyler J. Fraum, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Neeta Vachharajani, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Aaron Gould, MD, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Min Xu, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Nael E. Saad, MBBCh, Saint Louis, MO (*Abstract Co-Author*) Research Consultant, Veran Medical Technologies, Inc; Proctor, Sirtex Medical Ltd
Kathryn J. Fowler, MD, Chesterfield, MO (*Abstract Co-Author*) Nothing to Disclose
William Chapman, MD, Saint Louis, MO (*Abstract Co-Author*) Founder, Pathfinder Therapeutics, Inc

PURPOSE

Locoregional therapy (LRT), such as transarterial chemoembolization (TACE), is a mainstay of managing hepatocellular carcinoma (HCC) in patients with cirrhosis. In such cases, LRT serves as a bridge to liver transplant (LT) by either maintaining tumor burden at acceptable levels or down-staging extensive disease to within the Milan criteria. The aim of this study was to evaluate the long-term survival of patients undergoing LT following LRT for HCC with respect to pre-transplant tumor burden and LRT-related variables.

METHOD AND MATERIALS

From 2000-2014, 258 adult patients with HCC pre-operatively treated with LRT underwent LT at our institution. For this retrospective analysis, we collected demographic information, LRT details, and post-LT clinical outcomes from our transplant database. These data were stratified according to whether each patient's HCC disease burden prior to LRT fell within the Milan criteria (WMC) or beyond the Milan criteria (BMC). Kaplan-Meier curves were generated for both groups for overall survival (OS), disease-free survival (DFS), and disease-specific survival (DSS). The log-rank test was used to evaluate for differences up to 10 years post-LT.

RESULTS

A total of 258 patients with 417 HCCs underwent 431 LRTs prior to LT. At presentation, 201 patients (78%) were classified as WMC. These patients underwent fewer LRTs prior to LT than BMC patients (1.5 v. 2.3, $p < 0.001$). The interval between first LRT and LT was longer for BMC patients (276 v. 171 days, $p < 0.001$). A higher percentage of BMC patients had imaging evidence of post-LRT disease progression (28 v. 14%, $p = 0.01$) at some point prior to LT. 257 patients (99.6%) satisfied Milan criteria by the time of LT. There was no significant difference between WMC and BMC patients with respect to OS ($p = 0.20$), DSS ($p = 0.42$), or DFS ($p = 0.13$).

CONCLUSION

BMC patients required more LRTs and were more likely to progress following LRT than WMC patients. As a result, BMC patients generally waited longer for LT. Once BMC patients were sufficiently down-staged and underwent LT, there were no significant survival differences between the WMC and BMC groups. To our knowledge, this analysis constitutes the largest single-center outcomes study of HCC patients treated with LRT before LT.

CLINICAL RELEVANCE/APPLICATION

Patients presenting with HCC exceeding the Milan criteria require longer and/or more extensive pre-transplant therapy but have similar post-transplant outcomes.

SSK19-05 Prediction of Early Response to Transpulmonary Chemoembolization and Transarterial Chemoperfusion in the Interventional Treatment of Unresectable Primary and Secondary Lung Cancer by Using Diffusion-Weighted MR Imaging: Preliminary Experience

Wednesday, Nov. 30 11:10AM - 11:20AM Room: E351

Awards
Student Travel Stipend Award

Participants
Iliana Bednarova, MD, Udine, Italy (*Presenter*) Nothing to Disclose
Andrei Roman, Cluj-Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose
Nour-Eldin A. Nour-Eldin, MD,PhD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Nagy N. Naguib, MD, MSc, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Chiara Zuiani, MD, Udine, Italy (*Abstract Co-Author*) Nothing to Disclose
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine whether the change of apparent diffusion coefficient (ADC) value after transpulmonary chemoembolization (TPCE) or transarterial chemoperfusion (TACP) in a palliative intention could predict the early response in unresectable lung cancer and lung metastases.

METHOD AND MATERIALS

- From January 2012 to February 2016, 295 patients (138 males/157 females) were treated with TPCE or TACP session in 4-week intervals. Finally, 11 patients (mean age: 58.8; age range 24-75) with primary lung tumor (bronchial carcinoma, n=4) and lung metastases from different primaries (breast cancer, n=2; thyroid cancer, n=1; renal cellular cancer, n=1; colorectal carcinoma, n=1; esophageal cancer, n=1; carcinoid, n=1) underwent chest MR imaging (1.5 Tesla) including DWI before and after the first treatment with TPCE or TACP.- DWI and ADC maps were acquired using b-values of 0 and 800 s/mm2 and the tumor's mean ADC value was calculated and compared in a 4-weeks interval.- The grouping reference was based on serial CT scans according to Response Evaluation Criteria in Solid Tumors (RECIST, version 1.1).

RESULTS

- All patients tolerated well the treatment and had no major complications.- According to the follow-up imaging data 3 patients presented a partial response (PR) and 8 patients a stable disease (SD). No patient belonged to complete response or progressive disease group. - The pretherapy ADC values had no significant difference between the PR group [(0.97±0.18) x 10(-3) mm(2)/s] and SD group [(0.88±0.27) x 10(-3) mm(2)/s] (p>0.05). The change of ADC value was statistically significantly higher in PR group

[(0.63±0.17) x 10(-3) mm(2)/s] compared with that in SD group [(0.19±0.15) x 10(-3) mm(2)/s] ($p<0.05$).

CONCLUSION

- From our preliminary results, the changes in ADC value were significant between the PR and SD group. - Noninvasive DWI could be potentially used to early predict and monitor unresectable primary and secondary lung cancer response to transpulmonary chemoebolization and transarterial chemoperfusion.

CLINICAL RELEVANCE/APPLICATION

The change of ADC value might have the potential to monitor and predict the treatment response of transpulmonary chemoembolization and transarterial chemoperfusion in patients with unresectable primary and secondary lung cancer.

SSK19-06 Prospective Trial Using Internal Pair-production Positron-emission Tomography (PET) after Radioembolization to Determine the Optimal Yttrium-90 (90Y) Dose for Objective Response of Hepatic Tumors

Wednesday, Nov. 30 11:20AM - 11:30AM Room: E351

Awards
Student Travel Stipend Award

Participants
Keith T. Chan, MD, MS, Seattle, WA (*Presenter*) Spouse, Employee, Health Advocacy Strategies, LLC
Adam M. Alessio, PhD, Seattle, WA (*Abstract Co-Author*) Research Grant, General Electric Company
Sandeep Vaidya, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Guy E. Johnson, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
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Sharon W. Kwan, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Ann E. Wilson, MS, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
David H. Lewis, MD, Seattle, WA (*Abstract Co-Author*) Research funded, Eli Lilly and Company
Siddharth A. Padia, MD, Seattle, WA (*Abstract Co-Author*) Consultant, BTG International Ltd; Research Grant, Koninklijke Philips NV

PURPOSE

90Y internal pair-production PET can provide a quantitative assessment of radiation dose delivered to intrahepatic tumors after radioembolization. This study prospectively assessed the required threshold dose for effective radioembolization of liver tumors.

METHOD AND MATERIALS

A single-arm prospective trial was performed at a single institution under IRB approval. Thirty-five patients with unresectable hepatocellular carcinoma (HCC) or non-HCC intrahepatic malignancies were recruited. Inclusion criteria were: ECOG performance status 0–2, Childs-Pugh A or B, and receiving first 90Y radioembolization treatment as part of routine clinical care. Time-of-flight PET imaging without additional tracer administration was performed the same day after 90Y treatment. Volumetric analysis of the tumors was performed using a proprietary software and radiation dose calculated for each tumor. Radiographic best response was assessed on follow-up imaging.

RESULTS

A total of 52 hepatic tumors (38 HCC, 14 non-HCC) were treated with median follow-up of 684 days. Median tumor size was 5.5 cm (range 2.8–17.9). Most treatments were performed via lobar hepatic artery infusion (76%) using glass microspheres (94%). HCC treatments showed 84% objective response (OR), 11% stable disease (SD), and 5% progressive disease (PD) based on best mRECIST response. Responders had a higher mean 90Y dose to tumor than non-responders (261Gy vs 104Gy, $p<0.01$). All non-responders had tumor dose <200Gy. No statistical difference was found between responders and non-responders for patient age, tumor volume, multifocal or extrahepatic disease, portal vein invasion, or injected 90Y activity.Treatment of non-HCC tumors showed 14% OR, 29% SD, and 57% PD based on best response RECIST 1.1. There was no significant difference in mean dose between responders and non-responders. No difference was found between the two groups for multifocal disease or injected 90Y activity.

CONCLUSION

HCC responders had a statistically greater mean tumor dose of 261Gy compared to 104Gy in non-responders. Delivered tumor dose significantly impacts treatment response in HCC, and can be assessed by PET.

CLINICAL RELEVANCE/APPLICATION

90Y-PET tumor dosimetry permits immediate assessment of HCC treatment adequacy after radioembolization, and may predict tumor response.

SSK19-07 Same Day Y90 Radioembolization: An EffectiveTreatment Model

Wednesday, Nov. 30 11:30AM - 11:40AM Room: E351

Participants
Ahmed Gabr, MD, MBBCh, Chicago, IL (*Presenter*) Nothing to Disclose
Joseph R. Kallini, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Vanessa L. Gates, MS, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Ryan Hickey, MD, Chicago, IL (*Abstract Co-Author*) Advisor, BTG International Ltd
Nadine Abouchaleh, BA, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Kush R. Desai, MD, Chicago, IL (*Abstract Co-Author*) Speakers Bureau, Cook Group Incorporated; Consultant, Cook Group Incorporated
Bartley G. Thornburg, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Robert J. Lewandowski, MD, Chicago, IL (*Abstract Co-Author*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc
Riad Salem, MD, MBA, Chicago, IL (*Abstract Co-Author*) Research Consultant, BTG International Ltd Research Grant, BTG

International Ltd

PURPOSE

To assess the feasibility of conducting pretreatment mesenteric angiography, coil embolization, technetium-99m macroaggregated albumin (99mTc-MAA) scanning, and yttrium-90 (Y90) radioembolization treatment in a single, same-day, combined outpatient encounter.

METHOD AND MATERIALS

78 patients from 2008 to 2015 were managed in a single outpatient encounter under the guidance of interventional radiology and nuclear medicine. Pretreatment planning was performed by reviewing baseline imaging and tumoral region of interest (ROI) was estimated by 3-D software; pre-treatment Y90 glass microsphere dosimetry was performed assuming a lung shunt of 10% for hepatocellular carcinoma (HCC) and 5% for liver metastases. Subsequently, mesenteric angiography and 99mTc-MAA scanning were performed followed by Y90 treatment in one outpatient encounter. Total in-room procedure time was recorded.

RESULTS

All patients underwent same-day pretreatment angiography, 99mTc-MAA and Y90 radioembolization. 16 patients received multiple segmental treatments to both lobes, 44 received right lobe treatment, and 18 received left lobe treatment. Median dose was 106 Gy. Median number of glass Y90 vials needed for complete treatment was 2 (1-6 vials). Median in-room time was 160 minutes (75-250 minutes). 18% (14/78) of patients were local residents, 55% (43/78) traveled from outside city limits, 18% (14/78) were from out-of-state, and 9% (7/78) were international. 77% (61/78) of patients treated presented with HCC, 22% (17/78) with liver metastases. Median lung dose was 3.5 Gy.

CONCLUSION

This study demonstrates the feasibility of same-day Y90 evaluation and treatment while maintaining the principles of safe and effective Y90 infusion including tumoricidal dosimetry, mitigation of non-target flow, and minimization of lung dose.

CLINICAL RELEVANCE/APPLICATION

We propose that same-day treatment paradigm to be considered for patients receiving radioembolization in selected cases. Indications include distant residence, elderly patients, contrast allergy, renal impairment, small/limited disease and absence of portal vein invasion. Convenience for patients is an important consideration as this approach is adopted in the future. Finally, we believe a room time averaging just over 2.5 hours makes this approach feasible and should translate into significant cost and time savings.

SSK19-08 Early Response Detected by DWI Predicts Survival of Patients Undergoing Y90-Radioembolisation for Hepatic Metastases

Wednesday, Nov. 30 11:40AM - 11:50AM Room: E351

Participants
Alexandra Barabasch, MD, Aachen, Germany (*Presenter*) Nothing to Disclose
Alexander Ciritsis, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Alexander Heinzel, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Nils A. Kraemer, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Christiane K. Kuhl, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Y90-Radioembolisation (RE) is a valuable treatment option for otherwise therapy-refractory liver malignancies. DWI has been shown to be helpful to assess response of liver metastases as early as 4 to 6 weeks after lobar treatment. Aim of this study was to evaluate whether change of lesion ADC early after treatment (within 6 weeks) can help predict patients' overall survival.

METHOD AND MATERIALS

Between May 2010 and April 2014, 41 consecutive patients (28 female, mean age 60 ± 10 years) underwent DW-MRI with b = 0, 50, and 800 at 1.5T within 6 weeks before and 6 weeks after lobar RE to treat secondary progressive liver metastases from solid cancers (21 colorectal, 16 breast, 4 other). Three target lesions per patient were assessed according to RECIST, and change of minimal ADC (ADCmin) was measured, with an increase of ADCmin by at least 30% regarded as indicating response. Patient survival was assessed by long-term follow-up. Comparison analysis was performed by the logrank test.

RESULTS

38/41 patients were followed until their death. Two patients (one with colorectal, the other with breast cancer) treated 1765 and 761 weeks ago, are still alive. One patient was lost after 13 weeks of follow-up. Overall median survival was 69 ± 67 weeks.
An ADC increase by 30% or more (i.e., response) was observed in 27/41 patients (66%). Median survival in this "DWI-responder" group was 86 ± 74 weeks, compared to 35 ± 43 weeks in the "DWI-non-responder" group ($p < 0.05$).
Based on RECIST analysis, metastases in 4/41 (10%) patients were categorized as progressive (PD), in another 4/41 as partial response (PR), and in 33/41 (80%) as stable (SD). Median survival was 64 ± 57 weeks in the PD-group, 67 ± 68 weeks in the SD group, and 87 ± 87 weeks in PR-group ($p > 0.05$).

CONCLUSION

Patients who, at 4 to 6 weeks after Y-90-RE treatment, exhibit response on DWI, can expect significantly longer overall survival than patients without such response. No such correlation was observed for tumor size changes according to RECIST.

CLINICAL RELEVANCE/APPLICATION

DW-MRI can be used to predict overall survival after RE of patients with liver metastases.

SSK19-09 Dynamic 4D-CT Angiography of the Abdomen for Guiding TACE: Impact on Reduction of Contrast Material, Operator Radiation Exposure, Catheter Consumption and Diagnostic Confidence

Wednesday, Nov. 30 11:50AM - 12:00PM Room: E351

Awards
Student Travel Stipend Award

Participants
Moritz H. Albrecht, MD, Charleston, SC (*Presenter*) Nothing to Disclose
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Julian L. Wichmann, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Stefan Zangos, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
U. Joseph Schoepf, MD, Charleston, SC (*Abstract Co-Author*) Research Grant, Astellas Group; Research Grant, Bayer AG; Research Grant, General Electric Company; Research Grant, Siemens AG; Research support, Bayer AG; Consultant, Guerbet SA; ; ;
Carlo N. De Cecco, MD, PhD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
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Sebastian Fischer, MD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Andreas Bucher, MD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Martin Beeres, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Nour-Eldin A. Nour-Eldin, MD,PhD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Ralf W. Bauer, MD, Frankfurt, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens Healthcare GmbH; Speakers Bureau, Bayer Healthcare; Speakers Bureau, GE Healthcare
Christian Tesche, MD , Charleston, SC (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the impact of 4D computed tomography angiography (4D-CTA) prior to transarterial chemoembolization (TACE) regarding administered contrast media, operator radiation exposure, catheter consumption, and diagnostic confidence.

METHOD AND MATERIALS

4D-CTA examinations prior to initial TACE of 29 patients (20 men; mean age, 65.7±11.5 years) with malignant liver tumors were analyzed. Multiplanar-reformate (MPR), volume-rendering-technique (VRT) and maximum-intensity-projection (MIP) series were reconstructed enabling a direct selective catheterization of the tumor-supplying artery without prior conventional digital subtraction angiography (DSA) of the abdominal aorta, coeliac trunk, superior mesenteric artery, and indirect portography. Twenty-nine patients who underwent traditional TACE served as the control group. The amount of administered contrast media, operator radiation exposure, and catheter consumption was compared between the different TACE workflows. Diagnostic confidence in the exclusion of portal vein thrombosis was assessed by two radiologists using 5-point Likert scales.

RESULTS

4D-CTA TACE resulted in a significant overall contrast media reduction of 12.8 ml (-13.8 %, $p<0.001$) and 61.0 ml less contrast were administered intra-arterially (-66.3%, $p<0.001$) compared to traditional TACE. Scattered radiation could be reduced by 50.5% for 4D-CTA compared to standard TACE ($p<0.001$). 4D-CTA TACE was performed using 0.7 less catheters on average ($p=0.063$). Diagnostic confidence in the exclusion of portal vein thrombosis could be significantly increased using 4D-CTA compared to traditional DSA images (scores, 3.9 and 2.4, respectively; $p<0.001$).

CONCLUSION

4D-CTA enables TACE with substantially reduced amount of contrast material, decreases operator radiation exposure, and increases diagnostic confidence in the exclusion of portal vein thrombosis.

CLINICAL RELEVANCE/APPLICATION

4D-CTA prior to TACE can reduce the intra-arterial amount of utilized contrast material by two-thirds. Thus, this technique may decrease the risk of CIN and enable TACE for patients with renal impairment, while 4D-CTA portography allows for a higher diagnostic confidence than conventional DSA images.

GIS-WEA

Gastrointestinal Wednesday Poster Discussions

Wednesday, Nov. 30 12:15PM - 12:45PM Room: GI Community, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

Participants
Manish Dhyani, MBBS, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

GI386-SD-WEA1 Contrast Enhancement in Abdominal CT: Comparison of the Different CT Scanners from Different Vendors; Phantom and Clinical Study

Station #1

Participants
Narumi Taguchi, Kumamoto, Japan (*Presenter*) Nothing to Disclose
Seitaro Oda, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Takeshi Nakaura, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Daisuke Utsunomiya, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshinori Funama, PhD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
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Hideaki Yuki, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Masafumi Kidoh, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Kenichiro Hirata, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Masahiro Hatemura, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasuyuki Yamashita, MD, Kumamoto, Japan (*Abstract Co-Author*) Consultant, DAIICHI SANKYO Group

PURPOSE

As different CT scanners feature different x-ray spectra and photon energy even at the same kVp settings, contrast enhancement can be different on different CT scanners. This have not been fully validated in clinical settings. We attempted to address this issue in phantom and clinical studies.

METHOD AND MATERIALS

Two different CT scanners were used in this study: scanner A (Brilliance-64; Philips Healthcare) and scanner B (Aquilion ONE, Toshiba). In phantom study, we compared the contrast enhancement between the two scanners under 80-, 100- and 120-kVp. Then, we calculated the effective energies of the two CT scanners by using the half-value layer measurement. In clinical study, 40 patients underwent abdominal scanning with scanner A and other 40 patients were scanned on scanner B at the same scanning- and contrast material injection protocol at 120-kVp. The contrast enhancement of their abdominal organs were assessed quantitatively and qualitatively.

RESULTS

In phantom study, the contrast enhancement for scanner B was 36.9%, 32.6% and 30.8% higher than scanner A at 80-, 100- and 120-kVp, respectively. The effective energies was higher for scanner A than scanner B (eg, 62.4 keV vs. 54.4 keV for 120-kVp with the large filter). In clinical study, quantitative analysis revealed that scanner B yielded significantly better contrast enhancement of the liver, kidney, portal vein, and inferior vena cava than scanner A. The mean visual scores in regard to contrast enhancement were significantly higher on images obtained by scanner B than scanner A.

CONCLUSION

There were significant differences in contrast enhancement of the abdominal organs between the two different CT scanners from different vendors even at the same scan- and contrast parameters.

CLINICAL RELEVANCE/APPLICATION

Contrast enhancement of the abdominal organs is slightly different between the two different CT scanners even at the same scan protocols.

GI387-SD-WEA2 Evaluation of the ACR's Recommendations for Management of Incidental Nodal Findings

Station #2

Awards
Student Travel Stipend Award

Participants
Paul Smereka, MD, New York, NY (*Presenter*) Nothing to Disclose
Ankur Doshi, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
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Andrew B. Rosenkrantz, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The ACR Incidental Findings Committee (ACR-IFC) advises that incidental abdominopelvic lymph nodes (LNs) with certain indeterminate imaging features undergo a 3 month follow-up exam and be deemed benign after 12 month stability. Our aim was to assess the utility of the ACR-IFC's recommendations for identifying and following-up abnormal incidental abdominopelvic LNs.

METHOD AND MATERIALS

We searched for abdominopelvic CT reports mentioning a LN in the Impression. Among 3,074 results from a 27 month period, 64 LNs met ACR criteria as incidental (no malignancy or lymphoproliferative disorder) and with sufficient follow-up to be classified as benign (biopsy; decrease in size; ≥12 month stability) or malignant (biopsy; increased FDG activity and detection of a primary malignancy). Two radiologists independently assessed the LNs for suspicious features by the ACR-IFC criteria. Outcomes were assessed in summary fashion.

RESULTS

10% (6) of LNs were malignant [lymphoma (n=4), lung cancer (n=1), small bowel adenocarcinoma (n=1)]; 90% (54) benign. 2 of the 6 malignant LNs were stable at initial 3-6 month follow-up prior to eventual diagnosis. 22% (13), 8% (5), 13% (8), and 15% (9) were deemed benign based on decreased size at initial <3 month, 3-5 month, 6-11 month, or ≥12 month follow-up, respectively; 23% (14) based on ≥12 month stability. Among 5 LNs stable at 3-5 month with additional follow-up, 2 were malignant (lymphoma on biopsy), 2 decreased at 11 month and 23 month follow-up, and 1 was stable at 20 month follow-up. No ACR-IFC feature (round with indistinct hilum; necrosis; hypervascularity; cluster ≥3 LNs; cluster ≥2 LNs in ≥2 stations; size ≥1cm in retroperitoneum) was significantly different between benign and malignant LNs (p=0.15-1). Nearly all LNS (97-98%) had ≥1 suspicious feature for each reader. Two features (necrosis and hypervascularity) were not identified in any LN; one feature (cluster ≥3 LNs) was present in 88%-93% of LNs.

CONCLUSION

ACR-IFC imaging features did not differentiate benign and malignant LNs. Abnormal LNs rarely decreased at the advised 3 month follow-up exam. When stable at 3 months, LNs were occasionally malignant or decreased on continued follow-up.

CLINICAL RELEVANCE/APPLICATION

The management of incidental abdominopelvic LNs remains a challenge. Further optimization of strategies for both the definition and follow-up of suspicious LNs is warranted.

GI388-SD-WEA3 Hepatopulmonary Shunting on Tc99m-MAA Liver Mapping: Correlation with Dynamic Cross Sectional Imaging and Description of Different Shunting Patterns

Station #3

Awards
Student Travel Stipend Award

Participants
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Hubert J. Vesselle, MD, PhD, Seattle, WA (*Abstract Co-Author*) Consultant, MIM Software Inc

PURPOSE

Various types of intrahepatic vascular shunting are seen on dynamic CT/MRI, especially in patients with liver tumors. Intrahepatic shunts diverting hepatic arterial blood flow to systemic venous return could potentially increase radiation dose to the lungs after intra-arterial Y90-microsphere treatment. To simulate this therapy, patients undergo an intra-arterial injection of Tc-99m MAA and gamma camera imaging (mapping), which is used to estimate the hepato-pulmonary shunt fraction. We compared findings on pre-therapy dynamic CT/MRI with the calculated shunt fraction from Tc99m-MAA mapping.

METHOD AND MATERIALS

We reviewed 523 Tc99m-MAA scans in 453 patients (301 males, 152 female) and their correlative cross sectional imaging. Cases with corresponding well-timed dynamic CT/MRI studies performed within 3 months of Tc-99m MAA mapping, and who had not received embolization between the two scans, were enrolled in the comparison of shunt fraction as calculated on Tc99m-MAA study and vascular shunting as identified on dynamic CT/MRI.

RESULTS

342 studies met these inclusion criteria: CT/MRI showed visible shunting in 63 of the studies. In 271 studies, no shunt was identified by cross sectional imaging. In 8 cases, CT/MRI studies were inconclusive for the presence of vascular shunting. In the first group with visible shunting on dynamic CT/MRI, the mean shunt fraction was 12.9% +/- 10.36% (95% CI 10.29-15.15%). In the second group without visible shunting, the mean shunt fraction was 4.3% +/-3.17% (95% CI 3.93-4.68%). The difference was statistically significant (p value <0.001). Three CT/MRI patterns of hepatic arterial flow shunting that potentially lead to increased hepatopulmonary shunting were identified: 1) Shunting to a hepatic vein. 2) To the portal vein with recanalized Paraumbilical vein. 3) To the portal vein with a TIPS in place.

CONCLUSION

Mean hepatopulmonary shunt fraction, calculated on Tc99m-MAA liver mapping, is higher when vascular shunting is visible on dynamic CT/MRI. Differences are statistically significant. Three patterns of shunting associated with increased hepatopulmonary shunt fractions are identified.

CLINICAL RELEVANCE/APPLICATION

Our results might help better understand the pathophysiology of hepatopulmonary shunting, and may help predict the patients with high hepatopulmonary shunting based on their dynamic non-invasive imaging.

GI389-SD-WEA4 Single-source Dual Energy Spectral CT Imaging for Evaluation of Pancreatic Ductal Adenocarcinoma - A Preliminary Study

Station #4

Participants
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Xiao-Zhu Lin, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To explore the quantitative parameters and characteristics of pancreatic ductal adenocarcinoma in dual energy spectral CT imaging.

METHOD AND MATERIALS

From 2013 to 2014, 113 patients were scanned with Gemstone Spectral Imaging (GSI). The ROI files including the monochromatic CT values , the eff-Z, the iodine-water concentration and the corresponding normalized values of the lesion (normalized to pancreatic parenchyma) and of pancreatic parenchyma in AP and PVP. The works were performed three times repeatedly. Paired T-test or Wilcoxon test were used for analyzing the differences between different phases and between PDAC and pancreatic parenchyma, and $P < 0.05$ was considered statistically significant.

RESULTS

The eff-Z and iodine-water concentration of PDCA in two phases were 8.14 ± 0.36 and 8.45 ± 0.39, 9.38 ± 5.75 (100ug/cm3) and 14.73 ± 7.00 (100ug/cm3), 1034 ± 12 (mg/cm3) and 1034 ± 14 (mg/cm3) respectively. The monochromatic CT values, the eff-Z, iodine (water) concentration and normalized monochromatic CT values (rang from 40 keV to 54 keV) of PDCA have significant differences between two phases ($P<0.05$), and no difference in the water (iodine) concentration. The monochromatic CT values in late arterial phase were lower than in portal venous phase at each energy level. And normalized monochromatic CT values increased with the increase of energy level. The eff-Z, iodine (water) concentration and water (iodine) concentration of pancreatic parenchyma in two phases were 8.91±0.41 and 9.24±0.39, 23.67±7.89 (100ug/cm3) and 30.41±8.55 (100ug/cm3), 1042±14 (mg/cm3) and 1041±15 (mg/cm3) respectively. The differences of eff-Z and iodine-water concentration between PDCA and pancreatic parenchyma were significant in both two phases.

CONCLUSION

The CT spectral HU curves, eff-Z and iodine concentration of PDCA were lower than those of pancreatic parenchyma in both AP and PVP. The CT spectral HU curve, eff-Z, iodine (water) concentration of PDCA in AP were lower than those of in PVP. The differences of CT spectral HU curves were more distinct at lower energy.

CLINICAL RELEVANCE/APPLICATION

The study suggests that combined with multi-parameter of spectral imaging can improve pancreatic ductal adenocarcinoma CT density resolution.

GI390-SD-WEA5 Disappearing or Residual Tiny (<= 5 mm) Colorectal Liver Metastases after Chemotherapy on Gadoxetic Acid-enhanced Liver MRI:Is Local Treatment Required?

Station #5

Participants
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Seung Soo Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the follow-up results of disappearing colorectal liver metastases (DLM) or residual tiny (≤ 5 mm) colorectal liver metastases (RTCLM) on gadoxetic acid-enhanced magnetic resonance imaging (MRI) in patients who had colorectal liver metastases (CLM) and received chemotherapy.

METHOD AND MATERIALS

Our institutional review board approved this retrospective study and informed consent was waived. Among patients who received chemotherapy for CLM and underwent gadoxetic acid-enhanced MRI between 2010 and 2012, 43 patients with 168 DLMs and 48 RTCLMs were included. The cumulative in situ recurrence rate of DLM and progression rate of RTCLM and their predictive factors were evaluated.

RESULTS

A total of 150 DLMs and 26 RTCLMs were followed up without additional treatment. The median follow-up period was 22.1 months (range, 2.4–73.8 months) for DLMs and 11.9 months (range, 2.4–60.9 months) for RTCLMs. At 1 and 2 years respectively, the cumulative in situ recurrence rates for DLM were 10.9% and 15.7% and the cumulative progression rates for RTCLM were 27.2% and 33.2%. The in situ recurrence rates at 1 and 2 years were both 4.9% for the DLM group that did not show reticular hypointensity of liver parenchyma on hepatobiliary phase.

CONCLUSION

DLM on gadoxetic acid-enhanced liver MRI indicates a high possibility of true complete response, especially in patients without chemotherapy-induced sinusoidal obstruction syndrome. Thirty seven percent of RTCLMs showed progression at 2 years.

CLINICAL RELEVANCE/APPLICATION

1. Follow-up without local treatment can be considered one of management options for disappearing liver metastasis on gadoxetic acid-enhanced liver MRI.2. Management of residual tiny colorectal liver metastases on gadoxetic acid-enhanced MRI should be determined with consideration of the patient’s performance status and the risk of local treatment.

GI391-SD- Virtual Enteroscopy: A Role for Small Bowel Imaging? A Preliminary and Feasibility Study

WEA6

Station #6

Participants
David Szapiro, MD, Kirkcaldy, United Kingdom (*Presenter*) Nothing to Disclose
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PURPOSE

CT-based Virtual Enteroscopy (VE) uses warm CO2 as an intraluminal negative contrast agent eliciting bowel wall relaxation responses via thermoreceptors in the gut. VE is a feasible technique for small bowel imaging whenever fluid-filled exams are contra-indicated or inconclusive. VE has been applied to subocclusive small bowel diseases, whether from known Crohn's disease or from other causes. When no definite cause for the patient's symptoms was found and capsule endoscopy was discarded as an alternative for diagnosis, VE was considered as an appropriate modality for optimising therapeutic management.

METHOD AND MATERIALS

Patients were prospectively selected after multidisciplinary discussion. Warm CO2 was delivered by a dedicated insufflator (VMX-1020A, Vimap Technologies) using a two-ends insufflation technique via a nasojejunal (NJ) tube and a rectal cannula. Simultaneous CO2 insufflation was then performed at 45 degrees Celsius. Automatic feedback from the insufflator indicated when optimal distention was reached. CT acquisition with IV iodine contrast followed. Image analysis was performed by using virtual endoscopy software. Each exam was then compared to a previous fluid-filled agent exam whenever available.

RESULTS

Small bowel insufflation with warm CO2 was applied successfully to 12 consecutive patients from July 2015 to March 2016, while 215 fluid-filled exams were performed during the same period. Compared to fluid-filled exams jejunal distention was significantly improved and more homogenous distention of the small bowel was obtained altogether. Patients with subocclusive disease have found VE more comfortable than with fluid-filled exams. In total, additional findings not found on fluid-filled exams included non-described stenosis (n=7), fistula (n=1), jejunal diverticulum (n=1) and tumours (n=2). Questionnaires demonstrated satisfactory patient experience despite NJ tube insertion.

CONCLUSION

While VE is more technically demanding for imaging patients with subocclusive symptoms, it is feasible and has shown promising results. All patients presenting with subocclusive pathologies showed better tolerance to warm CO2 insufflation than with orally ingested agents.

CLINICAL RELEVANCE/APPLICATION

Subocclusive disorders of the small bowel can be explored by warm CO2 when fluid-filled exams are non diagnostic, or contra-indications to more sophisticated or expensive exam like capsule endoscopy are present.

GI392-SD-WEA7 Evaluation Precision of Liver Surface Nodularity Measurements using a CT Imaging Phantom

Station #7

Awards
Student Travel Stipend Award

Participants
Kevin A. Zand, MD, Jackson, MS (*Presenter*) Nothing to Disclose
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Seth Lirette, MS, Jackson, MS (*Abstract Co-Author*) Nothing to Disclose
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Michael Griswold, PhD, Jackson, MS (*Abstract Co-Author*) Nothing to Disclose
Andrew D. Smith, MD, PhD, Jackson, MS (*Abstract Co-Author*) Research Grant, Pfizer Inc; President, Radiostics LLC; President, Liver Nodularity LLC; President, Color Enhanced Detection LLC; President, eMASS LLC; Pending patent, Liver Nodularity LLC; Pending patent, Color Enhanced Detection LLC; Pending patent, eMASS LLC;

PURPOSE

To evaluate precision of liver surface nodularity measurements using a CT imaging phantom.

METHOD AND MATERIALS

An anthropomorphic CT imaging phantom was constructed with simulated normal/cirrhotic liver and visceral/subcutaneous fat components. Simulated liver surface had regions with no surface nodules (SMOOTH) and with 2 mm radius half spheres (NODULAR). The phantom was scanned multiple times on a GE Lightspeed 16 CT scanner with adjustment of individual imaging parameters (section thickness, kVp, mA, field of view [FOV], and smoothing kernel) and on 22 different CT scanners from 4 manufacturers at 12 imaging centers. Simulated LSN was measured using quantitative software. Repeatability, reproducibility, and inter-reader agreement were evaluated by repeatability coefficient (RC), reproducibility coefficient (RDC), and intra-class correlation (ICC), respectively.

RESULTS

LSN measurements of SMOOTH and NODULAR simulated liver surface (2.13 and 3.50, respectively) were significantly different ($p<0.001$) and matched expected values from previously assessed patient exams. Optimal LSN measurements were obtained for section thickness between 1.0-5.0mm, kVp ≥200, mAs ≥200, and FOV ≤40cm. Smoothing kernel had little impact on LSN

measurements. LSN measurements from CT images derived from a single scanner showed high repeatability (RC=0.321). LSN measurements had high inter-reader agreement (ICC=0.996; N=5 readers) with a RDC of 0.287. LSN measurements are highly reproducible across multiple CT scanners (N=22) from 4 different manufacturers at 12 different imaging centers using routine imaging protocols (RDC=0.511).

CONCLUSION

Routine liver CT imaging parameters can be used to measure LSN with high precision, suggesting that the technology is adaptable to multi-institutional clinical studies.

CLINICAL RELEVANCE/APPLICATION

Routine liver CT imaging parameters can be used to measure LSN with high precision, suggesting that the technology is adaptable to multi-institutional clinical studies. Routine liver CT imaging parameters can be used to measure liver surface nodularity with high precision, suggesting that the technology is highly reproducible across multiple different CT scanners from different manufacturers and different imaging centers and therefore adaptable to multi-institutional clinical studies.

GI393-SD-WEA8 CT in Occlusive and Non-Occlusive Ischemic Colitis

Station #8

Participants
Nadia S. Gonzalez, MD, Dresden, Germany (*Presenter*) Nothing to Disclose
Verena Plodeck, MD, Dresden, Germany (*Abstract Co-Author*) Nothing to Disclose
Jakob Dobroschke, Dresden, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Laniado, MD, Dresden, Germany (*Abstract Co-Author*) Reviewer, Johnson & Johnson

PURPOSE

To evaluate CT findings of Ischemic Colitis (IC) and to correlate findings with etiology (occlusive versus non-occlusive).

METHOD AND MATERIALS

We retrospectively evaluated 41 patients with IC confirmed by surgery and/or endoscopy. CT and clinical history were reviewed. CT signs of IC (pericolic fat stranding/fluid, colonic wall thickening/thinning, abnormal wall enhancement, dilatation, pneumatosis intestinalis, portomesenteric gas, pneumoperitoneum and/or mesenteric vascular stenosis/occlusion) and its localization were analyzed and correlated with the presence of occlusive IC (OIC) and non-occlusive IC (NOIC).

RESULTS

There were 29 male and 12 female patients (mean age 70 years). NOIC was the cause of IC in 26 patients (low flow state, s.p. cardiac surgery, aortic wall hematoma and dissection) and OIC in the remaining 15 patients (s.p. infrarenal aortic surgery, cardio-embolic and thrombotic event, portal hypertension). All patients showed signs of pericolic fat stranding or fluid. Wall thinning was found in 24 patients (58%) and wall thickening in 14 (34%). Fourteen patients (34%) showed abnormal wall enhancement. Mesenteric vascular abnormalities were found in 31 patients (75.6%). Segmental involvement was more frequent (n=29, mostly right colon) than subtotal involvement of the colon (n=12). A significant correlation was found between NOIC and the presence of wall thinning and colonic dilatation (p=0.002 and p=0.001 respectively). Patients with OIC showed a significant correlation with wall thickening (p=0.002). The presence of intraabdominal gas significantly correlated with NOIC (p=0.005). Right colon involvement was more frequent with NOIC (66%). All patients had cardiovascular comorbidities. Overall mortality was 31% (n=13).

CONCLUSION

CT allows the detection of signs of IC. NOIC is the more frequent cause of IC compared to OIC. NOIC usually shows wall thinning with dilatation, affecting more frequently the right colon. OIC frequently presents with wall thickening. Knowledge of the full spectrum of potential CT signs and certain risk factors of IC is essential for diagnosis, allowing a prompt and effective treatment.

CLINICAL RELEVANCE/APPLICATION

Ischemic Colitis shows a wide spectrum of CT findings which are often subtle. Knowledge of the etiology (occlusive or non-oclusive) and certain CT signs is essential to make the diagnosis.

GI130-ED-WEA9 Fifty Shades of Intraductal Papillary Neoplasm of the Bile Duct

Station #9

Awards
Magna Cum Laude

Participants
Hyo Jung Park, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
So Yeon Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hyoung Jung Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung Soo Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Gil-Sun Hong, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung-Mo Hong, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Ho Byun, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Moon-Gyu Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To outline the current concept in intraductal papillary neoplasm of the bile duct2. To present various morphologic features of intraductal papillary neoplasm of the bile duct and their mimickers3. To establish radiologic perspectives on multidisciplinary management

TABLE OF CONTENTS/OUTLINE

1. Introduction of the current concept in intraductal papillary neoplasm of the bile duct (IPNB)(1) Previous names (2) New concept

according to the 2010 WHO classification(3) Similarities and differences of intraductal papillary neoplasms involving the pancreaticobiliary system2. Imaging features(1) Factors associated with morphologic features: The presence or absence of mucin hyper secretion, the size and morphology of tumors, tumor location(2) Four morphologic features and their mimickers: Mass with proximal duct dilatation, mass with proximal and distal duct dilatation, disproportional duct dilatation with mass, cystic mass(3) New MRI features: DWI findings, mucus thread sign3. Radiologic perspectives on multidisciplinary management(1) Disease extent evaluation(2) Diagnosis and plans for an optimal treatment

GIS-WEB

Gastrointestinal Wednesday Poster Discussions

Wednesday, Nov. 30 12:45PM - 1:15PM Room: GI Community, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

Participants
Manish Dhyani, MBBS, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

GI396-SD-WEB3 Different Curative Effect of Preoperative Chemoradiotherapy in Subgroups with Different Proportion of Mucous Lake of Rectal Cancer

Station #3

Participants
Wuteng Cao, Guangzhou, China (*Presenter*) Nothing to Disclose
Zhiyang Zhou, PhD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Fangqian Li, guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yanbang Lian, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose
Dan Liang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Xinhua Wang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Dechao Liu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

There was a certain proportion of rectal carcinoma with different proportions of mucus lake. The purpose is to compare curative effects after CRT in subgroups with different proportion of mucous lake.

METHOD AND MATERIALS

323 patients with rectal cancer were underwent rectal MRI examinition including T2-weighted and T1-weighted FSE sequences before CRT. High signal area of mucous lake in T2 imaging was manually draw up and the proportion of mucous lake was calculated automatically in GE AW4.5 post-processing workstation, according which the cases were divided into the following subgroups: conventional carcinoma without any mucous lake (Group AC); cases containing the proportion of 1-25% (Group1), 26-50%(Group2), 51-75%(Group3), 76-100%(Group4) mucous lake compared with the whole tumor area. Cases of Group3 and Group4 were known as MC. Compare TN stage of rectal cancer using MRI before CRT with pathologic TN stage of the specimen after surgical removal. The TN downstaging and degree of tumor regression after CRT were evaluated in different subgroups above.

RESULTS

The five subgroups with different proportions of mucous lake had statistical differences in T downstaging rate ($P = 0.002$). The downstage rate of Group3 was significantly lower than that of Groupl AC (6/26 vs 128/214, $P < 0.001$). The downstage rate of Group 4 was higher than that of group 3 (5/7 vs. 6/26). There were no significant statistical differences of N downstaging rate in the five subgroups (84.6% vs. 79.5%, 76.9%, 66.7%, 76.9%, $p = 0.081$). The downstage degree of Group3 was significantly lower than that of the conventional AC ($P < 0.001$), and that of Group1 ($P < 0.001$). Compare tumor completely response (CR) and there were overall statistical differences in subgroups (CR rate, respectively, 22.4% for AC, 19.1% for group1, 20.7% for group2, 0% for group3, 42.9% for group4. $P = 0.017$). The CR rate of Group 3 was obviously lower than other groups, but Group4 obviously higher than that of other groups.

CONCLUSION

T downstaging rate after CRT in MC(with 51-75% mucous lake) was poor than that of conventional adenocarcinoma without any mucous lake and adenocarcinoma with a small quantity of mucous lake(< 50%). However, the curative effect index in MC cases(with mucous lake > 75%) was better than that of cases with 51-75% mucous lake after CRT.

CLINICAL RELEVANCE/APPLICATION

Cases with mucous lake of more than 75% proportion may be more sensitive to neoadjuvant therapy.

GI397-SD-WEB4 Diffusion Weighted Magnetic Resonance Imaging of Pancreatic Ductal Adenocarcinoma: Correlation with Metastatic Disease Potential

Station #4

Awards
Student Travel Stipend Award

Participants
Trevor Morrison, MD, Boston, MA (*Presenter*) Nothing to Disclose
Alejandro Garces-Descovich, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Arthur Moser, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Koenraad J. Mortele, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To analyze the possible relationship between the apparent diffusion coefficient (ADC) of pancreatic ductal adenocarcinoma (PDAC), at the time of initial staging, and the presence or development of metastatic disease.

METHOD AND MATERIALS

IRB approval with waiver of informed consent was obtained for this HIPPA compliant retrospective study. A total of 75 consecutive patients with histopathologically proven PDAC who underwent DWI-MRI between January 2012 and December 2014 were evaluated; 24/75 patients were excluded because PDAC was not seen on MRI (n=14) or due to the patient being on neo-adjuvant therapy already (n=10). Outcome data for the remaining 51 patients (28 male with average age 65.8, 23 female with average age 66.7) was obtained from the online medical record (mean follow-up 720 days). The overall correlation between the ADC value and the presence or development of metastatic disease was assessed using Student's T-test.

RESULTS

Of 51 patients, 22 (43%) either had metastatic disease at the time of the MRI (n=12) or went on to develop metastatic disease (n=10). Metastasis were observed primarily in liver (n=19), but also in omentum (peritoneum) (n=1), lung and liver (n=1) and bone (n=1). Patients with metastatic disease had a significantly lower mean pre-treatment ADC value (1,271 mm2/s) than those who did not (1,472 mm2/s) ($p<0.01$). No significant difference between ADC values of those who had metastatic disease at the time of the MRI (1,232 mm2/s) compared to those who developed metastasis at a later date (1,316 mm2/s) ($p=0.2$) was identified.

CONCLUSION

Pre-treatment ADC values of PDAC are significantly lower in patients who have or will develop metastatic disease.

CLINICAL RELEVANCE/APPLICATION

An MRI biomarker that determines which patients with PDAC have or go on to develop metastasis would have great impact on clinical management. While more investigation is needed, our results suggest that DWI-MRI can be of value in determining which patients with PDAC will develop metastatic disease.

GI398-SD-WEB5 Follow-up of Multicentric HCC according to the mRECIST Criteria: Role of 320-Row CT with Semi-automatic 3D Analysis Software for Evaluating the Response to Systemic Therapy

Station #5

Participants
Marco Moschetta, MD, Bari, Italy (*Abstract Co-Author*) Nothing to Disclose
Michele Telegrafo, MD, Bari, Italy (*Presenter*) Nothing to Disclose
Amato Antonio Stabile Ianora, Bari, Italy (*Abstract Co-Author*) Nothing to Disclose
Giuseppe Angelelli, Bari, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the role of 320-row CT with 3D Analysis software in the follow-up of multicentric hepatocellular carcinoma (HCC) treated with systemic therapy according to the mRECIST criteria.

METHOD AND MATERIALS

In the period between December 2012 and June 2015 38 patients with multicentric HCC undergoing systemic therapy were assessed twice a year by MDCT before and after injection of contrast medium with three-phasic technique. Two blinded radiologists evaluated multi-planar images (MPR) images classifying the response to therapy in PR (partial response), PD (progressive disease), SD (stable disease) and CR (complete response) by using the mRECIST criteria. 30 days later, the same two blinded radiologists evaluated the same target lesions applying the 3D semi-automatic analysis software. The differences between the two evaluating systems were assessed using the analysis of variance (ANOVA test). The inter-observer agreement for both the evaluating systems was calculated using Cohen's kappa statistics.

RESULTS

In 10/38 cases (26%) PR was found; in 6/38 (16%) PD; in 22/38 (58%) SD. The analysis of variance did not detect statistically significant differences between the two systems of measurement ($p>0.05$). The inter-observer agreement (k) was 0.62 for the measurements in MPR and 0.86 for the measurements performed by using the 3D Analysis Software, with a significantly higher value for the proposed semi-automatic software ($p<0.05$).

CONCLUSION

The semi-automatic 3D Analysis Software represents a reliable method for evaluating the HCC response to therapy according to the mRECIST criteria and could be proposed in the clinical practice.

CLINICAL RELEVANCE/APPLICATION

The proposed semi-automatic 3D Analysis Software represents a fast, reliable and accurate technique for evaluating the HCC response to therapy according to the mRECIST criteria and could be proposed in the clinical practice.

GI399-SD-WEB6 Two-Dimensional US Elastography for Focal Lesions in Liver Phantoms: Influencing Factors for Stiffness Measurement of Small Lesions

Station #6

Participants
Jeong Ah Hwang, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
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Kyoung Doo Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Tae Wook Kang, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyo Keun Lim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ji Eun Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

US elastography (USE) has been investigated for the purpose of estimating liver fibrosis, but 2-dimensional (2-D) USE can depict a focal lesion with different elasticity with a color map. The purpose of this study is to determine accuracy and influencing factors of stiffness value of focal lesions in the phantoms using 2-D USE.

METHOD AND MATERIALS

Using two customized phantoms with different elasticity (4±1 kilopascal [kPa], mimicking normal liver; 15±2 kPa, mimicking liver cirrhosis [LC]) which have 9 spherical hypoechoic inclusions with same elasticity (23±3 kPa), different size (20mm, 15mm and 10mm in a raw) and different depth (3cm, 5cm and 7cm). Two radiologist investigated stiffness of inclusion bodies and background for each inclusions using in the region of interest (ROI). Mean stiffness and standard deviation (SD) in ROI were acquired, and the shape of inclusion was also assessed with a qualitative 5-graded scoring system about target visualization on color map. As possible influencing factors, the type of background phantom, depth of inclusions, size of inclusions, and observers were considered. We compared by Kruskal-Wallis test, and performed multiple regression tests to detect significant influencing factors about 2-D USE.

RESULTS

Measured mean stiffness value was significantly higher in LC phantom (10.50 kPa in normal, 13.81 kPa in LC; p=0.013), inclusions in 7cm of depth (10.94 kPa in 3cm, 11.20 kPa in 5cm and 15.59 kPa in 7cm; p=0.001). In multiple regression analysis in mean stiffness, there was significant difference of mean stiffness in type of phantom, depth and size of inclusions. Mean SD in ROI was also significantly larger in 7cm of depth (0.86 kPa in 3cm, 1.23 kPa in 5cm and 3.94 kPa in 7cm; p=0.001). In multiple regression analysis for SD in ROI, there were significant differences in type of phantom and depth of inclusions. Morphologic score was significantly different only in aspect of the size of inclusion bodies (p<0.001). Background stiffness was not different according to depth or observers (p=0.491 and 0.522, respectively).

CONCLUSION

2-D USE for focal lesion evaluation could be influenced by different background stiffness, deep position of the lesion, and small size of lesion.

CLINICAL RELEVANCE/APPLICATION

Background liver stiffness, depth and size of the target lesion should be considered for focal hepatic lesion evaluation using 2-D USE.

GI400-SD-WEB7 Agreement of Six- and Composite Three-echo Magnitude PDFF-Estimation MRI Sequences in a Multi-center Clinical Trial

Station #7

Participants
Michael S. Middleton, MD, PhD, San Diego, CA (*Presenter*) Consultant, Allergan plc Institutional research contract, Bayer AG Institutional research contract, sanofi-aventis Group Institutional research contract, Isis Pharmaceuticals, Inc Institutional research contract, Johnson & Johnson Institutional research contract, Synageva BioPharma Corporation Institutional research contract, Takeda Pharmaceutical Company Limited Stockholder, General Electric Company Stockholder, Pfizer Inc Institutional research contract, Pfizer Inc
Mary Kosinski, PhD, Nashville, TN (*Abstract Co-Author*) Employee, NuSirt Biopharma, Inc
Omar Flores, PhD,MBA, Nashville, TN (*Abstract Co-Author*) Employee, NuSirt Biopharma, Inc
Michael Zemel, PhD, Nashville, TN (*Abstract Co-Author*) Employee, NuSirt Biopharma, Inc
Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;

PURPOSE

Most MR scanners can acquire 6-echo and/or composite 3-echo magnitude MRI sequences to estimate proton density fat fraction (PDFF). PDFF estimated from the first 3 echos of a 6-echo sequence is nearly equivalent to that estimated from all 6-echos. However, to pool data in clinical trials, we need to show that PDFF derived from 6-echo sequences is essentially equivalent to that derived from separately-acquired composite 3-echo sequences. Hence, the purpose of this study was to calculate the agreement of baseline 6- and composite 3-echo sequences using regression and Bland-Altman analysis in a multi-center clinical trial.

METHOD AND MATERIALS

Anonymized baseline MRIs were analyzed to estimate PDFF for 64 subjects from 7 sites in an ongoing multi-center clinical trial. A multi-echo (ME) magnitude spoiled gradient-recalled-echo (6-echos) MRI sequence, and a pair of double-echo sequences were acquired for each subject. A composite 3-echo dataset was created from the double-double-echo (DDE) sequences. Two additional composite three-echo datasets (one from 1st, 2nd, an 4th echoes; one from first 3 echoes) were created directly from the ME sequence. Three co-localized regions of interest were placed in the right lobe of the liver for all sequences. PDFF was calculated for each dataset using a custom MatLab algorithm. Regression and Bland-Altman analysis was performed to evaluate agreement between PDFF derived from the three composite DDE datasets, and the ME sequence.

RESULTS

ME sequence-derived PDFF ranged from 2.11 to 35.07%. PDFFs from separately- acquired ME and composite DDE sequences showed strong agreement (slope near 1, intercept near 0), but were slightly different (mean difference 0.46%; difference range -2.01 to 1.96%; p < 0.0001). Agreement was even stronger for the composite DDE sequences derived directly from the ME sequence, with best agreement for the composite DDE sequence derived from the first 3 echos of the ME sequence (mean difference 0.14%; difference range -0.86 to 0.69%).

CONCLUSION

PDFFs derived from ME sequences showed strong agreement with those derived from separately-acquired and derived composite DDE sequences, with small differences that are likely to be considered negligible in clinical trials.

CLINICAL RELEVANCE/APPLICATION

Our data support that PDFFs from 6-echo and separately-acquired composite 3-echo magnitude MRI sequences may be pooled, given their strong agreement in a multi-center clinical trial.

GI165-ED-WEB8 Evaluation of Abdominal and Pelvic Manifestations of Graft versus Host Disease (GvHD) after Hematopoietic Stem Cell Transplantation

Station #8

Awards
Certificate of Merit

Participants
Kinan Alhalabi, Scottsdale, AZ (*Presenter*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Venkata S. Katabathina, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Khaled M. Elsayes, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Amy K. Hara, MD, Scottsdale, AZ (*Abstract Co-Author*) Royalties, General Electric Company;
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV

TEACHING POINTS

1. Describe the pathology behind Graft-versus-Host-Disease.
2. Review the most important radiologic findings of the disease in the abdomen and pelvis.
3. Highlight the contribution of radiology in the management of the disease.

TABLE OF CONTENTS/OUTLINE

Graft versus Host disease is a frequent complication of bone marrow and liver transplantation. Grafted T cells proliferate in the immunocompromised host and attack host cells with ‘‘foreign’’ proteins, leading to severe organ dysfunction. T cells can attack any organ in the body, but the GI tract, skin, liver, eyes, mucous membranes are the main affected organs. GvHD can present within 100 days after transplantation (acute phase), or after 100 days (chronic phase). It usually presents with a maculopapular rash, jaundice, diarrhea, and hepatosplenomegaly. Radiology plays a significant role in diagnosing GvHD, showing the extent of the disease, and in guiding the management. Radiologic findings depend on the organs involved. When the GI tract is affected, the bowel is described as having a ‘‘ribbon’’ appearance with fold thickening. Immunosuppressant drugs have reduced the incidence of the disease, although it does still frequently occur.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Venkata S. Katabathina, MD - 2012 Honored Educator
Amy K. Hara, MD - 2015 Honored Educator
Khaled M. Elsayes, MD - 2014 Honored Educator
Perry J. Pickhardt, MD - 2014 Honored Educator

GI174-ED-WEB9 Old Friends, New Foes: Hepatic Vascular Tumors on Gadoxetic Acid-enhanced MRI & Diffusion-weighted Images

Station #9

Participants
Bohyun Kim, MD, Suwon, Korea, Republic Of (*Presenter*) Nothing to Disclose
So Yeon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jei Hee Lee, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kyoung Won Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung Soo Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Roh, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Moon-Gyu Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To describe the causes why hepatic vascular tumors can look so different on gadoxetic acid-enhanced MRI compared to conventional ECF contrast agent-enhanced MRI. To outline the imaging spectrum of hepatic vascular tumors on gadoxetic acid-enhanced MRI and describe imaging pearls and pitfalls in comparison with features on MRI using ECF contrast agents To present imaging pearls and pitfalls of common hepatic vascular tumors on diffusion-weighted images with an emphasis on the speed of enhancement.

TABLE OF CONTENTS/OUTLINE

1. Introduction to vascular tumors of the liver
(1) Spectrum of benign, borderline, and malignant entities
(2) Why can hepatic vascular tumors look so different on gadoxetic acid-enhanced MRI compared to conventional ECF contrast agent-enhanced MRI?2. Cavernous hemangioma
(1) Pearls and pitfalls
(2) Special considerations
i. Speed of intratumoral enhancement: effects on DWI
ii. Sclerosing hemangioma: a great mimicker 3. Epithelioid hemangioendothelioma
(1) Pearls and pitfalls4. Primary hepatic angiosarcoma

(1) Pearls and pitfalls5. Summary for key features in gadoxetic acid-enhanced MR and diffusion-weighted images

VSIO41

Interventional Oncology Series: Mechanisms Matter: Basic Science Every IO Should Know

Wednesday, Nov. 30 1:30PM - 6:00PM Room: S405AB

GI IR

AMA PRA Category 1 Credits ™: 4.25
ARRT Category A+ Credits: 5.00

FDA Discussions may include off-label uses.

Participants
Muneeb Ahmed, MD, Wellesley, MA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Gain an appreciation of the basic scientific underpinnings of interventional oncology. 2) Understand how and why these mechanistic studies can have an impact on both daily clinical practice and future therapeutic paradigms. 3) Characterize the most important advances of tumor ablation over the last two decades. 4) Gain a better understanding of the cutting edge imaging techniques that facilitate successful state of the art interventional oncologic practice.

ABSTRACT

The first half of the session has been organized into a thematic unit entitled: "Mechanisms Matter: Basic science every IO should know" and will be dedicated to gaining an appreciation of the basic scientific underpinnings of interventional oncology and understand how and why such studies can have an impact on both daily clinical practice and future therapeutic paradigms. This will include an initial lecture outlining the many insights and lessons that can be directly applied from radiation therapy and hyperthermia, followed by lectures that center upon key mechanistic pathways that are being used to improve transcatheter embolization and tumor ablation. Two presentations will outline our current understanding of the potential systemic effects of post-procedure, cytokine-mediated inflammation - the negative effects leading to tumorigenesis and the potential beneficial immune (abscopic) effects of IO therapies. A highlight of the session will be a keynote address "20 years of thermal ablation: Progress, Challenges and Opportunities". Dr. Solomon, a noted thought leader in the field will not only characterize the most important advances of tumor ablation over the last two decades and place them in their proper historical and developmental context, but will also identify key areas of research in device and technique development that hold the potential to propel the field forward in the upcoming decade. The second half of the session "Advancing IO with cutting-edge imaging techniques" will be dedicated to the cutting edge imaging modalities that facilitate successful state of the art IO practice. Leading authorities will provide an in depth look at advances and adaptation of 5 of the main technologies as they relate to enhancing interventional oncology including: advanced ultrasound and fusion techniques; state-of-the-art angiographic imaging (including Cone beam CT and subtraction reconstruction); tailoring MR for IO; the the role of PET/CT; and molecular imaging.

Sub-Events

VSIO41-01 Thermal Biophysiology - The Basis for Improving Tumor Ablation

Wednesday, Nov. 30 1:30PM - 1:45PM Room: S405AB

Participants
Christopher L. Brace, PhD, Madison, WI, (clbrace@wisc.edu) (*Presenter*) Shareholder, NeuWave Medical Inc Consultant, NeuWave Medical Inc Shareholder, Symple Surgical Inc Consultant, Symple Surgical Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-02 Ischemia - The Primer Mover: Apoptosis, Hif-1a and VEGF Pathways

Wednesday, Nov. 30 1:45PM - 2:00PM Room: S405AB

Participants
Bradford J. Wood, MD, Bethesda, MD (*Presenter*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, W. L. Gore & Associates, Inc ; Researcher, Cook Group Incorporated; Patent agreement, VitalDyne, Inc; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; ; ; ;

LEARNING OBJECTIVES

View learning objectives under the main course title.

VSIO41-03 Sensitivity of Hepatocellular Cell Lines to Aerobic and Glycolytic Metabolic Inhibitors under Simulated Heat Shock and Hypoxia

Wednesday, Nov. 30 2:00PM - 2:10PM Room: S405AB

Awards
Student Travel Stipend Award

Participants
Andrew J. Barrow, MD, Houston, TX (*Presenter*) Nothing to Disclose
Andrea Cortes, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Rony Avritscher, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Derek L. West, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study is to explore targeted killing of hepatocellular cancer cells surviving incomplete thermal ablation through

The purpose of this study is to explore targeted killing of hepatocellular cancer cells surviving incomplete thermal ablation through the use of metabolic inhibitors. We investigate the sensitivity of hepatocellular cell lines to various metabolic inhibitors under the following conditions: normal culture conditions, following sub-lethal heat exposure, and hypoxic conditions, in order to simulate the effects of incomplete ablation.

METHOD AND MATERIALS

Human Hep3B and HepG2 and rat RH-7777 hepatocellular tumor lines were exposed to sub-lethal heat shock at 43 C or to normal incubation temperature of 37 C. Cells were then treated with serial dilutions of the glycolytic inhibitors: 3-bromopyruvate or FX-11, or modulators of oxidative phosphorylation: neutralized dichloroacetic acid (DCA), antimycin A, carbonyl cyanide-4-trifluoromethoxy phenylhydrazone (FCCP), or a combination of FX-11 and antimycin A. Hypoxia experiments were performed by pre-incubating cells in a hypoxic environment, and then treating with serial dilutions of doxorubicin, FX-11, and Antimycin A. Cell viability was assessed using resazurin indicator and plate reader.

RESULTS

All hepatocellular cell lines demonstrated cytotoxicity to all of the glycolytic and anaerobic inhibitors in a concentration dependent manner. Heat shock experiments demonstrated that hepatocellular cell lines exposed to sub-lethal heat shock were surprisingly less sensitive to 3-bromopyruvate than controls maintained at normal culture conditions. For the other inhibitors, no significant differences in sensitivity were observed between sub-lethal heat shock groups and control groups. Hypoxia experiments revealed that all hepatocellular cell lines demonstrated increased sensitivity to doxorubicin in hypoxic conditions. In addition, this effect was further potentiated by the glycolytic inhibitor FX-11, but not oxidative phosphorylation inhibitor (OXPHOS) antimycin A.

CONCLUSION

Hypoxia increases the sensitivity of hepatocellular cell lines to doxorubicin, an effect which is further potentiated by the glycolytic inhibitor FX-11, but not by OXPHOS inhibitor Antimycin A.

CLINICAL RELEVANCE/APPLICATION

Our results imply that oxidative phosphorylation is important in doxorubicin sensitivity, and that FX-11 is a useful candidate to increase the efficacy of hypoxia inducing cancer treatments such as chemoembolization and anti-VEGF therapy

VSIO41-04 Tailoring Nanodrugs for IO: Free Radicals, Heat Shock Proteins, and Beyond

Wednesday, Nov. 30 2:10PM - 2:25PM Room: S405AB

Participants
Muneeb Ahmed, MD, Wellesley, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-05 Thermal Ablation: Induction of Tumorigenesis Factors by in Vitro Hyperthermia

Wednesday, Nov. 30 2:25PM - 2:35PM Room: S405AB

Participants
Aurelia Markezana, MSc, Jerusalem, Israel (*Presenter*) Nothing to Disclose
Elina Zorde Khvalevsky, PhD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose
Eithan Galun, MD, PhD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Svetlana Gourovich, BSC, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
S. Nahum Goldberg, MD, Jerusalem, Israel (*Abstract Co-Author*) Consultant, AngioDynamics, Inc; Research support, Cosman Medical, Inc; Consultant, Cosman Medical, Inc;

PURPOSE

To determine whether the moderate hyperthermic doses, routinely encountered in the periablational zone during radiofrequency and microwave ablation, induce pro-tumorigenic genetic and proteomic activation of tumor cells and hepatocytes.

METHOD AND MATERIALS

An in vitro assay was established to asses the effect of hyperthermia on tumorigenesis factor induction. R3230 rat mammary tumor cells (n=2.5x10^5) were heated in 250 µl RPMI+10%FCS medium to 45±1ºC or 43±1ºC for 0, 2, 5, & 10 min and then incubated at 37ºC in a humidified incubator for 1.5, 3, 8, or 24 hr (n=3 trials each; total N=135). Primary mouse hepatocytes (n=4x10^5) were also heated in 1ml DMEM/F12+5%FCS medium to 45±1ºC or 44±1ºC (N=48). mRNA expression profile of factors and cytokines implicated in RF-induced tumorigenesis including IL-6, TNFα,STAT3, hepatocyte growth factor (HGF) and vascular endothelial growth factor (VEGF) were evaluated by relative quantitative Real-Time PCR. Heat shock protein (HSP) 70 was used as control. Secretion of cytokine IL-6 at 3 and 8 hr following 45±1ºC heating for 5 min was assessed by ELISA, with intracellular transcription factor STAT3 assessed by Western blot.

RESULTS

Dose and time dependent elevation of HSP70, IL-6, TNFα, and HGF gene expression were observed. For R3230, IL-6 and TNFα mRNA levels were maximum at 3hr incubation following 45ºCx10min heating (11.8±7.8 and 19.1±15.9 fold induction, respectively). HGF expression peaked at 8hr with a maximal induction of 24.1±17.8. HSP70 expression also peaked at 8 hr with a maximal induction of 156.2± 17.8 fold over unheated controls. Likewise, IL-6 expression doubled at 44ºC for hepatocytes. For both cell types, STAT3 doubled its expression at 3hr. VEGF expression showed little if any upregulation. At 43ºC HSP70 was the only gene with elevated expression. ELISA of IL-6 confirmed a significant time dependent increase of IL-6 secretion by 14±3 % over controls ($p<0.05$) at 8hr. Likewise, Western blot of R3230 demonstrated an increase of 20 ±10% ($p<0.05$) STAT3 total protein at 8hr compared to unheated controls.

CONCLUSION

Both hepatocytes and some tumor cell populations react to heating by increasing transcription, secretion, and protein production of

factors that are known to induce increased post-ablation tumorigenesis.

CLINICAL RELEVANCE/APPLICATION

Elucidation of the pathways that can potentially induce tumorigenesis post-ablation may allow us to uncover robust methods to eliminate these unwanted secondary effects.

VSIO41-06 Non-thermal Percutaneous Ablation: Cryo, IRE and More

Wednesday, Nov. 30 2:35PM - 2:50PM Room: S405AB

Participants
Stephen B. Solomon, MD, New York, NY (*Presenter*) Research Grant, General Electric Company

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-07 Optimizing Irreversible Electroporation (IRE) Ablation with a Bipolar Electrode

Wednesday, Nov. 30 2:50PM - 3:00PM Room: S405AB

Participants
Ayelet Wandel, MD, Holon, Israel (*Presenter*) Nothing to Disclose
Eliel Ben-David, MD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Mohamed Faroja, MD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Isaac Nissenbaum, BSc, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Svetlana Gourovich, BSC, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
S. Nahum Goldberg, MD, Jerusalem, Israel (*Abstract Co-Author*) Consultant, AngioDynamics, Inc; Research support, Cosman Medical, Inc; Consultant, Cosman Medical, Inc;

PURPOSE

To prospectively optimize bipolar irreversible electroporation (IRE) by characterizing the effects of electrical parameters and controlling tissue electrical properties.

METHOD AND MATERIALS

Single electrode bipolar IRE was performed in 28 in-vivo pig livers (78 ablations). First, effects of voltage (2,700- 3,000V), number of pulses, repeated cycles (1-6), and pulse width (70- 100µsec) were studied. Next, electrical conductivity was altered by instillation of hypertonic and hypotonic fluids. Finally, effects of thermal stabilization were assessed using internal electrode cooling. Treatment effect was evaluated 2-3hr post-IRE. Dimensions were compared and subjected to statistical analysis.

RESULTS

Delivering 3,000 V at 70µsec for a single 90 pulse cycle yielded 3.8±0.4 x 2.0±0.3cm of ablation. Applying 6 cycles of energy increased the ablation to 4.5±0.4 x 2.6±0.3cm ($p<0.001$). Further increasing pulse lengths to 100µsec (6 cycles) increased ablation to 5.0±0.4 x 2.9±0.3cm ($p<0.001$), but resulted in electric spikes and system crashes in 40-50% of cases. Increasing tissue electrical conductivity via hypertonic solution instillation in surrounding tissues increased the frequency of generator crashes, whereas continuous instillation of distilled water eliminated this arcing phenomenon, but reduced ablation to 2.3±0.1cm. Controlled instillation of distilled water when electrical arcing was suspected from audible popping produced ablations of 5.3±0.6 x 3.1±0.3cm without crashes. Finally, 3.1±0.1cm short-axis ablation was achieved without system crashes with internal electrode perfusion at 37°C vs. 2.3±0.1cm with 4-10°C perfusion ($p<0.001$).

CONCLUSION

Bipolar IRE ablation zones can be increased with repetitive high voltage and greater pulse widths while performing maneuvers such as judicious instillation of hypotonic fluids or internal electrode perfusion that minimize accompanied unwanted electrical arcing.

CLINICAL RELEVANCE/APPLICATION

The development of single insertion IRE devices that can achieve clinically meaningful ablation sizes will facilitate appropriate adoption of this platform for clinical practice.

VSIO41-08 Understanding Post-Procedure Inflammation: AKT and C-Met Pathways

Wednesday, Nov. 30 3:00PM - 3:15PM Room: S405AB

Participants
David A. Woodrum, MD, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-09 Systemic Implications of IO Therapies: Increased Tumorigenesis?

Wednesday, Nov. 30 3:15PM - 3:30PM Room: S405AB

Participants
Muneeb Ahmed, MD, Wellesley, MA, (mahmed@bidmc.harvard.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

VSIO41-10 Targeting STAT3 to Suppress the Systemic Pro-Oncogenic Effects of Hepatic RF Ablation

Wednesday, Nov. 30 3:30PM - 3:40PM Room: S405AB

Participants
Gaurav Kumar, PhD, Boston, MA (*Presenter*) Nothing to Disclose
S. Nahum Goldberg, MD, Jerusalem, Israel (*Abstract Co-Author*) Consultant, AngioDynamics, Inc; Research support, Cosman Medical, Inc; Consultant, Cosman Medical, Inc;
Eithan Galun, MD, PhD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To identify key expressed genes in the periablational rim after hepatic radiofrequency ablation (RFA) and their role in driving the stimulation of distant tumor growth in small animal models.

METHOD AND MATERIALS

First, gene expression analysis (Illumina array) was performed after RFA of normal liver in C57BL mice. 12 mice were allocated to receive RFA (70ICx5min) or sham electrode placement (no RF). Periablational liver was harvested at 24, 72h, and 7d post RFA. Data was analyzed for differentially expressed genes (>2 fold change) and their functional annotations. Next, STAT3 was identified as a key periablational mediator, and 16 F344 animals were allocated to hepatic RFA or sham treatment ± STAT3 inhibitor S3I-201 (4 groups, n=4) for pSTAT3 immunohistochemistry (IHC) at 24h. Finally, 24 rats were implanted with subcutaneous R3230 adenocarcinoma and allocated to RFA or sham ± S3I-201 arms (4 groups; n=6). Outcomes included tumor growth analysis, tumor proliferation (Ki67) and microvascular density(MVD) analysis.

RESULTS

At 24h post-RFA, 217 genes had altered expression (107 up-regulated/110 down-regulated). This decreased to 55 genes (27 up/28 down) and 18 genes at 72h and 7d post-RF, respectively. At 24h, functional annotations identified 7 activated pathways of which the STAT3 gene occurred in 4 including those associated with various pro-oncogenic genes and pathways. Correlative IHC of the periablational rim 24h after hepatic RFA confirmed elevated pSTAT3 activation, which was suppressed using S3I-201 (31.7±3.4 vs. 3.8±1.7% cells/field; $p<0.001$). The addition of S3I-201 with hepatic RFA reduced systemic distant R3230 tumor growth including compared to the sham arm (at 7d, RFA/S3I-201: 11.8±0.5mm; RFA alone: 19.8±0.7mm; S3I-201 alone: $p<0.001$; sham: 15±0.7mm, $p<0.001$ for all comparisons). Distant tumor proliferation and MVD mirrored trends in tumor growth between arms.

CONCLUSION

STAT3 activation is observed after hepatic RFA in rodents and can be suppressed using adjuvant STAT3 inhibitor. This may represent a clinically implementable solution for blocking unwanted 'off-target' effects of RFA generated by several upstream genes such as IL-6.

CLINICAL RELEVANCE/APPLICATION

Local STAT3 inhibition after hepatic RFA may offer a clinically implementable solution for blocking systemic tumorigenic effects of RFA generated by upstream cytokines/factors.

VSIO41-11 Systemic Implications of IO Therapies: Beneficial Immune Effects?

Wednesday, Nov. 30 3:40PM - 3:55PM Room: S405AB

Participants
Joseph P. Erinjeri, MD, PhD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-12 Panel Discussion: So What Does all This Mean?

Wednesday, Nov. 30 3:55PM - 4:05PM Room: S405AB

Participants

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-13 Trancatheter IO: 30 Years of Progress, Challenges and Opportunities

Wednesday, Nov. 30 4:05PM - 4:20PM Room: S405AB

Participants
Jean-Francois H. Geschwind, MD, Westport, CT, (jeff.geschwind@yale.edu) (*Presenter*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC

LEARNING OBJECTIVES

1. Learn the scientific rationale for intra-arterial therapy in Liver Cancer2. Understand the pharmacokinetic principles of TACE3. Recognize the impact of Cone Beam CT imaging on the efficacy of TACE

ABSTRACT

LEARNING OBJECTIVES

View learning objectives under main course title.

View learning objectives under main course title.

VSIO41-14 Advancing IO with Cutting-edge Imaging Techniques

Participants

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-15 Advanced Ultrasound and Fusion Techniques

Wednesday, Nov. 30 4:30PM - 4:45PM Room: S405AB

Participants
Luigi Solbiati, MD, Rozzano, Italy, (lusolbia@tin.it) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

VSIO41-16 Response Assessment by Volumetric Iodine-uptake Measurement: Preliminary Experience in Patients with Intermediate-advanced Hepatocellular Carcinoma Treated with Radioembolization

Wednesday, Nov. 30 4:45PM - 4:55PM Room: S405AB

Participants
Giulia Lorenzoni, Pisa, Italy (*Presenter*) Nothing to Disclose
Alessandro Grigolini, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Irene Bargellini, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Laura Crocetti, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Roberto Cioni, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Davide Caramella, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the volumetric iodine-uptake (VIU) changes by dual-energy CT (DECT) in assessing early response to selective internal radiotherapy (SIRT) in hepatocellular carcinoma (HCC) patients, compared with RECIST 1.1 and mRECIST.

METHOD AND MATERIALS

Nineteen patients treated with 24 sessions of SIRT were included in this retrospective study. At baseline and early (4-8 weeks) follow-up, target lesion response was assessed by RECIST 1.1, mRECIST, tumor volume (cm3), mean iodine content (μg/cm3) and VIU (mg). Cox regression and Kaplan-Meyer analysis were used to explore differences in overall survival between responders and non-responders for each method.

RESULTS

There were 18 (75%) responders for tumor volume (≥10% decrease), 9 (37.5%) responders for iodine content (≥20% decrease) and 18 (75%) responders for VIU. Cumulative survival significantly ($p<0.01$) correlated with all these parameters, with the strongest correlation found with the iodine content. As opposite, there was no significant association between survival and RECIST 1.1 (CR+PR: 16.7%, 4 patients) and mRECIST (CR+PR: 33.3%, 8 patients).

CONCLUSION

Early assessment of volume and iodine content changes after SIRT can differentiate responders from non-responders, overcoming the limitations of RECIST 1.1 and mRECIST.

CLINICAL RELEVANCE/APPLICATION

Volumetric iodine-uptake changes can assess early response to radioembolization in hepatocellular carcinoma patients, correlating with cumulative survival.

VSIO41-17 State-of-the-Art Angiographic Imaging: Cone Beam CT and Beyond

Wednesday, Nov. 30 4:55PM - 5:10PM Room: S405AB

Participants
Ming De Lin, PhD, Cambridge, MA, (ming.lin@philips.com) (*Presenter*) Employee, Koninklijke Philips NV

LEARNING OBJECTIVES

-Discuss the role of cone-beam computed tomography (CBCT) for intraprocedural imaging during transcatheter arterial chemoembolization (TACE)-Explain the advantages of CBCT over standard 2D angiography in the detection of hepatocellular carcinoma lesions and their feeding arteries-Describe how CBCT during TACE can be used to assess the technical endpoint of embolization-Show how 3D quantification can be used in CBCT and how this fits into the treatment workflow along with MR and MDCT.

ABSTRACT

Cone-beam computed tomography (CBCT) is an imaging technique that provides 3D imaging intraprocedurally from a rotational scan acquired with a C-arm equipped with a flat panel detector. Utilizing CBCT images during interventional procedures bridges the gap between the world of diagnostic imaging, where the image acquisition is typically performed separately from the procedure, and

that of interventional radiology, which traditionally has been 2-dimensional (fluoroscopy and angiography).In the scope of transcatheter arterial chemoembolization (TACE), CBCT is capable of providing more information than standard two-dimensional imaging alone in localizing and/or visualizing liver tumors (“seeing” the tumor) and targeting tumors though precise microcatheter placement in close proximity to the tumors (“reaching” the tumor). It can also be useful in evaluating treatment success at the time of procedure (“assessing” treatment success). We will also look into how 3D quantification can be used in CBCT and how this fits into the treatment workflow along with MR and MDCT.

LEARNING OBJECTIVES

1) Discuss the role of cone-beam computed tomography (CBCT) for intraprocedural imaging during transcatheter arterial chemoembolization (TACE). 2) Explain the advantages of CBCT over standard 2D angiography in the detection of hepatocellular carcinoma lesions and their feeding arteries. 3) Describe how CBCT during TACE can be used to assess the technical endpoint of embolization. 4) Show how 3D quantification (qEASL) can be used in CBCT and how this fits into the treatment workflow along with MR and MDCT.

ABSTRACT

Cone-beam computed tomography (CBCT) is an imaging technique that provides 3D imaging intraprocedurally from a rotational scan acquired with a C-arm equipped with a flat panel detector. Utilizing CBCT images during interventional procedures bridges the gap between the world of diagnostic imaging, where the image acquisition is typically performed separately from the procedure, and that of interventional radiology, which traditionally has been 2-dimensional (fluoroscopy and angiography).In the scope of transcatheter arterial chemoembolization (TACE), CBCT is capable of providing more information than standard two-dimensional imaging alone in localizing and/or visualizing liver tumors (“seeing” the tumor) and targeting tumors though precise microcatheter placement in close proximity to the tumors (“reaching” the tumor). It can also be useful in evaluating treatment success at the time of procedure (“assessing” treatment success). We will also look into how 3D quantification (qEASL) can be used in CBCT and how this fits into the treatment workflow along with MR and MDCT.

VSIO41-18 Validation of a CBCT Virtual Injection and Perfusion Planning Tool with Selective CBCT Angiography and Radiopaque Bead Embolization

Wednesday, Nov. 30 5:10PM - 5:20PM Room: S405AB

Participants
William F. Pritchard JR, MD, PhD, Bethesda, MD (*Presenter*) Nothing to Disclose
Martijn Van Der Bom, MSC, Andover, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
William van der Sterren, MSc, Best, Netherlands (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Haydar Celik, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Alessandro G. Radaelli, PHD, MS, Best, Netherlands (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, W. L. Gore & Associates, Inc ; Researcher, Cook Group Incorporated; Patent agreement, VitalDyne, Inc; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; ; ; ;
Juan A. Esparza, Laurel, MD (*Abstract Co-Author*) Nothing to Disclose
David L. Woods Jr, MS,BA, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Ivane Bakhutashvili, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Elliot B. Levy, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Venkatesh P. Krishnasamy, MD, Delaware, OH (*Abstract Co-Author*) Nothing to Disclose
John W. Karanian, PhD, Laurel, MD (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the accuracy of novel virtual injection and perfusion planning software based on arterial CBCT angiograms in predicting regions of subsequent selective actual perfusion and embolization in the liver

METHOD AND MATERIALS

Nonselective dual phase CBCT angiography of the liver (XperCT, Allura Xper FD20, Philips, Best, Netherlands) was performed in 3 domestic swine. Virtual perfusion maps of 9 target hepatic arteries were extracted using novel software added on the framework of a 3D vessel-tracking and fluoroscopy guidance platform for tumor embolization (Emboguide, Philips). Target arteries were selectively catheterized and dual phase CBCT performed without reflux for retrospective comparison to the virtual perfusion maps. The virtual catheter site was selected based on actual catheter location. The software identified all downstream arterial branches supplied and generated a map of adjacent tissue perfused. One target artery in each animal was embolized to stasis using radiopaque beads (LC Bead LUMI, Biocompatibles UK, Farnham, UK) followed by CBCT. Anonymized imaging data from a patient with hypervascular liver tumors undergoing DEB/TACE were retrospectively analyzed with the same virtual perfusion software to assess its potential for prediction of subselective perfusion and embolization.

RESULTS

In all injections, the manually selected virtual injection and virtual perfusion maps corresponded to actual target vessels and contrast-perfused tissue in swine. The imageable beads co-localized in the expected distribution of the virtual injection. The software successfully correlated virtual and actual perfusion in a patient undergoing DEB TACE.

CONCLUSION

Virtual injection and perfusion maps derived from CBCT using novel software corresponded to actual target vessels and embolized tissue in a swine model.

CLINICAL RELEVANCE/APPLICATION

This virtual injection and perfusion software may provide a useful tool for procedural definition of partitions of the tumor in planning and predicting DEB/TACE delivery and facilitate sequential subselective embolization.

VSIO41-19 Tailoring MR for IO

Wednesday, Nov. 30 5:20PM - 5:35PM Room: S405AB

Participants
Stephan Clasen, MD, Tuebingen, Germany (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

MR imaging is now used for guidance of biopsy and for therapy with thermal ablation. During the last 15 years, field of interventional MRI has switched from experimental studies to clinical application in patients presented with cancer. The major role of image guidance for biopsy and thermal ablation is to ensure a safe and precise intervention with a percutaneous approach, i.e. biopsy of viable tumor tissue or for thermal ablation a complete coagulative necrosis of targeted tumor tissue including a safety margin without injury of critical structures. Therefore, image guidance during the intervention should allow a 3D-planning and provide an exact targeting, a reliable monitoring in case of therapy, and a controlling after ablation therapy. A precise targeting for the placement of the instrument is a precondition for a safe and effective intervention. New MR-scanners offer the unique possibility to combine the advantages of MR imaging such as excellent soft-tissue contrast, multiplanar capabilities, ultra-fast imaging, and sensitivity to thermal effects, during the entire ablation procedure with a good access to the patients. The development of fast acquisition techniques with adequate temporal and spatial resolution necessary to perform thermal therapies as well as the advance of different configured MR-Scanners e.g. open-bore contributed mostly to the development of interventional MR imaging over the last years. Finally, more sophisticated features available in high-field MR-Scanners such as assessment of different physiological information with diffusion weighted imaging (DWI) and near on-line temperature monitoring, which represents an essential feature in MR imaging-guided percutaneous ablation for the control of heat distribution. Regarding the clear advantages by using MR imaging in interventional oncology, it is somewhat surprising that the use of MR guided for intervention remains after almost 20 years of clinical evaluation still limited to some centers worldwide. Limited availability of open bore MR scanners is probably the main reason for its reduced use in interventional oncology. The feasibility of MR guided intervention specially thermal ablation has been evaluated in several clinical studies, showing its effectivity, its safety and even its time-efficacy in skilled hands.

VSIO41-20 Volumetric Changes in the Enhancing Tumor Burden Can Be Used to Evaluate Tumor Response and Predict Survival Early in Patients with Infiltrative/Multifocal Hepatocellular Carcinoma (HCC) after the First Transcatheter Arterial Chemoembolization (TACE)

Wednesday, Nov. 30 5:35PM - 5:45PM Room: S405AB

Participants
Cuihong Liu, Jinan, China (*Presenter*) Nothing to Disclose
Susanne Smolka, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Duc Do Minh, BSc, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
John Treilhard, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Qiang Huang, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Julius Chapiro, MD, New Haven, CT (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV
Ming De Lin, PhD, Cambridge, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC

PURPOSE

Imaging based response assessment after transcatheter arterial chemoembolization (TACE) is important. A new 3D enhancement based approach (quantitative European Association for the Study of the Liver [qEASL]) has been shown to be more accurate than traditional methods (RECIST, mRECIST, WHO, EASL). Previous qEASL works were done on a lesion basis with ≤3 hepatocellular carcinoma (HCC) tumors per patient and the lesions had well-defined tumor borders. In this work, we evaluated patients with either multi-focal or infiltrative (ambiguous tumor border) HCC on a whole liver basis. This study investigates whether the whole liver enhancement pattern (enhancing tumor burden [ETB]) can be used to measure treatment response and predict survival.

METHOD AND MATERIALS

Retrospective study of 53 patients with infiltrative or multifocal HCC treated by TACE from 2001-14. Semi-automated 3D quantification software was used to segment the whole liver and calculate the ETB on multi-phasic contrast-enhanced MRI before and 1 month after TACE. The whole liver was segmented, then pre-contrast MR was registered to and subtracted from arterial phase MR. To calculate ETB, amount of voxels with greater enhancement than healthy liver (user indicated in 10x10x10 ROI) was measured. ETB change before and after TACE was used to assess response. Survival analysis included Kaplan-Meier curves with log-rank test and Cox regression. Cutoffs distinguishing responders from non-responders were 20,25,30,35,40,45 and 50% reduction in ETB. Akaike information criterion (AIC) was used to determine optimal cutoff to predict survival.

RESULTS

Mean age 59.9 years, 73.6% male, 30.2% presented with >50% tumor burden, 43.4% portal venous invasion, and none had extrahepatic metastasis. Mean ETB decreased significantly after TACE: 997.9 to 629.4cm3 ($p<0.01$). There was significant survival difference between responders (2.1-85.1months) and non-responders (15.8-44months); all cutoffs $p<0.01$. Based on AIC, 45% response cutoff was best predictive model (HR:0.06, 95%CI: 0.13-0.267, $p<0.01$)

CONCLUSION

Volumetric ETB can be used to evaluate the tumor response and predict survival in patients with infiltrative, multifocal HCC after first TACE.

CLINICAL RELEVANCE/APPLICATION

Response assessment after TACE for infiltrative and multifocal HCC by whole liver volumetric enhancement quantification is feasible

and can predict survival.

VSIO41-21 The Role of PET/CT

Wednesday, Nov. 30 5:45PM - 6:00PM Room: S405AB

Participants
Paul B. Shyn, MD, Boston, MA, (pshyn@bwh.harvard.edu) (*Presenter*) Research Consultant, Galil Medical Ltd; Research Grant, Siemens AG

LEARNING OBJECTIVES

ABSTRACT

LEARNING OBJECTIVES

1) Compare advantages of PET/CT with other imaging modalities in guiding interventional radiology procedures. 2) Describe strategies to improve lesion targeting during PET/CT interventional procedures. 3) Apply various PET/CT imaging techniques for the intraprocedural assessment of tumor ablation margins.

ABSTRACT

Positron Emission Tomography/Computed Tomography (PET/CT) enhances our capabilities in image-guided interventions in multiple ways. PET/CT enables targeting of disease foci not visible using other imaging modalities, provides uninterrupted visibility of targets despite intraprocedural changes in surrounding tissues or thermal effects of ablation, and facilitates unique intraprocedural strategies for assessing tumor ablation results. Many case examples will be shown that highlight rationales, strategies and emerging techniques for successful PET/CT-guided interventions.

SPOR41

RSNA-AOSR Joint Symposium: The Role of Imaging in Transplantation

Wednesday, Nov. 30 3:00PM - 4:30PM Room: E350

GI OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Richard L. Baron, MD, Chicago, IL (*Director*) Nothing to Disclose
Byung Ihn Choi, MD, PhD, Seoul, Korea, Republic Of (*Director*) Nothing to Disclose

Sub-Events

SPOR41A Imaging for Selection and Prioritization of LT Candidates with HCC: The Asian Perspective

Participants
Utaroh Motosugi, MD, Yamanashi, Japan (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the basic idea of liver transplantation in Japan. 2) To recognize the standard approach for the treatment of HCCs based on a guideline by Japanese Society of Hepatology. 3) To list the role of radiologists for selection of liver transplant candidates with HCCs.

ABSTRACT

Japan is one of the major countries, which develop large number of HCCs in the world. Traditionally, liver transplantation takes place in Japan much less frequently compared with western countries. Especially, the number of cadaveric transplant is enormously small. Living donor liver transplantation is a treatment option only for the patients with Child-Pugh class C disease, if present, with HCCs within Milan criteria: expected prognosis is <1 year. Therefore, most HCCs are managed with local treatment including percutaneous ablation and surgical resection. The liver imaging with CT and MRI has important role for the selection of candidate of liver transplantation. For this sake, dynamic CT is typically used because Japanese government recommends that to simplify the selection of the patients. Basic roles of pre-transplantation imaging in patients with HCC include staging of HCCs, evaluating extra-hepatic portal vein and other vessels for operators, screening diseases of other organs such as infection, intracranial hemorrhage, and malignancy, as well as steatosis of the donor's liver. Indication of liver transplantation beyond Milan criteria has been discussed for long time. That might be acceptable for living donor transplantation; if a donor's strong will is confirmed and there is no hope for the patients' survival otherwise. Liver transplantation in Japan usually means living donor transplantation, which implies patient-tailored management is necessary rather than standardization.

URL

SPOR41B Imaging for Selection and Prioritization of LT Candidates with HCC: The North American Perspective

Participants
An Tang, MD, Montreal, QC, (an.tang@umontreal.ca) (*Presenter*) Advisory Board, Imagia Cybernetics Inc

LEARNING OBJECTIVES

1) To review the diagnostic criteria of hepatocellular carcinoma (HCC) in North America. 2) To discuss the selection criteria of liver transplant candidates with HCC in USA and Canada. 3) To summarize the prioritization systems of liver transplant candidates with HCC.

ABSTRACT

Liver transplant candidates with HCC are competing for the same organs as those without HCC. Hence, it is important for this scarce resource to be allocated fairly and justly to those who will benefit the most from it. Unlike many other cancers, HCC is often diagnosed noninvasively by imaging without biopsy confirmation. A misdiagnosis by the radiologist can lead to management errors with potentially fatal implications not only for the transplant recipient but also for those left on the waiting list. In this lecture, we will briefly discuss the geographic regions and distribution of liver transplant centers in USA and Canada. We will provide an overview of the organizational structure of agencies coordinating tranplant selection, prioritization, and logistics. We will review the diagnostic criteria of HCC in North America according to Liver Imaging Reporting And Data System (LI-RADS), which is congruent with the HCC diagnostic imaging components of the American Association for the Study of Liver Diseases (AASLD) and United Network for Organ Sharing and Organ Procurement and Transplantation Network (UNOS-OPTN) systems. We will discuss imaging modalities, contrast agents accepted, recommended minimum specifications for dynamic CT or MRI of the liver, and modalities accepted for extrahepatic spread or metastatic disease. We will summarize the selection criteria, staging and prioritization systems applicable to liver transplant candidates with HCC.

URL

SPOR41C Imaging of Liver Donors

Participants
Jeong Min Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Grant, Guerbet SA; Support, Siemens AG; Grant, Bayer AG; Grant, General Electric Company; Grant, STARmed Co, Ltd; Grant, RF Medical Co, Ltd; Grant, Toshiba Corporation; Grant, Samsung Medical Healthcare

LEARNING OBJECTIVES

1) To illustrate essential components of preoperative evaluation of liver donor candidates for improved candidate selection and a reduction in transplant operative complication rates. 2) To review commonly used diagnostic imaging tests for assessment of the vascular and biliary anatomy, evaluation of the hepatic parenchyma and calculation of liver volumes. 3) To demonstrate common surgically relevant vascular and biliary anatomic variants.

ABSTRACT

Liver transplantation (LT) is widely accepted to be the only curative treatment modality for end stage liver disease today, and is also commonly performed in patients with hepatocellular carcinoma (HCC) who do not have a sufficient hepatic reserve to undergo resection with curative intent. In order to improve donor candidate selection, and to reduce complication related with liver transplantation, it is essential to evaluate presence of normal variation of the hepatic vasculature and biliary system, and abnormal changes of parenchyma such as hepatic fibrosis or steatosis and assessment of liver volume. Currently, many transplantation centers, preoperative evaluation of liver donor candidates is performed by using of computed tomography (CT) with three dimensional (3D) postprocessing techniques and MR imaging with magnetic resonance cholangiopancreatography (MRCP). CT angiography is able to delineate the small segmental hepatic arteries and accessory hepatic veins very well, and is also used for CT volumetry, and for screening of significant parenchymal abnormalities. Breath-hold T2 corrected MR spectroscopy as well as multi-echo chemical shift imaging can provide proton density fat fraction, which is well correlated with pathological degree of hepatic steatosis. Biliary system evaluation commonly involves a traditional T2 weighted noncontrast MRCP, but T1 weighted contrast-enhanced MRCP utilizing hepatobiliary contrast agents can be used as a supplement examinations to improve diagnostic confidence for biliary anatomy. Combined use of CT and MRI can effectively reduce the necessity of invasive tests such as liver biopsy, direct angiography or intraoperative cholangiogram in donor candidates. Although surgically relevant vascular and biliary anatomic variants are quite common, preoperative identification of surgically relevant vascular and biliary anatomic variants with imaging allowed most donor candidates with anatomical variants remain eligible for donation.

SPOR41D Imaging After Loco Regional Treatment as a Bridge to Transplant - Assessment of Response

Participants
Claude B. Sirlin, MD, San Diego, CA (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;

LEARNING OBJECTIVES

1) To review the radiologic stages that may qualify for priority points for liver transplant in North America. 2) To understand the rationale for loco regional treatment as a bridge to transplant. 3) To review the loco regional treatments most frequently used as a bridge to transplant. 4) To become familiar with the emerging LI-RADS criteria for treatment response assessment in pre-transplant patients.

SSM08

Gastrointestinal (Radiogenomics)

Wednesday, Nov. 30 3:00PM - 4:00PM Room: E353A

GI CT MR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Andrew D. Smith, MD, PhD, Jackson, MS (*Moderator*) Research Grant, Pfizer Inc; President, Radiostics LLC; President, Liver Nodularity LLC; President, Color Enhanced Detection LLC; President, eMASS LLC; Pending patent, Liver Nodularity LLC; Pending patent, Color Enhanced Detection LLC; Pending patent, eMASS LLC;
Srinivasa R. Prasad, MD, Houston, TX (*Moderator*) Nothing to Disclose

Sub-Events

SSM08-01 Hepatocellular Adenoma MRI Phenotype Identification: 2016 Update

Wednesday, Nov. 30 3:00PM - 3:10PM Room: E353A

Participants
Sylvain Bise, Pessac, France (*Abstract Co-Author*) Nothing to Disclose
Nora Frulio, Bordeaux, France (*Abstract Co-Author*) Nothing to Disclose
Arnaud Hocquelet, Pessac, France (*Presenter*) Nothing to Disclose
Jean-Frederic Blanc, Bordeaux, France (*Abstract Co-Author*) Nothing to Disclose
Nicolas Alberti, MD, Bordeaux, France (*Abstract Co-Author*) Nothing to Disclose
Charles Balabaud, Bordeaux, France (*Abstract Co-Author*) Nothing to Disclose
Herve Trillaud, MD, Bordeaux, France (*Abstract Co-Author*) Nothing to Disclose
Paulette Bioulac-Sage, Bordeaux, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Magnetic resonance imaging (MRI) might be the cornerstone of the management of hepatocellular adenomas (HCA). The objective was to perform correlation between MRI and pathological HCA subtypes, to improve MRI diagnosis towards a less invasive diagnosis strategy.

METHOD AND MATERIALS

Pathological and radiological data of 116 HCAs were consecutively and retrospectively analyzed to investigate new MR features of the 4 HCA pathological subtypes. Complication risks according to both HCA subtypes and sizes were also analyzed.

RESULTS

38/43 (88.4%) HNF1α mutated (H-HCAs) were discriminated by (i) fatty component (homogenous or heterogeneous) and (ii) hypovascular pattern association on MRI, with sensitivity (Se) of 88.4% and specificity (Sp) of 97.2%. 51/58 (87.9%) inflammatory HCAs (IHCAs) displayed MRI features of sinusoidal distension (SD) including 3 different patterns (global SD and atoll sign previously described, and a new "croissant sign" (portion of peripheral rim hyperintense on T2W and/or arterial phase with persistent delayed enhancement - 14/58, 24.1%), corresponding to Se of 87.9% and Sp of 100%. Central Hemosiderin deposits (13/58, 22.4%) appeared very specific (100%) of IHCAs in association to SD. β-catenin mutation were unidentifiable from IHCAs (14 b-IHCAs, 24.1%). HCAs remaining non-classifiable by MRI were H-HCAs (4/116, 3.4%) and IHCAs (3/116, 2.5%) with tumor area remodeled by necrotic/hemorrhagic changes >50%, H-HCA without steatosis (1/116, 0.8%), IHCAs without SD (4/116, 3.4%), β-catenin mutated (6/116, 5.1%) and unclassified HCAs (9/116, 7.7%). Malignant transformation (6/116, 5.1%) and bleeding (24/116, 20.6%) cases were not found below HCA sizes of 5.2cm and 4.2cm respectively.

CONCLUSION

The contribution of new MRI criteria in addition to previously described classical criteria, allow identifying 88% of the 2 main HCAs subtypes (H-HCA, IHCA) and therefore decreasing considerably the place of biopsy in diagnosis strategy.

CLINICAL RELEVANCE/APPLICATION

The contribution of new MRI criteria in addition to Laumonier's criteria allows to identify 88% of the 2 major HCAs subtypes in discriminating (i) low to moderate steatotic H-HCAs with "hypovascular pattern", and (ii) remodeled IHCAs bearing peripheral "croissant sign" +/- central hemosiderin deposits.

SSM08-02 The Value of Gadoxetic Acid-enhanced and Diffusion-weighted MR Imaging for Predicting Cytokeratin19-Positive Hepatocellular Carcinoma

Wednesday, Nov. 30 3:10PM - 3:20PM Room: E353A

Participants
Seo-Youn Choi, MD, Bucheon, Korea, Republic Of (*Presenter*) Nothing to Disclose
Seong Hyun Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ji Eun Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jeong Ah Hwang, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyun Jeong Park, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ji Hye Min, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the value of preoperative MR imaging for predicting cytokeratin (CK) 19-positive hepatocellular carcinoma (HCC) and to evaluate the prognosis after surgery of CK 19-positive HCC.

METHOD AND MATERIALS

Two hundred and four patients with a CK19-positive HCC and 38 with a CK19-negative HCC who underwent surgery after gadoxetic acid-enhanced and diffusion-weighted MR imaging were retrospectively evaluated. Two radiologists evaluated the preoperative MR imaging findings in consensus. Significant MR imaging findings for differentiating two groups were identified on univariate and multivariate analyses. Time-to-recurrence rate after surgery was also compared between two groups.

RESULTS

In univariate and multivariate analyses, lobulated or ill-defined margin ($p = 0.024$), rim enhancement on arterial phase ($p < 0.001$), lower tumor-to-liver signal intensity ratio on hepatobiliary phase images (≤0.5221, $p = 0.01$) and tumor-to-liver ADC ratio (≤0.820, $p < 0.001$) were independently significant factors for predicting CK19-positive HCC. When three of these four criteria are combined, 63.2% (24/38) of CK19-positive HCCs were identified with specificity of 90.7% (185/204). When all four criteria are satisfied, specificity was 99.5%. The time-to-recurrence rate was significantly higher in patients with CK19-positive HCCs compared with those with CK19-negative HCCs (23.9% vs. 3%, 36.1% vs. 10.0%, 36.1% vs. 20.1% and 45.2% vs. 29.8% in 6months, 1, 2 and 3years, respectively) ($p = 0.001$).

CONCLUSION

Gadoxetic acid-enhanced and DW MR imaging may be helpful for predicting CK19-positive HCCs with higher time-to-recurrence rate.

CLINICAL RELEVANCE/APPLICATION

Lobulated or ill-defined margin, rim enhancement on arterial phase, lower tumor-to-liver signal intensity ratio on hepatobiliary phase images and lower tumor-to-liver ADC ratio were independently significant factors for predicting CK19-positive HCC, which is related to poor prognosis or early recurrence of HCC after surgical resection.

SSM08-03 Volumetric Textural Analysis of Colorectal Masses at CT Colonography: Differentiating Benign from Malignant Pathology and Comparison with Human Readers

Wednesday, Nov. 30 3:20PM - 3:30PM Room: E353A

Participants
B. Dustin Pooler, MD, Madison, WI (*Presenter*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Yifan Hu, MS, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose
Jake R. Theis, MD, Bloomington, MN (*Abstract Co-Author*) Nothing to Disclose
Richard Halberg, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Zhengrong Liang, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV

PURPOSE

To apply higher-order volumetric texture analysis to colorectal masses at CT colonography (CTC) for differentiation of benign and malignant lesions, and compare against human performance.

METHOD AND MATERIALS

A validated volumetric texture analysis method was applied to 63 pathologically-proven colorectal masses (mean size, 4.2 cm; range, 3-8 cm) at non-contrast CTC in 60 adults (mean age, 66.5 years; range, 45.9-91.6 years). 32 (51%) of the 63 masses were invasive adenocarcinoma and 31 (49%) were benign advanced adenomas. Analyzed texture features included density, gradient, and curvature. Three readers with CTC experience (radiology resident, fellow, and staff) independently analyzed the likelihood of malignancy using a 5-point scale (1=definitely benign, 2=probably benign, 3=indeterminate, 4=probably malignant, 5=definitely malignant). Areas under the ROC curve (AUC) and point accuracy levels were compared.

RESULTS

The ROC AUC for differentiating benign and malignant lesions using the texture features from the original density and higher-order derivative images of gradient and curvature reached 0.9363. AUC for the resident, fellow, and staff was 0.926, 0.869, and 0.960, respectively. Volumetric texture analysis was 83.6% sensitive and 87.5% specific at a threshold score of 0.5300. Resident/fellow/staff/pooled sensitivity and specificity using 3-5 score as positive were 93.5%/81.8/96.9%/90.7% and 81.3%/74.2%/77.4%/77.6%, respectively. Pooled accuracy for the three readers was 85%.

CONCLUSION

Higher-order volumetric textural analysis demonstrated excellent performance for distinguishing benign from malignant colorectal masses at CTC, comparable to experienced human performance.

CLINICAL RELEVANCE/APPLICATION

Higher-order volumetric textural analysis may be useful in characterization of colorectal masses at CT.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Perry J. Pickhardt, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator

SSM08-04 Pathological T Stages of Rectal Cancer Can Be Accurately Discriminated via Radiomic Features From

Post-Chemoradiation T2w MRI

Wednesday, Nov. 30 3:30PM - 3:40PM Room: E353A

Participants
Jacob T. Antunes, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Justin T. Brady, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Scott R. Steele, MD, Tacoma, WA (*Abstract Co-Author*) Nothing to Disclose
Conor Delaney, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Joseph Willis, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Jayakrishna Gollamudi, MD, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose
Raj M. Paspulati, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Pablo R. Ros, MD, PhD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Anant Madabhushi, PhD, Piscataway, NJ (*Abstract Co-Author*) Nothing to Disclose
Satish Viswanath, Cleveland, OH (*Presenter*) Scientific Advisory Board Member, Virbio Inc

PURPOSE

Treatment response evaluation in rectal cancer typically involves tumor-node-metastasis (TNM) staging, which may be visually identifiable on *in vivo* MRI but has high interobserver variability (expert agreement~53%). We present preliminary results of using radiomics (computer-extracted features from radiographic images) to identify quantitative imaging signatures on post-chemoradiation T2w-weighted (T2w) MRI that differentiate between pathologic T stages, a marker of tumor response to treatment.

METHOD AND MATERIALS

38 rectal cancer patients with pathologic T stage from excised specimens (and N0 M0) had been pre-operatively imaged using a 3T T2w turbo-spin echo MRI post-chemoradiation. 78 first-order statistical, gray level, gradient, Haralick, and Gabor radiomic features were extracted from T2w volumes on a per voxel basis. Tumor extent was annotated on T2w images based on visual inspection by an expert radiologist. Our approach comprised of (1) computing statistics to describe feature values within each tumor annotation (median, variance, kurtosis, skewness, entropy), (2) ranking features using statistical analysis to identify significant differences between different groups of patients, and (3) clustering of the top 3 radiomic features to determine whether they differentiate pathologic T stage groupings.

RESULTS

Our cohort comprised 4 T stage groups: T0 (n = 7), T1-2 (n =11), T3 (n = 11), and T4 (n = 9). Scatterplots of top features in 3D space demonstrate excellent clustering of T0 vs T1-2 patients (89% accuracy) and T3 vs T4 patients (80% accuracy). The T2w intensity does not capture any differences between T0 vs T1-2 tumors and T3 vs T4 tumors. Top-ranked radiomic features comprised macro-scale Gabor operators which capture oriented filter responses indicative of sub-visual micro-architectural differences between different pathologic T stages.

CONCLUSION

Gabor radiomic features on T2w MRI appear to be predictive of pathologic T stage following neoadjuvant chemoradiation in patients with rectal cancer. This could help more definitively assess treatment response in these patients *in vivo*.

CLINICAL RELEVANCE/APPLICATION

Tumor stage is used for treatment response assessment in patients with rectal cancer, and radiomic features from post-chemoradiation MRI may be able to accurately identify pathologic T stage. These may be useful in predicting patient response to neoadjuvant treatment *in vivo* to help assist pre-operative planning.

SSM08-05 VEGFR2 Expression in Hepatocellular Carcinoma, Dysplastic and Regenerative Liver Nodules and Correlation with Pre-Biopsy Dynamic Contrast Enhanced CT

Wednesday, Nov. 30 3:40PM - 3:50PM Room: E353A

Participants
Wolfgang M. Thaiss, MD, Tuebingen, Germany (*Presenter*) Nothing to Disclose
Sascha Kaufmann, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Christopher Kloth, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Konstantin Nikolaou, MD, Tuebingen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG; Speakers Bureau, Bracco Group; Speakers Bureau, Bayer AG
Hans Bosmuller, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Marius Horger, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the distribution of Vascular Endothelial Growth Factor Receptor 2 (VEGFR2) in hepatocellular carcinoma (HCC), dysplastic (DN) and regenerative liver nodules (RLN) for possible group differentiation and to correlate the results with pre-histology, in vivo dynamic contrast enhanced CT (DCE-CT) data.

METHOD AND MATERIALS

Retrospective database search revealed 34 patients (63.6y, SD 8.9, 7 female) at our institution that underwent liver biopsy or surgery due to suspected HCC or dysplastic nodules after DCE-CT was performed between 2009 and 2015. Patients received no previous chemo- or interventional therapy. Immunohistochemistry for VEGFR2 was performed and the Immunoreactive Score (IRS) was used for staining quantification.DCE-CT was performed at 80 kVp with a 128-row CT scanner (Somatom Definition AS+), evaluation and ROI measurements were carried out using syngo Volume Perfusion CT Body (Siemens Healthcare). Blood flow, blood volume and hepatic perfusion index were assessed. One-way ANOVA with Tukey correction for group comparison and Pearson's r for correlations were used.

RESULTS

Histology confirmed HCCs (n = 10), DN (n = 7) and RLN (n = 34). Mean IRS for VEGFR2 in HCCs was 9.1 (SD 3.0), 7.3 (SD 1.6) for dysplastic nodules and 5.2 (SD 2.8) for regenerative liver nodules (p=0.0004 for HCC vs. RLN; p=0.06 for HCC vs. DN, not

significant).Perfusion values varied significantly between all three groups for blood flow and hepatic perfusion index ($p<0.001$ and $p<0.0001$) and for blood volume in HCC vs. RLN ($p<0.0001$) and DN vs. RLN ($p = 0.0019$).Strong correlations between VEGFR2-IRS and perfusion parameters were observed for blood flow in HCCs ($r = 0.88$, $p<0.01$) and hepatic perfusion index in HCCs and DN ($r = 0.85$, $p<0.04$; $r = 0.9$, $p<0.01$).

CONCLUSION

Immunostaining revealed different expression levels for VEGFR2 in HCCs, dysplastic liver nodules and regenerative liver nodules. Non-invasive perfusion assessment of HCC and its precursors is feasible using DCE-CT and perfusion markers blood flow, blood volume and hepatic perfusion index correlated well with VEGFR2-immunostaining.

CLINICAL RELEVANCE/APPLICATION

The strong correlations between DCE-CT perfusion parameters and the expression levels of VEGFR2 in immunohistochemistry propose new horizons in diagnosis and anti-VEGFR therapy monitoring in HCC and its precursors.

SSM08-06 CT Radiogenomic Characterization of ATRX and DAXX Alterations in Primary Pancreatic Neuroendocrine Tumors

Wednesday, Nov. 30 3:50PM - 4:00PM Room: E353A

Awards
Trainee Research Prize - Resident

Participants
Jonathan McGovern, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose
Aatur Singhi, MD, PhD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Amir Borhani, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Alessandro Furlan, MD, Pittsburgh, PA (*Abstract Co-Author*) Book contract, Reed Elsevier; Research Grant, General Electric Company
Herbert J. Zeh, MD, Johnstown, PA (*Abstract Co-Author*) Nothing to Disclose
Kevin M. McGrath, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Nathan Bahary, MD,PhD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Anil K. Dasyam, MD, Pittsburgh, PA (*Abstract Co-Author*) Book contract, Reed Elsevier

PURPOSE

To compare the computed tomography (CT) characteristics of primary pancreatic neuroendocrine tumors (PanNETs) in patients with and without loss of the death domain–associated protein (DAXX) or alpha thalassemia/mental retardation syndrome X-linked (ATRX) proteins. PanNETs with DAXX/ATRX alterations have previously been shown to be associated with poor prognosis.

METHOD AND MATERIALS

Institutional review board approval was obtained and the requirement for informed consent was waived for this retrospective study. In 186 subjects with pathology-proven PanNETs, contrast-enhanced multiphasic CTs were available in 127 and the remaining subjects were excluded. Of these 127 subjects, 33 were DAXX/ATRX-negative and 94 were DAXX/ATRX-positive. Two blinded reviewers evaluated preoperative multiphasic CTs in consensus for the following variables: Invasion of adjacent organs and vessels, the presence of cystic or necrotic degeneration, hepatic, osseous, or lymph node metastases, tumor calcification, objective and subjective tumor enhancement, lobulated/irregular or smooth contour, tumor size, and the presence of biliary or pancreatic ductal dilatation. Statistical analysis was performed using chi-squared tests or Student's t-tests.

RESULTS

Subjects with DAXX/ATRX-negative PanNETs were significantly more likely to have tumors which demonstrated vascular invasion ($p < 0.001$), hepatic or osseous metastases ($p < 0.001$), and pancreatic ductal dilatation ($p < 0.001$). Additionally, PanNETs associated with loss of DAXX/ATRX were larger in size (mean 51.5 mm, in comparison with 27.8 mm for wild-type tumors; $p < 0.001$), more likely to be irregular in contour ($p < 0.001$), and more likely to contain calcifications ($p < 0.007$). There was no significant difference between groups in invasion of adjacent organs, the presence of cystic or necrotic degeneration, biliary dilatation, metastatic lymphadenopathy, or in subjective or objective tumor enhancement.

CONCLUSION

PanNETs which harbor alterations in the DAXX or ATRX proteins demonstrate radiographic evidence of aggressive behavior, including vascular invasion, hepatic or osseous metastases, larger size, irregular contour, tumor calcification, and pancreatic ductal dilatation.

CLINICAL RELEVANCE/APPLICATION

Identification of imaging characteristics suggesting the presence of DAXX/ATRX alterations could guide pathologic diagnosis and have implications for clinical prognosis and management.

SSM09

Gastrointestinal (Small Bowel Imaging)

Wednesday, Nov. 30 3:00PM - 4:00PM Room: E353B

GI CT MR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Joel G. Fletcher, MD, Rochester, MN (*Moderator*) Grant, Siemens AG; ;
Seong Ho Park, MD, Seoul, Korea, Republic Of (*Moderator*) Research Grant, DONGKOOK Pharmaceutical Co, Ltd

Sub-Events

SSM09-01 Dual-Energy CT of Gastrointestinal Stromal Tumors: Impact of Noise-Optimized Virtual Monochromatic Imaging on Image Quality and Diagnostic Accuracy

Wednesday, Nov. 30 3:00PM - 3:10PM Room: E353B

Participants
Simon S. Martin, MD, Frankfurt, Germany (*Presenter*) Nothing to Disclose
Julian L. Wichmann, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Jan-Erik Scholtz, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Boris Bodelle, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Volkmar Jacobi, MD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Moritz H. Albrecht, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the impact of a noise-optimized algorithm for reconstruction of virtual monoenergetic images (VMI+) regarding detection and localization of abdominal gastrointestinal stroma tumors (GIST) on image quality and diagnostic accuracy in dual-energy CT (DECT).

METHOD AND MATERIALS

Arterial phase DECT images of 27 patients (15 men; 65.9±14.1 years) with GIST were reconstructed with standard linear blended (F_0.5), VMI+ and traditional monoenergetic (VMI) algorithm in 10-keV increments from 40 to 100 keV. Attenuation measurements were performed in GIST lesions and metastases for objective signal-to-noise (SNR) and contrast-to-noise ratio (CNR) calculation. Five-point scales were used to evaluate contrast enhancement and overall image quality. Diagnostic accuracy for the detection of GIST lesions and metastases was assessed in F_0.5, 70-keV VMI, 40-keV VMI+ and 60-keV VMI+ series and receiver operating characteristics (ROC) curve analysis was performed.

RESULTS

VMI+ series at 40-keV showed highest quantitative image parameters (SNR, 11.0±4.6; CNR, 9.2±4.5). Subjective assessment of vascular enhancement peaked in the 40-keV VMI and VMI+ series (both median, 5), whereas subjective overall image quality values were highest in 50-keV and 60-keV VMI+ series (both median, 5). Sensitivity and specificity for detection of GIST lesions and metastases were 96% and 91% for 40-keV VMI+, 90% and 87% for 60-keV VMI+, 88% and 87% for 70-keV for VMI, and 90% and 86% for F_0.5 reconstructions. Area under the curve (AUC) was significantly superior ($P \leq 0.039$) for 40-keV VMI+ (0.998) compared to 60-keV VMI+ (0.949), 70-keV VMI (0.939) and F_0.5 series (0.961).

CONCLUSION

Diagnostic accuracy in the detection of GIST lesions and metastases can be significantly increased using 40-keV VMI+ reconstructions compared with standard linearly blending and traditional VMI technique in arterial phase DECT.

CLINICAL RELEVANCE/APPLICATION

Noise-optimized virtual monoenergetic reconstruction (VMI+) can improve diagnostic accuracy for detection and localization of GIST lesions and metastases.

SSM09-02 -Radiation Dose Consideration with CT Enterography Exams in Adult IBD Patients: A Report on 246 Examinations

Wednesday, Nov. 30 3:10PM - 3:20PM Room: E353B

Awards
Student Travel Stipend Award

Participants
Khalid W. Shaqdan, MD, Boston, MA (*Presenter*) Nothing to Disclose
Rodrigo Canellas, MD, Cambridge, MA (*Abstract Co-Author*) Nothing to Disclose
Manuel Patino, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Avinash R. Kambadakone, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Onofrio A. Catalano, MD, Napoli, Italy (*Abstract Co-Author*) Nothing to Disclose
Dushyant V. Sahani, MD, Boston, MA (*Abstract Co-Author*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc

PURPOSE

This study evaluates filtered back projection (FBP) and iterative reconstruction (IR) algorithms on image quality and radiation dose

in adults undergoing CT enterography (CTE) exams.

METHOD AND MATERIALS

From Dec 2012 to Mar 2015, 246 portal venous phase CTE exams (5mm thickness) were performed in 240 patients (mean age = 43.4, mean bodyweight = 73 kg, male-female ratio=117:123). 122 CTE scans were processed using FBP, and 124 examinations were processed using IR (ASiR, n = 96 and SAFIRE, n = 28). 120 kVp (ATCM 75 - 450 mA) was applied in 218 exams and in 28 exams 100 kVp (Quality ref mAs 180) was used .Two readers independently reviewed 30 randomly sampled CTE for image quality, noise, and artifacts using 5-point scale. Size-specific-dose-estimates (SSDE) were compared and statistically analyzed. Objective noise and attenuation were also determined. Examinations were retrieved using dose-monitoring software (eXposure) to obtain SSDE, and ACR dose index registry was used to obtain benchmark radiation doses.

RESULTS

Diagnostic interpretations were rendered in all 246 exams. The diagnostic image quality (IQ) scores were high (mean IQ = 4.25) with comparable scores for FBP and IR images (FBP = 4.4 and IR = 4.2). IR image noise had lower noise (FBP = 22 and IR = 12.3), and higher CNR than FBP (FBP=1.9 and IR = 2.4). The median SSDE value (9.6 mGy) was 30% lower than the benchmark reported value in ACR dose index registry (13.9 mGy). The mean SSDE was lower for IR (FBP = 8.6 mGy and IR = 7.4 mGy) and higher dose reduction in patients weighing ≤90 kg (FBP = 9.7 mGy and IR = 8.7 mGy) over those weighing > 90kg (FBP = 12.3 and IR = 11.9).

CONCLUSION

CTE exams in adults had 30% lower dose than the benchmark and studies performed with IR produces diagnostically adequate image quality when compared to FBP at a lower radiation dose especially in those with average to smaller body weight.

CLINICAL RELEVANCE/APPLICATION

CTE is often preferred exam in evaluation of IBD patients for both diagnosis and disease monitoring, therefore accumulation of radiation is a concern since patients are often young and will require serial studies. With a combination of low-dose techniques and IR methods, one can markedly reduce radiation dose at CTE while maintaining diagnostic accuracy.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Dushyant V. Sahani, MD - 2012 Honored Educator
Dushyant V. Sahani, MD - 2015 Honored Educator
Dushyant V. Sahani, MD - 2016 Honored Educator

SSM09-03 Correlation of MRI Features and MRI Activity Scoring Systems to Hisopatholgy in The Terminal Ileum in Crohn's Disease

Wednesday, Nov. 30 3:20PM - 3:30PM Room: E353B

Participants
Carl A. Puylaert, MSc, Amsterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Charlotte J. Tutein Nolthenius, MD, Amsterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Jeroen Tielbeek, MD, Amsterdam, Netherlands (*Presenter*) Nothing to Disclose
Frans M. Vos, PhD, Amsterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Stuart A. Taylor, MBBS, London, United Kingdom (*Abstract Co-Author*) Research Consultant, Robarts Clinical Trials, Inc
Jaap Stoker, MD, PhD, Amsterdam, Netherlands (*Abstract Co-Author*) Research Consultant, Robarts Clinical Trials

PURPOSE

To evaluate several magnetic resonance imaging (MRI) activity scoring systems for diagnosis and grading of Crohn’s disease (CD) in the terminal ileum (TI) as compared to histopathology.

METHOD AND MATERIALS

Ethics approval and written informed consent were obtained prior to inclusion, Suspected/proven CD were prospectively included from December 2011 until August 2014. Each patient underwent MR enterography (MRE) and ileocolonoscopy with standardized TI biopsies within two weeks time. The TI at MRE was evaluated by two observers for individual disease features on MRI,based on which four MRI scoring systems (CDMI, London, MaRIA and Clermont) were calculated. MRI features and scoring systems were correlated to the histopathological eAIS score (0–6). Reproducibility and diagnostic accuracy were evaluated by the weighted kappa and intraclass coefficient (ICC).

RESULTS

A total of 114 patients (mean age 31 years; female 55%) were included. Enhancement, length, perimural T2 signal, apparent diffusion coefficient (ADC) and relative contrast enhancement (RCE) showed good reproducibility (ICC: 0.6–0.8). Wall thickness, mural T2 signal, pattern and degree of enhancement, mural edema, length and ADC showed moderate correlation to eAIS (r=0.40-0.60), while other individual features showed no or poor correlation (r<0.40). All four scoring systems showed moderate correlation to eAIS and good reproducibility. CDMI showed the highest correlation to eAIS (r=0.52–0.57) and highest agreement (ICC=0.78), although the difference was not significant. Diagnostic accuracies for scoring systems ranged from 74–77% for observer 1 and from 69–72% for observer 2. Reproducibility, correlation coefficients and diagnostic accuracy did not differ significantly between the scoring systems.

CONCLUSION

For all four scoring systems reproducibility, correlation to the histopathological reference standard and diagnostic accuracy were comparable. Therefore, the choice for usage may be based on other aspects such as personal preference, experience and practical considerations.

CLINICAL RELEVANCE/APPLICATION

Four MRI scoring systems (CDMI, London, MaRIA and Clermont) are comparable for diagnosis and grading of CD activity and show similar reproducibility; preference can be based on other aspects.

SSM09-04 Bowel Inflammatory Severity of Non-stricturing Crohn Disease on MR Enterography: Can DWI Modify MaRIA Score System for Improved Quantitative Assessment?

Wednesday, Nov. 30 3:30PM - 3:40PM Room: E353B

Participants
Jin Sil Kim, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hye Young Jang, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seong Ho Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, DONGKOOK Pharmaceutical Co, Ltd
Kyunghwa Han, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ah Young Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Magnetic Resonance Index of Activity (MaRIA) is a score system developed before use of DWI to measure bowel inflammatory severity of Crohn disease (CD) on MR enterography (MRE). Its validation results diverged and interpretation of “ulcer” in the score system seems to cause inconsistency. This study is to determine whether DWI can modify and add to MaRIA for improved quantitative assessment of bowel inflammation.

METHOD AND MATERIALS

Fifty consecutive adults suspected of CD underwent MRE and ileocolonoscopy within 1 week. MRE including DWI (b=900 s/mm²) was performed after oral administration of 1500 mL 2.5% sorbitol over a prolonged time (80 min) to achieve good fluid distention of both the small bowel and the right-sided colon. Endoscopy recorded inflammatory activity according to CD endoscopic index of severity (CDEIS) to serve as reference standard. Excluding final non-CD diagnoses, technical failure, and unobtainable reference standard, 79 segments (39 terminal ilea and 40 right-sided colons) in 42 patients (M:F, 33:9; 27±6.2 years) were analyzed. MaRIA score and modified (m) MaRIA score, in which the original "ulcer" (presence vs. absence) was replaced with DWI grades (0–2), were obtained by three random independent readers. MaRIA and mMaRIA were compared regarding their correlation with CDEIS, accuracies for diagnosing active (CDEIS>=3) and severe (CDEIS>=12) inflammation, and interobserver agreement. Additionally, it was determined whether DWI was an independent factor to predict CDEIS when adjusted for MaRIA.

RESULTS

Both MaRIA and mMaRIA correlated strongly with CDEIS without statistically significant difference between them: r=0.737 (95% CI, 0.652–0.810) and 0.742 (0.651–0.816), respectively (p=.387). ROC areas were not significantly different between MaRIA and mMaRIA for diagnosing active inflammation, 0.908 vs. 0.904 (p=.814), and severe inflammation, 0.901 vs. 0.886 (p=.485). Intraclass correlation coefficient among the three readers was significantly higher for mMaRIA than for MaRIA, 0.841 vs. 0.697 (p<.001). DWI grade was not independently correlated with CDEIS when adjusted for MaRIA (β=3.22; p=.076).

CONCLUSION

mMaRIA (ulcer replaced with DWI grades) could significantly improve interobserver agreement; however, DWI did not independently contribute to predict CDEIS when adjusted for MaRIA.

CLINICAL RELEVANCE/APPLICATION

mMaRIA incorporating DWI enables to assess bowel inflammatory severity of CD more consistently across readers.

SSM09-05 Value of MRI for Prediction of Histopathologic features of Ileal Crohn's Disease

Wednesday, Nov. 30 3:40PM - 3:50PM Room: E353B

Participants
Mathilde Wagner, MD, PhD, Paris, France (*Presenter*) Consultant Olea Medical
Makel Ko, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Manjil Chatterji, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Xiaofei Zhang, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Joana Torres, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Noam Harpaz, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Bachir Taouli, MD, New York, NY (*Abstract Co-Author*) Consultant, MEDIAN Technologies ; Grant, Guerbet SA

PURPOSE

To assess the value of magnetic resonance enterography (MRE) including diffusion-weighted imaging (DWI) for characterization of histopathologic tissue composition of small bowel Crohn’s disease (CD) strictures.

METHOD AND MATERIALS

During a one-year period, consecutive patients with ileal CD and ileal strictures who underwent small bowel resection and a preoperative contrast-enhanced MRE exam including DWI within one month before surgery were retrospectively included. Pattern, degree of enhancement, presence of ulcerations, fistulas, abscesses and stenotic lesions were assessed by 3 radiologists in consensus. One of the radiologists performed a quantitative analysis in strictured small bowel segments: wall thickness (mm) on T2 HASTE and T1 fat sat, enhancement ratios (ER) on contrast-enhanced images (ER=[(signal intensity (SI) post - SI pre)/SI pre] x100%), mean apparent diffusion coefficient (ADC) and computed the MaRIA score. A pathologist assessed the degree of inflammation using a 3-point scale. Smooth muscle actin (SMA) and Sirius red (SR) immunostains were performed, quantified using morphometry and normalized by the length of the involved segment. The ratio of the two normalized staining (=SMA/SR) was computed.

RESULTS

35 patients with CD (M/F: 17/18, mean age 33y) were included. The mean delay between MRE and surgery was 10.6 days (1-30).

40 ileal segments were analyzed. Layered pattern at early post-contrast phase was more frequent with marked inflammation (P=0.015). Mean ADC was significantly lower in inflammation grade 2-3 compared to grade 1 (1.07±0.14 vs. 1.28±0.27 10-3 mm2/s, P=0.028). MaRIA score was significantly higher in grade 2-3 than in grade 1 (30±9 vs. 23±8, P=0.013). Weak but significant correlations were found between inflammation grade and ADC/MaRIA score (r -0.388/0.376, P<0.021). Maria score and wall thickness on T1 were correlated with SMA staining (r 0.514/0.378, P<0.016). The wall thickness on T2 was correlated with the ratio (r 0.368, P=0.019) and was significantly higher in strictures with predominant muscle hypertrophy (P=0.037).

CONCLUSION

MRI parameters can predict tissue composition of stricturing ileal CD. These findings need to be verified in a prospective study.

CLINICAL RELEVANCE/APPLICATION

Quantitative MRI can potentially be used to predict tissue composition of ileal stricturing CD, and can potentially be used for treatment response.

SSM09-06 MR Enterography for the Evaluation of Anastomosis Status In Crohn Disease: A Double-institutional Retrospective Study

Wednesday, Nov. 30 3:50PM - 4:00PM Room: E353B

Participants
Chiara Pozzessere, MD, Siena, Italy (*Presenter*) Nothing to Disclose
Maria A. Mazzei, MD, Siena, Italy (*Abstract Co-Author*) Nothing to Disclose
Luca Volterrani, Siena, Italy (*Abstract Co-Author*) Nothing to Disclose
Alfredo Cirigliano, siena, Italy (*Abstract Co-Author*) Nothing to Disclose
Raphael Dautry, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Youcef Guerrache, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Paul Bazeries, Angers, France (*Abstract Co-Author*) Nothing to Disclose
Giulia Fiorilli, Siena, Italy (*Abstract Co-Author*) Nothing to Disclose
Carla Vindigni, Siena, Italy (*Abstract Co-Author*) Nothing to Disclose
Philippe A. Soyer, MD, PhD, Paris, France (*Abstract Co-Author*) Consultant, Guerbet SA;
Mourad Boudiaf, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Anastomosis strictures after ileocolic resection are common in Crohn disease (CD) and differentiating between inflammatory recurrence from fibrotic alteration is challenging for the clinical management. The aim of the study was to evaluate Magnetic Resonance Enterography (MRE) in characterizing the anastomosis status in patients with Crohn disease who had previously undergone ileocolic resection and, in particular, in differentiating between inflammatory recurrence from fibrotic alterations.

METHOD AND MATERIALS

Informed consent was obtained for all patients. From two different institutions, sixty-three consecutive MREs, of patients with CD who had previously undergone ileocolic resection were retrospectively and independently analyzed by two readers. The results were compared to the endoscopic findings. Interobserver agreement was calculated. Correlations between MRE findings and anastomotic status were evaluated at univariate analysis. A P value ≤0.05 was considered statistically significant.

RESULTS

Inter-observer agreement was good (k=0.8). At univariate analysis, wall thickening, restricted diffusion and wall enhancement were the most discriminating variables between normal and abnormal anastomosis (P<0.001). Greater wall thickening (>6mm), wall stratification, greater degree (moderate to severe) of restricted diffusion, greater degree (moderate to severe) of wall enhancement and layered enhancement pattern were the most discriminating variables between inflammatory recurrence and fibrotic strictures (P<0.001).

CONCLUSION

In this double-institutional retrospective study, MRE could differentiate between normal and abnormal anastomosis and, in the abnormal cases, between inflammatory recurrence and fibrotic strictures.

CLINICAL RELEVANCE/APPLICATION

MRE is useful for anastomosis status evaluation in patients with CD who underwent ileocolic resection and, in particular, it can differentiate between inflammatory recurrence and fibrotic alterations.

SSM23

Vascular Interventional (Gastrointestinal Interventions)

Wednesday, Nov. 30 3:00PM - 4:00PM Room: E450B

GI IR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 0

FDA Discussions may include off-label uses.

Participants
Hyeon Yu, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose
Naganathan B. Mani, MD, Chesterfield, MO (*Moderator*) Nothing to Disclose

Sub-Events

SSM23-01 Minimally Invasive Low Voltage Pulsed Electric Fields of the Fundus of the Stomach as a Weight-loss Intervention

Wednesday, Nov. 30 3:00PM - 3:10PM Room: E450B

Participants
Rahmi Oklu, MD, PhD, Scottsdale, AZ (*Presenter*) Nothing to Disclose
Hassan Albadawi, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of this study was to examine whether low voltage electric fields can ablate enteroendocrine cells--the cells that make ghrelin as well as other hormones in the fundus of the stomach that could be important in the regulation of body weight.

METHOD AND MATERIALS

16 week old diet-induced obese (DIO) C57BL/6J mice and their aged matched control mice were treated with 60, 90, 120 and 150 volts per mm delivered at 1 hertz for a total of 100 pulses with each pulse lasting 60-80 microseconds. In the treated group, a 10 mm tweezertrode was used to deliver the pulsed electric fields to the glandular part of the stomach. Animals in both groups were subsequently observed daily for weight and food-intake while on high fat diet. At 3 days and at 10 days, the stomach was removed and processed for histology, immunohistochemistry and Western blotting. Sequential five-micron sections were immunostained for ghrelin, myeloperoxidase and smooth muscle actin. Images of these immunostained slides were then analyzed to estimate proportion of ghrelin positive cells and myeloperoxidase positive cells in the treated segments compared to the untreated segments. Additionally, estimated volume of smooth muscle layer in the stomach wall was measured in both treated and untreated segments. Western blots were performed to quantitate ghrelin levels.

RESULTS

Electric field treatment with 120 volts per mm produced the best results in the sections examined. The ablated zone in these mice demonstrated nearly complete absence of ghrelin positive cells when compared to the sham and non-treated segments of the stomach ($P<0.05$); this was consistent with ghrelin Western blotting ($P<0.05$). The ablated zone revealed histologic signs of inflammation, however, there was preservation of the lamina propria and the longitudinal and circumferential smooth muscle cell layers remained intact. While on high-fat diet, the control groups gained 6±2.4gr, and the treated mice lost -2±1.1gr ($P<0.05$).

CONCLUSION

In this feasibility study, low voltage electric fields applied to the stomach are safe and can be used to selectively ablate enteroendocrine cells in the fundus of the stomach to cause weight loss.

CLINICAL RELEVANCE/APPLICATION

The obesity epidemic is one of the primary causes of morbidity and mortality. The need for a safe, cost-effective, and minimally invasive intervention is of paramount importance given the massive scope of this epidemic.

SSM23-02 Partially-Covered Stent Placement versus Surgical Gastrojejunostomy for the Palliation of Malignant Gastroduodenal Obstruction Secondary to Pancreatic Cancer

Wednesday, Nov. 30 3:10PM - 3:20PM Room: E450B

Participants
Jiaywei Tsauo, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ho-Young Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kun Yung Kim, MD, Jeonju-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung-Hoon Park, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Jung Jun, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Min Tae Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the outcomes of partially-covered self-expandable metallic stent (SEMS) placement with surgical gastrojejunostomy (GJ) in patients with gastroduodenal obstruction caused by pancreatic cancer.

METHOD AND MATERIALS

The medical records of 107 patients with gastroduodenal obstruction caused by pancreatic cancer who underwent fluoroscopic partially-covered SEMS placement (n = 75) or surgical GJ (n = 32) at our institution were reviewed.

RESULTS

The technical (100% vs. 100%; P > 0.999) and clinical (98.7% vs. 96.9%; P = 0.511) success rates were similar between the SEMS and GJ group. The mean GOOSS score was higher in the SEMS group at 1 week after treatment (2.3 ± 0.5 vs. 1.2 ± 0.4; P < 0.001) but was similar between the two groups at 1 month (2.7 ± 0.5 vs. 2.8 ± 0.5; P = 0.242). The median hospital stay was shorter in the SEMS group than in the GJ group (7 days vs. 14 days; P < 0.001). The overall complication (22.7% vs. 28.1%; P = 0.547) and reintervention (21.3% vs. 25.0%; P = 0.677) rates were similar between the two groups. The median patency (99 days vs. 138 days; P = 0.102) and survival (106 days vs. 140 days; P = 0.245) were also similar between the two groups.

CONCLUSION

The outcomes of partially-covered SEMS placement seem to be more favorable than surgical GJ in patients with gastroduodenal obstruction caused by pancreatic cancer.

CLINICAL RELEVANCE/APPLICATION

Partially-covered SEMS placement has similar technical and clinical success, complication, and reintervention rates compared with surgical GJ Partially-covered SEMS placement is more advantageous than surgical GJ with regard to the time to restore oral intake and length of hospital stay. Partially-covered SEMS placement has similar patency and survival compared with surgical GJ

SSM23-03 Radiation-Induced Esophageal Strictures Treated with Fluoroscopic Balloon Dilation: Long-term Clinical Outcomes and Factors Influencing Recurrence in 62 Patients

Wednesday, Nov. 30 3:20PM - 3:30PM Room: E450B

Participants
Kun Yung Kim, MD, Jeonju-Si, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ho-Young Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung-Hoon Park, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young Chul Cho, BS, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jiaywei Tsauo, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Jung Jun, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Min Tae Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the long-term outcomes of balloon dilation in patients with radiation-induced esophageal stricture (RIES) and to identify factors associated with its recurrence.

METHOD AND MATERIALS

A retrospective study was performed in a single, tertiary-referral, university hospital in 62 consecutive patients who had undergone fluoroscopic balloon dilation for RIES between December 1998 and December 2015. The outcomes were assessed with reference to the following variables: success rates; complications; procedural details, recurrence, patency; and survival. Univariate and multivariate Cox proportional hazards regression analyses was performed to identify independent predictors of recurrence.

RESULTS

120 balloon dilation sessions were performed in 62 patients (mean, 1.9 sessions per patient; range, 1 to 15 sessions). During the follow-up period (mean, 38.1 months; range, 2.2 to 156 months), clinical success was achieved in 53 (85.5%) patients after single (n = 37) or multiple (n = 16) dilation sessions. Complications occurred in 26.7% of the dilation sessions with 2 cases requiring invasive treatment. The primary patency rates at 1, 2, 3, and 5 years were 60%, 56%, 52%, and 52%, respectively. Secondary patency rates at 1, 2, 3, and 5 years were 87%, 85%, 85%, and 80%, respectively. Multivariate logistic regression analysis identified an interval from radiation therapy (RT) to stricture of ≥ 6 months (hazard ratio [HR], 0.205; P < 0.001), strictures located at the cervical esophagus (HR, 5.846; P < 0.001), and stricture length of ≥ 2 cm (HR, 2.923; P = 0.006) as significant predictors of recurrence.

CONCLUSION

Balloon dilation is safe and effective for treating RIES, with favorable long-term outcomes. An interval from RT to stricture of ≥ 6 months, strictures located at the cervical esophagus, and stricture length of ≥ 2 cm appear to be associated with recurrence.

CLINICAL RELEVANCE/APPLICATION

Fluoroscopic balloon dilation is valuable as an initial therapeutic option and relatively simple, safe, and easy procedure for patients with RIES.

SSM23-04 Fluoroscopic Removal of Retrievable Self-Expandable Metal Stents in Patients with Malignant Esophageal Strictures: Using Three Different Removal Techniques

Wednesday, Nov. 30 3:30PM - 3:40PM Room: E450B

Participants
Min Tae Kim, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ho-Young Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung-Hoon Park, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Pyeong Hwa Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kun Yung Kim, MD, Jeonju-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jiaywei Tsauo, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung-hwan Yoon, SEOUL, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate clinical outcomes of fluoroscopic removal of retrievable self-expandable metal stents (SEMSs) for malignant esophageal strictures, to compare clinical outcomes of three different removal techniques, and to identify predictive factors of successful removal by standard technique (primary technical success).

METHOD AND MATERIALS

137 stents were removed in 128 patients with malignant esophageal strictures. Primary, overall technical success, removal-related complications were evaluated. Logistic regression models were constructed to identify predictive factors of primary technical success.

RESULTS

Primary technical success rate was 78.8% (108/137). Complications occurred in six (4.4%) cases. Stent location in the upper esophagus (P=0.004), stricture length over 8 cm (P=0.030), and the proximal granulation tissue (P<0.001) were negative predictive factors of primary technical success. If the proximal granulation tissue existed, eversion technique was more frequently used (P=0.002).

CONCLUSION

Fluoroscopic removal of retrievable SEMSs for malignant esophageal strictures using three different removal techniques appeared to be safe and easy. Standard technique is safe and effective in majority of patients. The proximal granulation tissue, stent location in the upper esophagus, and stricture length over 8 cm were negative predictive factors of primary technical success.

CLINICAL RELEVANCE/APPLICATION

Fluoroscopic removal of retrievable SEMSs using three different removal techniques is safe and easy in patients with malignant esophageal strictures.

SSM23-05 Efficacy and Safety of A Newly Designed, Externally Full Covered Self-expandable Metallic Stent with Anti-migration Feature for the Treatment of Malignant and Benign Esophageal Strictures

Wednesday, Nov. 30 3:40PM - 3:50PM Room: E450B

Participants
Kun Yung Kim, MD, Jeonju-Si, Korea, Republic Of (*Presenter*) Nothing to Disclose

PURPOSE

The purpose of this study was to investigate the efficacy and safety of the new self-expandable metallic stent (SEMS) for the treatment of malignant and benign esophageal strictures.

METHOD AND MATERIALS

With approval from our institutional review board, the records of 81 patients who underwent the new externally full covered SEMS placement in esophagus between October 2010 and June 2015 were retrospectively reviewed. The stent has a double step flange at each end to prevent stent migration and has a externally covered membrane to prevent membrane separation. Data were retrospectively reviewed for patient characteristics, technical and clinical success, stent dysfunction, survival, and complications were analyzed.

RESULTS

Technical and clinical success was achieved in all patients (100%). The dysphagia score improved from 3.3 ± 0.6 to 1.1 ± 0.7 after treatment (P < 0.001). In malignant strictures, stent dysfunction occurred in 14 patients (20.0%): migration in five (7.1%), tumor overgrowth in eight (11.4%), and food impaction in one (1.4%). In benign strictures, stents dysfunction occurred in 5 patients (45.5%): migration in four (36.4%), tissue granulation in 1 (9.1%). The major complication occurred in 6 patients (8.6%) with malignant strictures and 1 patient (9.1%) with benign strictures, including aspiration pneumonia (n=4), tracheoesophageal fistula (n=2), intractable vomiting (n=1). There was no membrane separation in both groups. The median survival was 135 days in malignant strictures, and was 670 days in benign strictures. Patients within benign group had a longer survival, but had higher stent migration rate than those on malignant group (P < 0.05).

CONCLUSION

The new stent was safe and effective for the palliation of malignant esophageal strictures, and resulted in relatively low migration and tumor overgrowth rates compared to those reported previously. Also, it could be a treatment option in refractory benign stricture, but stent migration rate was relatively high.

CLINICAL RELEVANCE/APPLICATION

Double step flange and externally covered membrane design in new stent could contribute solving problems what the current stent has.

SSM23-06 Fluoroscopic Balloon Dilation for the Treatment of Adhesive Small Bowel Obstruction: A 15-Year Single Institution Experience

Wednesday, Nov. 30 3:50PM - 4:00PM Room: E450B

Participants
Jiaywei Tsauo, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ho-Young Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kun Yung Kim, MD, Jeonju-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung-Hoon Park, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Jung Jun, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Min Tae Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the safety and effectiveness of fluoroscopic balloon dilation (FBD) for the treatment of adhesive small bowel obstruction (ASBO).

METHOD AND MATERIALS

Data of 44 patients (Sex, 26 males and 18 females; mean age, 53.7 ± 13.0 years) treated for ASBO with FBD at our institution

Data of 44 patients (Sex, 26 males and 18 females; mean age, 55.7 ± 13.0 years) treated for ASBO with FBD at our institution between January 2000 and February 2016 were obtained from a prospectively maintained electronic database.

RESULTS

Technical success was achieved in 39 (88.6%) patients. Thirty-five (79.5%) patients had partial obstruction and nine (20.5%) had complete obstruction. The mean length of the stricture was 3.0 ± 1.8 cm. The median procedure time was 32.0 minutes (interquartile range [IQR], 21-47 minutes). Technical failure due to inability to negotiate the guidewire through the stricture occurred in five (13.6%) patients. Clinical success was achieved in 34 (87.2%) patients after one (n = 32) or two (n=2) sessions of FBD. There were no major complications directly related to FSP. The median hospital stay was 11 days (IQR, 4-19 days). The median follow-up period was 1406 days (IQR, 594-2236 days). Recurrence occurred in nine (26.5%) patients in a median time of 47 days (IQR, 20-212 days). Eight (23.5%) patients died of comorbid conditions in a median time of 346 days (IQR, 202-703 days).

CONCLUSION

FBD appears to be safe and effective for the treatment of ASBO. However, recurrence seems to be a major drawback of FBD in ASBO treatment. Future prospective studies are warranted to determine the role of FBD in the management of ASBO.

CLINICAL RELEVANCE/APPLICATION

FBD appears to be safe and effective for the treatment of ASBO. Recurrence seems to be a major drawback of FBD in ASBO treatment. Future prospective studies are warranted to determine the role of FBD in the management of ASBO.

ED005-TH

Gastrointestinal Thursday Case of the Day

Thursday, Dec. 1 7:00AM - 11:59PM Room: Case of Day, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

Participants

Christine M. Peterson, MD, Hummelstown, PA (*Presenter*) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Constantine A. Raptis, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Rex A. Parker III, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Elizabeth B. Maddox, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Christopher Molloy, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Andrew P. Robbins, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Andrew L. Warren, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Vincent M. Mellnick, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Oscar Garcia-Fraga, MD, Hershey, PA (*Abstract Co-Author*) Nothing to Disclose
Kelly Tung, MD,MS, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) Each GI case of the day will be taken from disorders of the luminal GI tract as well as the liver, spleen, pancreas, and biliary system. The findings may be uncommon manifestations of common diseases or common manifestations of uncommon diseases.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Perry J. Pickhardt, MD - 2014 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator

RC609

Imaging Pancreatic Diseases

Thursday, Dec. 1 8:30AM - 10:00AM Room: N228

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC609A Pancreatic Cancer

Participants
Eric P. Tamm, MD, Houston, TX, (etamm@mdanderson.org) (*Presenter*) Institutional Research Grant, General Electric Company

LEARNING OBJECTIVES

1) Understand the current status of staging pancreatic cancer, the impact of cross-sectional imaging on staging, and understand the category of "borderline resectable pancreatic cancer." 2) Appreciate the impact of advances in vascular reconstruction surgery on staging and surgical planning. 3) Have a basic understanding of neoadjuvant therapy, and its impact on staging.

ABSTRACT

Because of recent advances in surgical trechnique and preoperative therapy, it has become useful for clinicians to group pancreatic cancer into categories useful for clinical trials and treatment management. Besides the clearly resectable, and clearly unresectable tumors, there has emerged the category of "borderline" resectable pancreatic cancer. Classifying patients into these three categories is dependent on precise descriptions of the extent of tumor, particularly vascular involvement, as seen on cross sectional imaging. These descriptions also depend on the use of commonly understood terminology. Understanding and appreciating new surgical techniques, advances in preoperative therapy and how this has impacted margin positivity, and therefore why it is important to describe accurately and clearly tumor involvement and how best to do that will be the focus of this lecture.

RC609B Cystic Pancreatic Tumors

Participants
Temel Tirkes, MD, Indianapolis, IN, (atirkes@iupui.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Classify cystic pancreatic tumors. 2) Describe the common and uncommon imaging patterns that allow differentiation of cystic pancreatic tumors. 3) Debate the role of imaging modalities in determining options for patient management.

ABSTRACT

MRI with MRCP has high sensitivity and moderate specificity for diagnosis of cystic neoplasms. Due to overlapping imaging features, specificity and inter-observer agreement is not very high. MRCP is useful for differentiating side-branch IPMNs from other pancreatic cysts such as MCNs which carries a higher malignant potential. Making this distinction can be very helpful in the management of the cystic neoplasms.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Temel Tirkes, MD - 2013 Honored Educator
Temel Tirkes, MD - 2014 Honored Educator

RC609C Acute Pancreatitis

Participants
Riccardo Manfredi, MD, Verona, Italy, (riccardo.manfredi@univr.it) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the working party classification of acute pancreatitis. 2) Appreciate the difference between peripancreatic and pancreatic necrosis. 3) Have an understanding of how imaging findings affect endoscopic and surgical management of severe acute pancreatitis.

ABSTRACT

Acute pancreatitis is an inflammatory disease of the pancreas. The diagnosis is achieved by means of clinical symptoms and confirmed by increased levels (X≥3) of amylase and lipase. Pancreatic injury is mild in 80% of patients, who recover without complications. The remaining patients have a severe disease with local and systemic complications. Gallstone migration, into the common bile duct, and alcohol abuse are the most frequent causes of pancreatitis in adults.The role of diagnostic imaging is to assess the severity of the disease, both in the early and the late phase, according to the revised criteria of Atlanta Classification, and According. Diagnostic imaging is also helpful in treatment planning: in mild forms supportive therapy is sufficient, whereas in

severe episodes management need to be decided by a multidisciplinary team including gastroenterologists, interventional radiologists, intensivists, and surgeons.

Handout:Riccardo Manfredi

http://abstract.rsna.org/uploads/2016/15001862/Acute Pancreatitis RSNA 2016.pdf

RC609D Autoimmune Pancreatitis

Participants
Joel G. Fletcher, MD, Rochester, MN (*Presenter*) Grant, Siemens AG; ;

LEARNING OBJECTIVES

1) To review the diagnostic criteria for autoimmune pancreatitis. 2) To discuss the differences between Type 1 and Type 2 autoimmune pancreatitis. 3) To understand the temporal changes and morphologic patterns of contrast enhancement in autoimmune pancreatitis. 4) To describe imaging features relating to the pancreatic and intrahepatic ducts, and periductal parenchyma, in autoimmune pancreatitis that may distinguish it from cancer, chronic pancreatitis, or PSC. 5) To describe non-diagnostic but other frequently seen imaging findings of autoimmune pancreatitis. 6) To illustrate imaging findings demonstrating response to treatment in autoimmune pancreatitis, as well as recurrence after initial remission.

RC629

Hepatocellular Carcinoma in the Cirrhotic Liver and LI-RADS (An Interactive Session)

Thursday, Dec. 1 8:30AM - 10:00AM Room: S402AB

GI MR OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC629A LI-RADS Overview: Current Status and Future Directions

Participants
Cynthia S. Santillan, MD, San Diego, CA, (csantillan@mail.ucsd.edu) (*Presenter*) Consultant, Robarts Clinical Trials, Inc

LEARNING OBJECTIVES

1) To teach participants how to apply the Liver Imaging Reporting and Data System (LI-RADS) to their interpretation of imaging studies for the evaluation of hepatocellular carcinoma in at-risk patients. 2) To inform radiologists about the various online resources available via the ACR LI-RADS website, including an atlas, lexicon, reporting templates, and flashcards. 3) To update radiologists about future content in LI-RADS, including ultrasound and treatment response assessment guidelines.

ABSTRACT

RC629B LI-RADS Imaging Features: What´s the Evidence?

Participants
An Tang, MD, Montreal, QC, (an.tang@umontreal.ca) (*Presenter*) Advisory Board, Imagia Cybernetics Inc

LEARNING OBJECTIVES

1) To review the major and ancillary CT and MRI features used in LI-RADS categorization for assessment of hepatocellular carcinoma (HCC). 2) To highlight the scientific literature supporting the major imaging features and criteria. 3) To summarize the evidence supporting ancillary features.

ABSTRACT

The Liver Imaging Reporting and Data System (LI-RADS) relies on major and ancillary CT and MRI features to categorize observations for assessment of hepatocellular carcinoma (HCC). The major features include arterial phase enhancement, diameter, "washout" appearance, "capsule" appearance and threshold growth. In this course, we will discuss the scientific literature supporting the major imaging features. This will include estimates of diagnostic performance, and intra- and inter-reader agreement. LI-RADS also includes ancillary imaging features that modify the likelihood of HCC. We will provide a brief overview of the evidence supporting these ancillary features. We will summarize the current literature on probability of HCC for each LI-RADS observation category.

RC629C LI-RADS and Hepatobiliary Agents

Participants
Kathryn J. Fowler, MD, Chesterfield, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To provide an overview of LI-RADS content that refers to hepatobiliary contrast agents. 2) To review the ancillary features that are described with hepatobiliary contrast agents. 3) To present case examples to illustrate the role of hepatobiliary contrast agents in the diagnosis of hepatocellular carcinoma.

ABSTRACT

Hepatobiliary contrast agents are routinely used in practice for diagnosing and staging HCC. Despite the potential diagnostic benefits, the role of hepatobiliary phase imaging has not been well defined in diagnostic algorithms. LI-RADS provides information on the use of these agents, their role in diagnosis, and potential pitfalls. The aim of this presentation is to provide an overview of hepatobiliary content included in the current version of LI-RADS.

RC629D Interactive Cases

Participants
Thomas A. Hope, MD, San Francisco, CA, (thomas.hope@ucsf.edu) (*Presenter*) Research Grant, Consultant, GE Healtcare

LEARNING OBJECTIVES

1) To understand how to apply LI-RADS major criteria for the diagnosis of HCC. 2) To review the role of LI-RADS M and LI-RADS 5V in the LI-RADS algorithm 3) To reinforce the use of LI-RADS through a series of multiple case examples.

ABSTRACT

SSQ06

Gastrointestinal (MRI Techniques and Contrast Media)

Thursday, Dec. 1 10:30AM - 12:00PM Room: E350

GI MR SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Scott B. Reeder, MD, PhD, Madison, WI (*Moderator*) Institutional research support, General Electric Company Institutional research support, Bracco Group
Jason A. Pietryga, MD, Riverside, RI (*Moderator*) Nothing to Disclose

Sub-Events

SSQ06-01 The Value of Magnetic Resonance Elastography in Differential Diagnosis Between Benign Malignant Focal Liver Tumor

Thursday, Dec. 1 10:30AM - 10:40AM Room: E350

Participants
Kan Liu, MD, beijing, China (*Presenter*) Nothing to Disclose
Han Ouyang, MD, Bejing, China (*Abstract Co-Author*) Nothing to Disclose
Chunwu Zhou, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xinming Zhao, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine magnetic resonance elastography for differentiating malignant and benign focal liver tumor.

METHOD AND MATERIALS

Imaging was performed on a 3.0-T clinical MR scanner equipped with a 32-element phased-array torso coil. Ninety patients were subjected to conventional plain scan and dynamic contrast-enhanced imaging (DCE) as well as magnetic resonance elastography (MRE). The MR elastography were acquired by using 60-Hz mechanical waves and two-dimensional Spin echo echo planar sequence (2D-SE-EPI). Elastogram was generated in an automated process consisting of an inversion algorithm. The stiffness value was measured in the elastogram of 86 tumors after exclusion of cyst, histopathologically undetermined or examination failed cases. Mann-Whitney U test and receiver-operating characteristic curve were performed on the stiffness values for differentiation of 41malignant tumors (24 hepatocellular carcinoma, 10 cholangiocarcinoma, 2 combined hepatocellular and cholangiocarcinoma,1 sarcomatoid carcinoma, 4 metastatic lesions) and 45 benign tumors(28 hemangiomas, 16 focal nodular hyperplasia, and 1 angiomyolipoma) .

RESULTS

Malignant focal liver tumors had significantly greater mean shear stiffness than benign focal liver tumor (7.64 ±2.4kPa vs 3.8 ±1.6kPa), they have statistically significant difference($p<0.01$).The area under the receiver-operating characteristic curve is 0.933.

CONCLUSION

MR elastography can help differentiating malignant and benign focal liver tumors

CLINICAL RELEVANCE/APPLICATION

In addition to conventional MRI techniques, MR elastography can iprove the ability of diagnosis of benign and malignant focal liver tumors.

SSQ06-02 Body Composition Profiling using MRI - Normative Data for Subjects with Diabetes Extracted from the UK Biobank Imaging Cohort

Thursday, Dec. 1 10:40AM - 10:50AM Room: E350

Participants
Olof Dahlqvist Leinhard, PhD, Linkoping, Sweden (*Presenter*) Stockholder, AMRA AB; Employee, AMRA AB
Jennifer Linge, Linkoping, Sweden (*Abstract Co-Author*) Employee, AMRA AB
Janne West, MSc, PhD, Linkoping, Sweden (*Abstract Co-Author*) Employee, AMRA AB; Stockholder, AMRA AB
Jimmy D. Bell, PhD, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Magnus Borga, PhD, Linkoping, Sweden (*Abstract Co-Author*) Stockholder, AMRA AB

PURPOSE

To describe the distribution of MRI derived body composition measurements in subjects with diabetes mellitus (DM) compared to subjects without diabetes.

METHOD AND MATERIALS

3900 subjects (1864 males and 2036 females) from the UK Biobank imaging study were included in the study. The age range was 45 to 78 years. Visceral adipose tissue volume normalized with height^2 (VATi), total abdominal adipose tissue volume normalized with height^2 (ATATi), total lean thigh muscle volume normalized with body weight (muscle ratio) and liver proton density fat fraction (PDFF) were measured with a 6 minutes 2-point Dixon imaging protocol covering neck to knee and a 10-point Dixon single axial slice

protocol positioned within the liver using a 1.5T MR-scanner (Siemens, Germany). The MR-images were analyzed using AMRA® Profiler research (AMRA, Sweden). 194 subjects with clinically diagnosed DM (DM group) were age and gender matched to subjects without DM (control group). For each variable and group, the median, 25%-percentile and 75%-percentile was calculated. Mann-Whitney U test was used to test the observed differences.

RESULTS

VATi in the DM group was 2.13 (1.43-2.62) l/m^2 (median, 25% - 75% percentile) compared to 1.32 (0.86 - 1.79) l/m^2 in the control group. ATATi in the DM group was 4.94 (3.86-6.19) l/m^2 compared to 3.40 (2.56 - 4.70) l/m^2 in the control group. Muscle ratio in the DM group was 0.13 (0.11 - 0.14) l/kg compared to 0.14 (0.12 - 0.15) l/kg in the control group. Liver PDFF in the DM group was 7.23 (2.68 - 13.26) % compared to 2.49 (1.53 - 4.73) % in the control group. Mann-Whitney U test detected significant differences between the DM group and the control group for all variables (p<10-5).

CONCLUSION

DM is strongly associated with high visceral fat, liver fat, and total abdominal fat, and low muscle ratio.

CLINICAL RELEVANCE/APPLICATION

Body composition profiling shows high potential to provide direct biomarkers to improve characterization and early diagnosis of DM.

SSQ06-03 Evaluation of Different Contrast Agent Application Protocols in Relation to Respiratory Motion Artifacts at Gadoxetate Disodium-Enhanced MRI

Thursday, Dec. 1 10:50AM - 11:00AM Room: E350

Participants
Kristina I. Ringe, MD, Hannover, Germany (*Presenter*) Nothing to Disclose
Christian Von Falck, MD, Hannover, Germany (*Abstract Co-Author*) Research Grant, Pro Medicus Limited Research Grant, Siemens AG
Hans-Juergen Raatschen, MD, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose
Frank K. Wacker, MD, Hannover, Germany (*Abstract Co-Author*) Research Grant, Siemens AG; Research Grant, Pro Medicus Limited; Research Grant, Delcath Systems, Inc;
Jan Hinrichs, MD, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the influence of different contrast agent application parameters on the occurrence of respiratory motion artifacts after gadoxetate disodium injection.

METHOD AND MATERIALS

200 patients (m=129, f=71; mean age 51y) who underwent a clinical routine liver MRI including gadoxetate disodium injection were included in this retrospective IRB approved study. Contrast agent application protocols (n=4) differed with regards to injection rate (1 or 2ml/s), dose (0.1ml/kg or fixed dose of 10ml) and nasal oxygen application (no or yes). For quantitative analysis, two radiologists in consensus performed arterial phase SNR measurements in the aorta and portal vein. Two different readers separately assessed the degree of motion artifacts (5-point scale) as well as arterial phase image quality (4-point scale). Quantitative and qualitative results were compared (Kruskal-Wallis Test, Dunn's multiple comparison Test). The influence of different contrast agent application parameters on the occurrence of respiratory motion artifacts was assessed using univariate analysis (p<0.05 deemed significant).

RESULTS

Use of a lower contrast injection rate resulted in significantly higher SNRs in the aorta and portal vein (p<0.05). Severe motion artifacts were observed in 11.5% of examinations, with no significant difference between protocols. At univariate analysis, injection rate, dose and oxygen application had no significant influence on the incidence or degree of severe respiratory artifacts (p>0.05).

CONCLUSION

Severe respiratory motion artifact at gadoxetate disodium-enhanced MRI is a known adverse effect. Technique specific factors regarding the mode of contrast application do not seem to significantly reduce the incidence of this phenomenon.

CLINICAL RELEVANCE/APPLICATION

Contrast dose, injection rate and supporting transnasal application of oxygen do not seem to significantly reduce the occurrence of severe motion artifacts at gadoxetate disodium-enhanced MRI.

SSQ06-04 Usefulness of Oxygen Inhalation in Patients with a Prior Episode of Arterial Phase Motion Associated with Gadoxetate Disodium: Intraindividual Comparison of Sequential Studies

Thursday, Dec. 1 11:00AM - 11:10AM Room: E350

Participants
Tomohiro Namimoto, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Kie Shimizu, kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Masataka Nakagawa, Kumamoto, Japan (*Presenter*) Nothing to Disclose
Seitaro Oda, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Takeshi Nakaura, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Daisuke Utsunomiya, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasuyuki Yamashita, MD, Kumamoto, Japan (*Abstract Co-Author*) Consultant, DAIICHI SANKYO Group

PURPOSE

To determine whether the use of oxygen inhalation provides adequate image quality in patients with a prior episode of transient severe motion (TSM) , based on severe arterial phase motion, despite minimal motion in the other dynamic phases on liver magnetic resonance (MR) images obtained with gadoxetate disodium.

METHOD AND MATERIALS

This prospective study was approved by the institutional review board. The requirement to obtain informed consent was waived. Fifty-one consecutive patients with TSM at the previous study with bolus injection of gadoxetate disodium were evaluated. Qualitative evaluation of TSM in this examination with oxygen inhalation (2L/min) was compared between patients who had TSM in their previous examination. And qualitative evaluation of TSM in the examination before previous examination without oxygen inhalation was compared between patients who had TSM in their previous examination in 35 patients. Two radiologists independently evaluated for the contrast material rated motion on a scale of 1 (non-diagnostic images) to 4 (no motion) at the arterial phase of dynamic MR imaging. Motion scores were compared by using the Wilcoxon signed rank test. The kappa statistic was determined to evaluate the agreement between two readers.

RESULTS

Mean motion scores in latest examinations with oxygen inhalation were significantly higher for patients who had TSM in their previous examination at arterial phase: Reviewer 1 (R1) 2.51 ± 0.70 vs 1.80 ± 0.57 (P < .0001); Reviewer2 (R2) 2.51 ± 0.70 vs 1.84 ± 0.67 (P < .0001), kappa=0.84, 0.74, respectively. Mean motion scores in the examination before previous examination without oxygen inhalation were slightly higher for patients who had TSM in their previous examination: R1 2.03 ± 0.79 vs 1.80 ± 0.57 (P = .085); R2 1.97 ± 0.79 vs 1.84 ± 0.67 (P =.391) , kappa=0.90, 0.74, respectively.

CONCLUSION

Use of oxygen inhalation improved image quality in patients with a prior episode of arterial phase TSM in liver MR imaging with gadoxetate disodium.

CLINICAL RELEVANCE/APPLICATION

Use of oxygen inhalation improves image quality in patients with a prior episode of arterial phase transient severe motion in liver MR imaging with gadoxetate disodium.

SSQ06-05 Intravenous Gadoxetate Disodium Administration Reduces Breath-Holding Capacity in the Hepatic Arterial Phase - A Multi-Center Randomized Placebo-Controlled Trial

Thursday, Dec. 1 11:10AM - 11:20AM Room: E350

Participants
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Mustafa R. Bashir, MD, Cary, NC (*Presenter*) Research support, Siemens AG; Research support, Guerbet SA; Research support, General Electric Company; Imaging Core Lab, NGM Biopharmaceuticals; Imaging Core Lab, TaiwanJ Pharma

PURPOSE

To determine, in a multi-center, double-blinded placebo-controlled trial, whether hepatic arterial phase breath-holding duration is affected by gadoxetate disodium administration.

METHOD AND MATERIALS

IRB approval was obtained for this prospective, multi-institutional HIPAA-compliant study; written informed consent was obtained from all subjects.At three sites, a total of forty-four volunteers each underwent an MRI examination in which images were acquired before and dynamically after bolus injection of gadoxetate disodium, normal saline, and gadoterate meglumine, administered in random order. The technologist and volunteer were blinded to the agent. Arterial phase breath-holding duration was timed after each injection, and volunteers reported subjective symptoms. Heart rate (HR) and oxygen saturation were monitored. Images were independently analyzed for motion artifacts by three radiologists. Arterial-phase breath-holding duration and motion artifacts after each agent were compared using the Mann-Whitney-U test and the McNemar test. Factors affecting the above outcomes were assessed using a multi-step linear modeling procedure.

RESULTS

Arterial-phase breath-holds were shorter after gadoxetate disodium (mean 32±19 sec) than after saline (mean 40±17 sec, p<0.001) or gadoterate meglumine (43±21 sec, p<0.001). In 80% (35/44) of subjects, arterial phase breath-holds were shorter after gadoxetate disodium than after both saline and gadoterate meglumine. 7% (3/44) of volunteers had severe arterial phase motion artifacts after gadoxetate disodium, 2% (1/44, p=0.62) after gadoterate meglumine, and none (0/44, p=0.25) after saline. HR and oxygen saturation changes were small and not significantly associated with contrast agent.

CONCLUSION

Hepatic arterial phase breath-holding duration is reduced following gadoxetate disodium administration in healthy volunteers.

CLINICAL RELEVANCE/APPLICATION

Hepatic arterial phase breath-holding duration is reduced following gadoxetate disodium administration in healthy volunteers. Despite prior controversies regarding whether hepatic arterial phase artifacts are due to motion or non-motion artifacts, this study shows that arterial phase breath holding is impaired and causes motion artifacts.

SSQ06-06 Initial Clinical Experience using An Abbreviated Hepatobiliary Phase-Based MR Protocol for HCC Screening in Cirrhotic Patients

Thursday, Dec. 1 11:20AM - 11:30AM Room: E350

Awards
Student Travel Stipend Award

Participants
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Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;
Alexander L. Kuo, MD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Hepatocellular carcinoma (HCC) surveillance has been shown to improve survival in patients with cirrhosis. Multiphasic contrast-enhanced MRI has higher sensitivity than other surveillance modalities, however widespread adoption of MRI-based surveillance is limited by cost, acquisition time, and availability. A rapid acquisition MRI protocol could address two of these limitations as the cost of MRI is driven partly by scan time. Previous work has demonstrated that a gadoxetate-enhanced, hepatobiliary-phase (HBP) abbreviated MRI (AMRI) protocol has higher sensitivity than reported values for ultrasound and CT. Here we present our institution's initial clinical experience after implementing AMRI for HCC surveillance.

METHOD AND MATERIALS

Between August 2014 and March 2016, 284 patients (91% with cirrhosis, 58% male, age 19-83) underwent AMRI including T2-weighted SSFSE, T1-weighted gadoxetate-enhanced HBP, and diffusion weighted images (DWI); requiring approximately 5.5 minutes of nominal scan time and 15-20 minutes of actual time. Scans were acquired on 1.5T or 3T clinical scanners, read by the radiologists on the clinical service, and reported using standard templates. Positive AMRIs triggered multiphasic CT or MRI within 4 weeks, which were interpreted and reported using LI-RADS v2014. Further management was determined by the patient's physicians as informed by these imaging results. Data was collected retrospectively with IRB approval and informed consent waiver; descriptive summaries were prepared.

RESULTS

Of 378 total AMRI scans 36 (9.5%) were positive, including 30 in cirrhotic patients. 23 of 30 underwent multiphasic imaging: 5/23 (22%) had at least one LR-4 or -5 nodule on the initial multiphasic CT or MRI, 2/23 (9%) has at least one LR-4 or -5 nodule on the follow-up multiphasic CT or MRI, and 8/23 (36%) had no observations (false positives). In all, 2.7% of all cirrhotic patients were found to have a LI-RADS 4/5 nodule after positive AMRI. 20 AMRI exams (5.3%) were inadequate.

CONCLUSION

Our initial clinical experience shows the feasibility of applying AMRI-based surveillance clinically. Further research is needed to determine the performance and cost-effectiveness of this approach.

CLINICAL RELEVANCE/APPLICATION

Development of a rapid acquisition lower-cost MRI would broaden the use of MRI-based HCC surveillance, potentially offering higher sensitivity than current recommended surveillance methods.

SSQ06-07 Gadoxetic Acid-Enhanced High Temporal Resolution Hepatic Arterial Phase Imaging: Impact on the LI-RADS Category

Thursday, Dec. 1 11:30AM - 11:40AM Room: E350

Participants
Satoshi Goshima, MD, PhD, Gifu, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshifumi Noda, MD,PhD, Gifu, Japan (*Presenter*) Nothing to Disclose
Nobuyuki Kawai, MD, Gifu, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroshi Kawada, MD, Gifu, Japan (*Abstract Co-Author*) Nothing to Disclose
Kyongtae T. Bae, MD, PhD, Pittsburgh, PA (*Abstract Co-Author*) Patent agreement, Bayer AG; Patent agreement, Guerbet SA; Patent agreement, Nemoto Kyorindo Co, Ltd;
Masayuki Matsuo, Gifu, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the value of view-sharing multi-hepatic arterial phase (mHAP) imaging for the diagnosis of hypervascular hepatocellular carcinoma (HCC).

METHOD AND MATERIALS

This prospective study was approved our institutional review board and written informed consent was obtained. From May 2014 to December 2015, forty-seven consecutive high-risk patients for HCC underwent gadoxetic acid-enhanced magnetic resonance (MR) image followed by transcatheter arterial chemoembolization (TACE). Hepatic arterial phase images were obtained 5 phases in a row with a shared central k-space of 12.5% within 22 seconds single breath hold, followed by portal venous, late (2 and 3 minutes), and hepatobiliary phase imaging. One-hundred-eight HCC nodules (size: 5–88 mm, mean size: 18.2 mm) confirmed on angiographic CT and lipiodol CT were evaluated for LI-RADS category based on single arterial phase and mHAP findings. Appearances of wash out, capsule, corona enhancement, and image quality were also evaluated using 5-point scale.

RESULTS

Twenty-four HCCs (22.2 %) (size: 6–19 mm, mean size: 12.3 mm) were categorized as LR-3 based on the single arterial phase.

Capsule appearance (25.9 %) and washout (57.4 %) were most frequently observed in late phase (2 minutes) and portal venous phase, respectively. Corona enhancement was observed in 73.1 % of all HCCs. Among the 24 HCCs with LR-3, corona enhancement was observed in 75 % nodules and contributed to upgrade category. No significant difference was found in the frequency of corona enhancement between mHAP and angiographic CT (P = 0.17). Image quality was valued as good or excellent in all cases.

CONCLUSION

View-sharing mHAP was feasible without compromising image quality and contributed to improve diagnostic confidence for hypervascular HCC in gadoxetic acid-enhance MR imaging.

CLINICAL RELEVANCE/APPLICATION

Multi-phasic hepatic arterial phase imaging using view-sharing technique can frequently capture the corona enhancement and improve diagnostic confidence for HCC in gadoxetic acid-enhanced MRI.

SSQ06-08 Quick and Robust Liver Iron Content Determination by MRI at 1.5 T Studied in 195 Patients

Thursday, Dec. 1 11:40AM - 11:50AM Room: E350

Participants
Arthur P. Wunderlich, PhD, Ulm, Germany (*Presenter*) Nothing to Disclose
Holger Cario, Ulm, Germany (*Abstract Co-Author*) Nothing to Disclose
Mario Teigeler, Ulm, Germany (*Abstract Co-Author*) Nothing to Disclose
Meinrad J. Beer, MD, Wuerzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Stefan A. Schmidt, Ulm, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To validate a quick and robust method for LIC determination based on gradient echo (GRE) MRI in a large patient cohort.

METHOD AND MATERIALS

195 patients (86f, 109m, age range 2 … 80 y, mean 29.1 ± 19.9 y) suspected for liver iron overload were investigated by 1.5 T MRI (Siemens Avanto, Siemens Healthcare, Iselin, NY). LIC reference values were obtained by the MRI based Ferriscan® method. Additionally, transversal slices of the liver were acquired with GRE using whole-body resonator as receiver coil with flip angle (FA) of 20° and 90°, TR 120ms and TE 4.8/19.1ms. Liver-to-muscle signal intensity ratio (SIR) and its uncertainty was calculated by manually placing three ROIs in vessel-free parts of the liver and two in paraspinal muscles. From linear regression of SIR logarithm to reference LIC, a relation was derived to determine LIC based on gradient echo data. Results were tested for diagnostic accuracy compared to reference LIC with respect to the threshold of 4.5 mg/g (80 µmol/g) relevant for treatment management.

RESULTS

LIC determination from GRE data performed excellent. Concerning the 4.5 mg/g threshold, our analysis yielded 48 true negatives (results of both methods below the threshold) and 2 false negatives (only GRE results below the threshold) as well as 143 true positives (above threshold) and 2 false positives. This means a sensitivity of 98.6% ± 1.9%, specifity of 96.0% ± 5.4% and positive/negative predictive value of 98.6%/96%. Accuracy was 98%.

CONCLUSION

The simple SIR approach, eliminating the need for sophisticated mathematics, proved highly efficient using our data analysis approach working with logarithm of intensity ratios. Demand for good signal homogeneity is a limitation, since body volume coil has to be used as receiver. This reduces signal-to-noise ratio and prohibits use of parallel imaging. Despite this, LIC can be determined with high diagnostic accuracy from GRE data requiring only a few breathholds.

CLINICAL RELEVANCE/APPLICATION

GRE MRI based LIC determination using logarithm of liver-to-muscle SIR is quick and easy as well as precise and suitable for clinical routine.

SSQ06-09 Quantitative Measurements for Gadoxetic Acid-Enhanced MRI for Preoperative Prediction of Posthepatectomy Liver Failure in Patients with Hepatocellular Carcinoma: Comparison with Future Remnant Liver Volume and Indocyanine Green Clearance Test

Thursday, Dec. 1 11:50AM - 12:00PM Room: E350

Participants
Dongkyun Kim, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Joon-Il Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Moon Hyung Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Young Byun, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung Eun Rha, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Soon Nam Oh, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung Eun Jung, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Michael Y. Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To identify if gadoxetic acid-enhanced MR quantitative measurements are useful for predicting posthepatectomy liver failure (PHLF) in hepatocellular carcinoma (HCC) patients by comparison with future remnant liver volume (FRLV) and indocyanine green (ICG) clearance test.

METHOD AND MATERIALS

Preoperative gadoxetic acid-enhanced MR were retrospectively evaluated in 73 consecutive patients with anatomical liver resection of HCC. As quantitative measurement of liver function, relative liver enhancement (RLE) and hepatocyte uptake index (HUI) were measured. RLE was calculated as relative increase of signal intensity of liver parenchyma between unenhanced and hepatobiliary

phase. HUI was calculated as following : VL x [(L20/S20)-1], (VL=liver volume, L20=mean signal intensity of liver, S20=of spleen on hepatobiliary phase). FRLV is expected volume of remnant liver after anatomical resection on preoperative CT. Plasma disappearance rate (PDR) and retention rate at 15 minutes (R15) of ICG were measured. We investigated additional value of multiplication of FRLV by RLE or HUI. Univariate analysis by Mann-Whitney test and multivariate analysis by logistic regression were performed to identify independent predictors of PHLF. To compare predictive performances between them, AUCs from receiver operating characteristic (ROC) were compared. PHLF was defined according to the criteria of International Study Group of Liver Surgery.

RESULTS

18 (24.6%) of 73 patients met the criteria of PHLF. Univariate analysis revealed that all 5 parameters, RLE, HUI, FRLV, ICG-PDR and R15, were significantly associated with PHLF. Multivariate analysis demonstrated that HUI, FRLV and ICG-R15 were independent predictors (p=0.007, 0.042 and 0.022, respectively). AUCs of HUI, FRLV, ICG-R15 and HUI x FRLV were 0.916, 0.840, 0.749 and 0.926. AUC of HUI or HUI x FRLV was significantly higher than that of ICG-R15 (p=0.039 and 0.023). However, AUC of HUI x FRLV was not significantly higher than that of HUI (p=0.252).

CONCLUSION

HUI measured from gadoxetic acid-enhanced MRI is superior than ICG clearance test and can be used to predict PHLF in HCC patients. Addition of FRLV to HUI does not further improve predictive performance for PHLF than HUI alone.

CLINICAL RELEVANCE/APPLICATION

1. Estimated liver function from gadoxetic acid-enhanced MR is superior than ICG clearance test in predicting PHLF.
2. Addition of FRLV to HUI does not further improve predictive performance for PHLF.

SSQ07

Science Session with Keynote: Gastrointestinal (Colon Cancer Screening and Staging)

Thursday, Dec. 1 10:30AM - 12:00PM Room: E353A

GI CT OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Judy Yee, MD, Clayton, CA (*Moderator*) Research Grant, EchoPixel, Inc
Dushyant V. Sahani, MD, Boston, MA (*Moderator*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc

Sub-Events

SSQ07-01 Gastrointestinal Keynote Speaker: CT Colonography in 2016

Thursday, Dec. 1 10:30AM - 10:40AM Room: E353A

Participants
Judy Yee, MD, Clayton, CA (*Presenter*) Research Grant, EchoPixel, Inc

SSQ07-02 Bowel Preparation in CT Colonography:Is Diet Necessary? (DIETSAN) A Randomized Trial

Thursday, Dec. 1 10:40AM - 10:50AM Room: E353A

Awards
Student Travel Stipend Award

Participants
Domenico De Santis, MD, Charleston, SC (*Presenter*) Nothing to Disclose
Davide Bellini, MD, Latina, Italy (*Abstract Co-Author*) Nothing to Disclose
Damiano Caruso, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Marco Rengo, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Andrea Laghi, MD, Rome, Italy (*Abstract Co-Author*) Speaker, Bracco Group Speaker, Bayer AG Speaker, General Electric Company Speaker, Koninklijke Philips NV

PURPOSE

To investigate whether diet restriction affects the quality of colon cleansing during reduced bowel preparation for CT colonography.

METHOD AND MATERIALS

This pragmatic single-centre randomized trial recruited asymptomatic and symptomatic patients aged 45 years or older and referred by clinicians for CT Colonography. Patients were randomly assigned in a 1:1 ratio, in block of ten, to receive a reduced bowel preparation with diet restriction or the same reduced bowel preparation without diet restriction. All investigators were masked to treatment allocation. The primary endpoint, analyzed by intention to treat, was a composite of indices describing the quality of large bowel cleansing. The trial is registered with ClinicalTrial.gov, number NCT02371655.

RESULTS

100 patients were randomly allocated to treatments (50 with diet restriction; 50 without diet restriction) and were included in intention-to-treat analysis. Six patients withdrew consent, leaving for analysis 46 assigned to reduced bowel preparation with diet restriction and 48 assigned to reduced bowel preparation without diet restriction. The mean residual stool (0.22 of three, 95%CI 0.00-0.44) and fluid burden (0.39 of three, 95%CI 0.25-0.53) scores for patients underwent diet restriction were similar to those in patients didn't follow any diet restriction (0.25, 95%CI 0.03-0.47 [P = .82] and 0.49, 95%CI 0.30-0.67 [P = .38], respectively). Both bowel preparations resulted in optimal colon cleansing. Serious adverse events were absent.

CONCLUSION

A reduced bowel preparation in association with faecal tagging and without any diet restriction demonstrated optimal colon cleansing effectiveness for CT colonography.

CLINICAL RELEVANCE/APPLICATION

Diet restriction during bolowel preparation for CT colonography is not necessary.

SSQ07-03 CT Colonography in Patients with Colon-Containing Hernias

Thursday, Dec. 1 10:50AM - 11:00AM Room: E353A

Participants
Michael S. Furman, MD, Providence, RI (*Presenter*) Nothing to Disclose
Kevin J. Chang, MD, Sharon, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the utility of CT Colonography (CTC) as a noninvasive screening tool in patients with a colon-containing hernia.

METHOD AND MATERIALS

This retrospective analysis was performed under IRB waiver and was HIPAA compliant. A full text search of radiology reports for two hospitals from 2006 to March 2016 was conducted using a data-mining system (Montage, Montage Healthcare Systems,

Philadelphia, PA, USA). A keyword search term of "CT Colonography" and "Hernia" yielded an initial set of reports in which the study indication, the type of hernia, and the contents of the hernia sac were recorded. The C-RADS score was recorded to evaluate diagnostic quality and determine the incompletion rate (i.e. C0 rate). A review of the reports and selected images on PACS was also conducted to determine the cause of exam incompletion.

RESULTS

2100 CTCs were performed during the time period with 433 reports mentioning a hernia. While most of the hernias were either hiatal or without bowel content, 79 patients had hernias containing bowel (3.8%) with 87% of these exams being performed after incomplete colonoscopy (69/79). 51 of these patients had colon-containing hernias (2.4%). 38 cases consisted of herniated colon alone and 13 cases consisted of both herniated small and large bowel. Colon-containing hernia locations were 49% ventral (25/51), 43% inguinal (22/51), and 4% hiatal (2/51), with 1 case each in umbilical, diaphragmatic, and parastomal locations. While the short segments of colon at the hernia neck remained nondistensible, adequate insufflation beyond the hernia sac was possible in 46 cases (90%). 6 cases were C0 with 4 directly related to poor distension beyond the hernia, 1 for poor prep, and 1 for poor distension of the rectosigmoid unrelated to the hernia. No complications occurred during any CTC in the setting of a bowel-containing hernia.

CONCLUSION

Colon containing hernias have long been considered a relative contraindication to CTC. However, these hernias are often the cause of incomplete colonoscopy leaving few alternatives to complete screening of the nonvisualized colon. This review shows a carefully-performed CTC may be performed safely in patients with colon-containing hernias with successful colonic distension beyond the hernia sac achieved in 90% of patients.

CLINICAL RELEVANCE/APPLICATION

CT Colonography is a safe and effective way to screen the colon in patients with colon-containing hernias.

SSQ07-04 Effect of Computer-Aided Detection of Flat Lesions on the Performance of Readers with Various Experience in CT Colonography

Thursday, Dec. 1 11:00AM - 11:10AM Room: E353A

Participants
Yasuji Ryu, MD, Boston, MA (*Presenter*) Nothing to Disclose
Janne J. Nappi, PhD, Boston, MA (*Abstract Co-Author*) Royalties, Hologic, Inc.; Royalties, MEDIAN Technologies;
Minh Phan, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Koichi Hayano, MD, Chiba, Japan (*Abstract Co-Author*) Nothing to Disclose
Chinatsu Watari, MD, boston, MA (*Abstract Co-Author*) Nothing to Disclose
Hiroyuki Yoshida, PhD, Boston, MA (*Abstract Co-Author*) Patent holder, Hologic, Inc; Patent holder, MEDIAN Technologies;

PURPOSE

To evaluate the effect of optimized computer-aided detection (CADe) on the performance of human readers in the detection of non-polypoid flat lesions in aymptomatic patients from a large multi-center CT colonography (CTC) clinical trial.

METHOD AND MATERIALS

A total of 200 cathartic CTC cases including examinations with colonoscopy-confirmed, morphologically flat lesions and normal examinations were sampled from a European multi-center CTC trial for asymptomatic patients at increased risk of colorectal cancer. Iodine tagging without or with barium was used in 1/3 of the cases. Three experienced readers (radiologists, surgeon, and internist) and an inexperienced reader reviewed the 200 CTC cases and recorded all detected lesions using primary 3D interpretation and a CADe second-read paradigm, where the CADe that was developed at our institution had been trained with cases independent from this study. The per-patient sensitivities, specificity, and area under the ROC curve (AUC) for the detection of flat lesions were compared between unassisted and CADe-assisted readers.

RESULTS

There were 34 patients (17%) with non-polypoid flat lesions: 17 patients had 18 flat lesions ≥10 mm and 17 had 27 flat lesions 6-9 mm, for which standalone CADe yielded 94% per-patient sensitivities. For the flat lesions ≥6 mm, the average per-patient sensitivities, specificities, and AUCs of the four unassisted readers were 60%, 81%, and 0.71, respectively, whereas those of CADe-assisted readers were 73% (p=.037), 79% (p=.34), and .77 (p=.0036), respectively. For 6-9 mm flat lesions, the corresponding performances were 54%, 83%, and 69% for unassisted readers, whereas those of CADe-assisted readers were 73% (p=.058), 82% (p=.28), and .78 (p=.019), respectively. For the flat lesions ≥10 mm, the performances were 59%, 94%, and .77 for unassisted readers, whereas those of CADe-assisted readers were 64% (p=.093), 94% (p=.76), and .80 (p=.069), respectively.

CONCLUSION

The use of CADe optimized for the detection of flat lesions increased statistically significantly the detection performance as measured by the AUC for ≥6 mm and 6-9 mm flat lesions in asymptomatic patients.

CLINICAL RELEVANCE/APPLICATION

Colorectal flat lesions are often missed in CT colonography examinations; however, the use of computer-aided detection could substantially improve detection sensitivity.

SSQ07-05 Evaluation of a CT Colonography Self-Training Program with or without CAD in Inexperienced Readers

Thursday, Dec. 1 11:10AM - 11:20AM Room: E353A

Participants
Lapo Sali, MD, Florence, Italy (*Presenter*) Nothing to Disclose
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Andrea Ferraris, MD, Turin, Italy (*Abstract Co-Author*) Nothing to Disclose
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Franco Iafrate Sr, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Andrea Laghi, MD, Rome, Italy (*Abstract Co-Author*) Speaker, Bracco Group Speaker, Bayer AG Speaker, General Electric Company Speaker, Koninklijke Philips NV
Lia Morra, PhD, Torino, Italy (*Abstract Co-Author*) Researcher, im3D SpA
Daniele Regge, MD, Torino, Italy (*Abstract Co-Author*) Speakers Bureau, General Electric Company
Mario Mascalchi, MD, PhD, Florence, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine whether: 1) a CT colonography (CTC) self-training program may improve reading performance of inexperienced readers; 2) CAD use during self-training may influence learning.

METHOD AND MATERIALS

In 3 centers 20 trainees (17 radiology residents, 3 radiologists) with no experience in CTC interpretation were randomized (1:1) to perform a self-training program using specific software (im3D CADCOLON SelfTraining): 1) with CAD as second reader; 2) without CAD. Training dataset consisted of 150 CTCs verified at colonoscopy. After a brief introductory course, an assessment test of 37 cases (21 positive, 24 lesions) with second reader CAD was administered to trainees. The same test was repeated after training. Per-patient sensitivity and specificity, and per-lesion sensitivity of the unassisted phase were calculated. Correlation between baseline and final performance was studied with linear regression analysis. A generalized estimating equation model was applied to evaluate learning and the impact of CAD use during training.

RESULTS

Average per-patient baseline vs. post-training sensitivity and specificity were respectively 93%(390/420) vs. 94%(395/420), and 76%(242/320) vs. 85%(271/320); per-lesion sensitivity was 74% (356/480) vs. 83%(396/480). Improvements in per-patient specificity ($p<0.0001$) and per-lesion sensitivity ($p=0.002$) were statistically significant. A significant inverse correlation was found between baseline performance and learning both for per-patient specificity ($R=-0.77, p<0.0001$) and sensitivity ($R=-0.56, p=0.009$), but not for per-lesion sensitivity ($p=0.77$). After correcting for baseline performance, a significant positive effect on specificity in the final test was observed in the CAD arm compared with the no-CAD arm (no CAD vs. CAD OR:0.46, CI95 %: 0.26-0.81; p=.007). No effect on per-patient or per-lesion sensitivity was observed ($p=0.56$ and $p=0.85$).

CONCLUSION

A self-training program for CTC improves readers' specificity and per-lesion sensitivity. CAD use during training may be beneficial for improvements in specificity.

CLINICAL RELEVANCE/APPLICATION

CAD use during training may help to improve specificity. Further studies to generalize this finding are needed.

SSQ07-06 Forward Projected Model-Based Iterative Reconstruction Solution (FIRST) in Low-Dose CT Colonography: Preoperative Assessment in Patients with Colorectal Cancer

Thursday, Dec. 1 11:20AM - 11:30AM Room: E353A

Participants
Narumi Taguchi, Kumamoto, Japan (*Presenter*) Nothing to Disclose
Seitaro Oda, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Masanori Imuta, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Takeshi Nakaura, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Daisuke Utsunomiya, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshinori Funama, PhD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Hideaki Yuki, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Masafumi Kidoh, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Kenichiro Hirata, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasuyuki Yamashita, MD, Kumamoto, Japan (*Abstract Co-Author*) Consultant, DAIICHI SANKYO Group

PURPOSE

The purpose of this study was to assess the effect of forward projected model-based iterative reconstruction solution (FIRST) on the preoperative assessment and planning of colorectal cancer in low-dose CT colonography (CTC).

METHOD AND MATERIALS

We studied 30 consecutive patients with colorectal cancer referred for surgical treatment. All underwent CTC under a standard radiation dose (SD) protocol in the supine position and a low-dose (LD, radiation dose reduction of approximately 85%) protocol in the prone position. The SD protocol images were reconstructed with standard filtered back projection (FBP). The LD protocol images were postprocessed using FBP and FIRST. Objective and subjective image quality parameters were compared among the three different CT image sets. Preoperative evaluation e.g. site, length, and T- and N staging was also performed by two experienced, and compared to post-surgical findings.

RESULTS

FIRST yielded the lowest image noise among the three reconstructions, there was a significant difference among them. The mean visual scores were significantly higher for SD-FBP and LD-FIRST than LD-FBP; those for SD-FBP and LD-FIRST were equivalent. More accurate preoperative information by CTC was obtained under SD-FBP and LD-FIRST than LD-FBP; those of SD-FBP and LD-FIRST were comparable.

CONCLUSION

FIRST can yield significantly improved image quality at low-dose CTC and provide equivalent preoperative information to a standard radiation dose protocol.

CLINICAL RELEVANCE/APPLICATION

FIRST can markedly reduce radiation dose while maintaining sufficient preoperative information.

SSQ07-07 Reducing the Radiation Dose of CT Colonography Applying a Spectral Filtration Technique and Advanced Modeled Iterative Reconstruction in Third-Generation Dual-Source CT: A Pilot Study

Thursday, Dec. 1 11:30AM - 11:40AM Room: E353A

Participants
Jingjuan Liu, MD, Beijing, China (*Presenter*) Nothing to Disclose
Wei Liu, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Huadan Xue, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Zheng Yu Jin, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess whether radiation dose of computed tomography colonography (CTC) could be further reduced while maintaining image quality applying novel spectral filtration and advanced modeled iterative reconstruction (ADMIRE) in third-generation dual-source CT(3rd DSCT).

METHOD AND MATERIALS

This prospective study consecutively included 62 patients, 21 of which were colorectal cancer patients. All patients underwent CTC at low dose protocol in supine position with tin-filtered Sn150kVp, ultra low dose protocol in prone position with tin-filtered Sn100kVp and standard 120kVp protocol in prone position. Both Sn150kVp and Sn100kVp images were reconstructed with ADMIRE of strength level 5, while 120kVp images were reconstructed with filtered back projection (FBP). Effective dose (ED) was compared among three protocols. Image noise (average of four locations) and signal-to-noise ratio (SNR) of psoas muscle and colorectal cancer were measured quantitatively. Qualitative assessment of 2D and virtual endoscopy (VE) were conducted at a five-score scale and were analyzed among different protocols and body mass index (BMI) patients.

RESULTS

ED was significantly lower in the Sn150kVp and Sn100kVp protocol than the 120kVp protocol, resulting in a 21% and 87% decrease (1.60 ± 0.31mSv, 0.26 ± 0.08 mSv vs. 2.02 ± 0.55 mSv; $p < 0.01$). Noise was decreased by 44% for Sn150kVp-ADMIRE5 compared with 120kVp-FBP (10.6±2.3 HU vs. 18.8±2.9 HU, p=0.000) while SNRpsoas and SNRcancer were increased by 85% and 60% (4.60 ± 1.22 vs. 2.48 ± 0.51, p=0.014; 3.91 ± 1.21 vs. 2.45 ± 0.78, p=0.012). Meanwhile, both noise and SNR were not significantly different between 120kVp-FBP and Sn100kVp-ADMIRE5($p>0.05$). Sn150kVp-ADMIRE5 has a better subjective performance than 120kVp-FBP, whereas Sn100kVp-ADMIRE5 were scored lower but still comparably good enough for supplying additional information. Noise and image quality were somewhat compromised with increased BMI, however no significant difference was found among different protocols.

CONCLUSION

Using Sn150kVp and Sn100kVp with ADMIRE reconstruction could reduce radiation dose in CTC by 21% and 87% as compared to conventional 120kVp-FBP protocol. Sn150kVp could provide better image quality. The image quality in Sn100kVp is sufficient for diagnosis although comproised.

CLINICAL RELEVANCE/APPLICATION

CTC at Sn150kVp and Sn100kVp with ADMIRE reconstruction in 3rd DSCT could reduce radiation dose remarkablely with robust image quality, which provides patients an alternative low dose CTC strategy.

SSQ07-08 Comparison of Non-Gaussian and Gaussian Diffusion Models of Diffusion Weighted Imaging at 3.0T MRI: A Pilot Study in Patients with Rectal Cancer

Thursday, Dec. 1 11:40AM - 11:50AM Room: E353A

Participants
Guangwen Zhang, xian, China (*Presenter*) Nothing to Disclose
Jinsong Zhang, Xi'an, China (*Abstract Co-Author*) Nothing to Disclose
Shuangshuang Wang, Xian, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare non-Gaussian diffusion models of diffusion-weighted imaging (DWI) including intra-voxel incoherent motion (IVIM) and stretched-exponential model (SEM) with Gaussian diffusion model at 3.0T MRI in the patients with rectal cancer, and to determine the optimal method for clinical application and further research in rectal carcinoma.

METHOD AND MATERIALS

Fifty nine consecutive patients with pathologically confirmed rectal adenocarcinoma underwent DWI with 16 b factors (0, 10, 20, 30, 40, 60, 80, 100, 150, 200, 400, 800, 1000, 1200, 1500, 2000s/mm2) at 3.0T MR system. DWI signals were fitted to the mono-exponential and non-Gaussian diffusion models (IVIM-mono, IVIM-bi and SEM) on primary tumor and adjacent normal rectal tissue. Standard apparent diffusion coefficient (ADC)derived from mono-exponential model, slow- and fast-ADC, f value (fraction of fast ADC) derived from IVIM model, α value and distributed diffusion coefficient (DDC) derived from SEM model were generated and compared between the tumor and normal tissues.

RESULTS

Stretched-exponential model, IVIM-mono and Mono exponential model can simulate actual attenuation of rectum better than IVIM-bi method. Stretched-exponential model exhibited the best fitting results to actual DWI signals of rectal cancer and normal rectal wall (R2=0.998, 0.999). DDC and α value of stretched-exponential model show significantly statistical differences between tumor and normal rectal wall ($p<0.01$). Statistical differences between tumors and normal rectums were also found in slow-ADC of both IVIM-mono and IVIM-bi, fast-ADC of IVIM-bi and Standard ADC in mono-exponential model ($p<0.01$).

CONCLUSION

Both non-Gaussian and Gaussian diffusion models of DWI could depict diffusion behavior of rectal cancer and normal tissues, of which stretched-exponential model is the most optimized result.

CLINICAL RELEVANCE/APPLICATION

(dealing with multi-b value DWI) SEM could provide much more valuable physiologic and pathologic information for rectal cancer and is recommended in further evaluation of the nature and prognosis of the carcinoma in rectum.

SSQ07-09 Interval Increase in Lesion Enhancement on Hepatocellular Phase Gadoxetic Acid Enhanced MRI is Associated with Complete Response to Neoadjuvant Chemotherapy in Colorectal Liver Metastases

Thursday, Dec. 1 11:50AM - 12:00PM Room: E353A

Awards
Student Travel Stipend Award

Participants
Shahriar Islam, MBBS, London, United Kingdom (*Presenter*) Nothing to Disclose
Shih Zhu R. Yiin, MBBS, FRCR, Singapore, Singapore (*Abstract Co-Author*) Nothing to Disclose
Angela M. Riddell, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Dow-Mu Koh, MD,FRCR, Sutton, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim was to determine whether the degree of enhancement on hepatocellular phase gadoxetic enhanced MRI and the apparent diffusion coefficient (ADC) before and after neoadjuvant chemotherapy could identify pathologic complete responders in colorectal liver metastases (CRLM).

METHOD AND MATERIALS

In this retrospective study, 22 patients (15 M: 7F ; mean age =65) with CRLM treated with neoadjuvant chemotherapy prior to liver resection were evaluated with gadoxetic acid enhanced MRI at 1.5T before and after chemotherapy. Breath-hold T1W and DWI using 4 b-values (0- 750 s/mm2) were performed. Regions of interest were drawn encompassing metastases on T1W images and ADC map by two expert radiologists with over 15 years experience to record their average signal intensities (SI) normalized to the signal intensities of paravertebral muscle and the average ADC value. We compared the median ADC value; pre-contrast and hepatocellular phase normalized SI and their percentage change in pathologic complete responders and pathologic non complete responders before and after chemotherapy using Mann-Whitney test. Receiver operating curve characteristics (ROC) of these parameters were determined. A p-value of < 0.05 was deemed statistically significant.

RESULTS

All patients received FOLFOX/FOLFIRI based-chemotherapy, while 8 received in addition bevacizumab. There were 37 CRLM at histology, of which 10 showed complete pathological response. There was a significant difference in the median percentage increase in the hepatocellular phase normalized SI of CRLM after neoadjuvant chemotherapy between pathologic complete responders (19.4%, 5.6%) and pathologic non complete responders (5.6%, 2.3%) ($p = 0.03$, $P = 0.04$) for readers 1 and 2 respectively. By ROC analysis, an increase in the median hepatocellular phase normalized SI of 19% after chemotherapy has a sensitivity of 67.6% (95%CI: 46-83.5%) and specificity of 44.4% (13.7-78.8%) for identifying pathologic complete responders ($p=0.03$). The other parameters including ADC were not statistically significant.

CONCLUSION

An interval increase in the hepatocellular phase normalized SI of CRLM is associated with pathologic complete response following neoadjuvant chemotherapy.

CLINICAL RELEVANCE/APPLICATION

Non-invasive identification of complete responders to neoadjuvant chemotherapy in CRLM may help to avoid major hepatic surgery.

SSQ08

Science Session with Keynote: Gastrointestinal (Esophagus and Stomach)

Thursday, Dec. 1 10:30AM - 12:00PM Room: E353C

GI CT MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Douglas S. Katz, MD, Mineola, NY (*Moderator*) Nothing to Disclose
William C. Small, MD, PhD, Atlanta, GA (*Moderator*) Nothing to Disclose

Sub-Events

SSQ08-01 Gastrointestinal Keynote Speaker: Update on the Role of Imaging in the Management of Esophagus and Gastric Cancer

Thursday, Dec. 1 10:30AM - 10:40AM Room: E353C

Participants
Douglas S. Katz, MD, Mineola, NY (*Presenter*) Nothing to Disclose

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Douglas S. Katz, MD - 2013 Honored Educator
Douglas S. Katz, MD - 2015 Honored Educator

SSQ08-02 Barium Swallow: Is It Still Useful in Modern Radiology?

Thursday, Dec. 1 10:40AM - 10:50AM Room: E353C

Participants
Cheng Xie, MBChB,BSC, Oxford, United Kingdom (*Presenter*) Nothing to Disclose
Sophie Shilston, Oxford, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Peter Cox, Oxford, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Horace F. D'Costa, Oxford, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Elderly patients complaining of dysphagia but do not meet the criteria for direct endoscopy are often referred for barium swallow examination (BSE) to investigate both structural and functional abnormalities. The purpose of this study was to evaluate the diagnostic accuracy of BSE in the detection of oesophageal malignancy in this group of patients and illustrate its complementary role in modern radiology.

METHOD AND MATERIALS

This is a retrospective cohort study of 200 consecutive patients (mean age 72 years) who had BSE for dysphagia without alarming symptoms of malignancy. Patients' BSE results, subsequent investigations including endoscopy/biopsy, histology, CT and up to 3 years of electronic case notes were reviewed.

RESULTS

BSE showed 22 suspicious malignant strictures, 50 normal findings, 128 benign causes of dysphagia in which 74% were due to dysmotility. Subsequent endoscopy and histology confirmed 15/22 cases of oesophageal malignancy (8 adenocarcinomas; 7 squamous cell carcinomas), 5 benign strictures (Barrett's oesophagus and peptic disease), and 2 normal results. These findings yielded 100% sensitivity, 96.2% specificity of BSE for the detection of oesophageal malignancy in this group of patients. Positive and negative predictive values were 68.2% and 100%, respectively. In addition, a BSE case series was collected to illustrate its role in the diagnosis and exclusion of incidental oesophageal mass.

CONCLUSION

BSE not only plays an important role in the diagnosis of functional oesophageal disorders, but it also demonstrates high sensitivity and specificity in the detection of oesophageal malignancy in the elderly patient with non-specific dysphagia.

CLINICAL RELEVANCE/APPLICATION

For elderly patients complaining of dysphagic symptoms without alarming features of malignancy BSE can serve as an effective first line investigation. This can help reduce the demand of endoscopy for every elderly patient without red flag symptoms and act an alternative investigation for those who are unable to tolerate endoscopy. It is also an useful tool for investigating incidental oesophageal mass found on CT.

SSQ08-04 Abstract Differentiating Malignant from Benign Gastric Mucosal Lesions with Quantitative Analysis in Dual Energy Spectral CT Initial Experience

Thursday, Dec. 1 11:00AM - 11:10AM Room: E353C

Participants
Meng Xiaoyan, BMedSc, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Hu Daoyu, PhD, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Zhen Li, MD, PhD, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
anqin li, Wuhan, China (*Presenter*) Nothing to Disclose

PURPOSE

To investigate the value of quantitative analysis in dual energy spectral computed tomography (DESCT) for differentiating malignant gastric mucosal lesions from benign gastric mucosal lesions (including gastric inflammation and normal gastric mucosa).

METHOD AND MATERIALS

This study was approved by the ethics committee and all patients provided written informed consent. 161 consecutive patients (63 with gastric cancer (GC), 48 with gastric inflammation (GI) and 50 with normal gastric mucosa (NGM)) who underwent dual-phases contrast enhanced DESCT scans in the arterial phase (AP) and portal venous phase (PVP) were included in this study. Iodine concentration (IC) in lesions was derived from the iodine-based material-decomposition images and normalized to that in the aorta to obtain normalized iodine concentration (nIC). The ratios of IC and nIC between the AP and PVP were calculated. Diagnostic confidence for GC and GI was evaluated with reviewing the features including gastric wall thickness, focal and eccentric on the conventional polychromatic images. All statistical analyses were performed by using statistical software SPSS 17.0.

RESULTS

IC and nIC in GC differed significantly from those in GI and NGM, except for nICAP in comparing GC with GI. Mean nIC values of GC (0.18±0.06 in AP and 0.62±0.16 in PVP) were significantly higher than that of NGM (0.12±0.03 in AP and 0.37±0.08 in PVP) (all $p<0.05$). There was also significant difference for IC values in GC, GI and NGM (24.19±8.27 mg/mL, 19.07±5.82 mg/mL and 13.61±2.52 mg/mL, respectively in AP and 28.00±7.01 mg/mL, 24.66±6.55 mg/mL and 16.94±3.06 mg/mL, respectively in PVP). Based on ROC analysis, nIC and IC in PVP had high sensitivities of 88.89% and 90.48%, respectively in differentiating GC from NGM, while the sensitivities were 71.43% and 88.89% during AP. IC and nIC ratios did not provide adequate diagnostic accuracy with their AUCs less than 0.65. With the conventional features, the diagnostic accuracy for GC and GI were 75.0% and 98.0%, respectively.

CONCLUSION

Quantitative analysis of DESCT imaging parameters for gastric mucosa, such as nIC and IC, is useful for differentiating malignant from benign gastric mucosal lesions.

CLINICAL RELEVANCE/APPLICATION

Quantitative analysis of DESCT imaging parameters for gastric mucosa, such as nIC and IC, is useful for differentiating malignant from benign gastric mucosal lesions.

SSQ08-05 3D Dynamic Contrast-Enhanced Ultrasound of Liver Metastases from Gastrointestinal Tumors: First-in-Human Assessment of Feasibility and Reproducibility

Thursday, Dec. 1 11:10AM - 11:20AM Room: E353C

Participants
Ahmed El Kaffas, PhD, Palo Alto, CA (*Presenter*) Co-founder, Oncoustics
Rosa Maria Silveira Sigrist, MD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
George Fisher, MD, PhD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Sunitha Bachawal, PhD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Joy Liau, MD, PhD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Alexander Karanany, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Jarrett Rosenberg, PhD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Huaijun Wang, MD, PhD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Dimitre Hristov, PhD, Stanford, CA (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV Partner, SoniTrack Systems, Inc
Juergen K. Willmann, MD, Stanford, CA (*Abstract Co-Author*) Research Consultant, Bracco Group; Research Grant, Siemens AG; Research Grant, Bracco Group; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company; Advisory Board, Lantheus Medical Imaging, Inc; Advisory Board, Bracco Group

PURPOSE

Dynamic contrast enhanced ultrasound (DCE-US) is a low-cost tool proposed for identifying early responders to cancer therapy. To date, sampling errors resulting from 2D imaging have restricted DCE-US when used to assess highly heterogeneous tumors. The purpose of this study was to perform a first-in-human clinical assessment of 3D DCE-US feasibility and reproducibility, and as a way to overcome sampling errors.

METHOD AND MATERIALS

Patients with liver metastases from gastrointestinal cancers were imaged with a Philips EPIQ7 coupled to an X6-1 matrix transducer. A total of 16 scan sessions were carried out over 10 patients. Pairs of repeated bolus and disruption-replenishment images were acquired within each scan session to determine reproducibility of parameters. Bolus consisted of intravenous injection of 0.2 ml Definity microbubbles followed by saline. Disruption-replenishment was carried out by infusing 0.9 ml of Definity microbubbles in 35.1 ml of saline over 8 min. Volumes-of-interest (VOI) and regions-or-interest (ROI) were segmented in each image to extract time-intensity curves (TICs). Parameters were quantified for the whole VOI and 4 sub-ROIs. Bolus parameters were: time-to-peak (TP), peak enhancement (PE), area-under-the-curve (AUC), mean-transit-time (MTT). Disruption-replenishment parameters were: relative blood volume (rBV), relative blood flow (rBF) and regional mean flow velocity (rMFV).

RESULTS

A large coefficient of variation (CV) was for ROIs from the same volume confirming potential sampling errors. The TP and MTT had the lowest CV while the rBF, rBV and rMFV parameters had the largest plane-to-plane variations with CVs up to 54%. Measurements made in 3D were consistently different than measurements made in 2D with an average percent difference of 60%. Reproducibility, evaluated by the concordance correlation coefficient (CCC) between repeated measurements, was good (0.80) to

excellent (0.95). The TP and MTT were the least reproducible with CCCs lesser than 0.80.

CONCLUSION

This first in human study confirms 2D DCE-US sampling errors and demonstrates that 3D DCE-US imaging with a matrix array transducer is feasible and reproducible in the clinic.

CLINICAL RELEVANCE/APPLICATION

DCE-US is inexpensive, exempt from radiation exposure and available at the bedside. Eliminating sampling errors through 3D imaging further potentiates its role as a clinical tool to identify early response to cancer therapy.

SSQ08-06 Preoperative TNM Stating of Initially Unresectable Gastric Cancer After Neoadjuvant Chemothereapy: Diagnostic Performance of MDCT Using New Staging Criteria

Thursday, Dec. 1 11:20AM - 11:30AM Room: E353C

Participants
Ijin Joo, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Se Hyung Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Cheong-Il Shin, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Su Joa Ahn, Seoul , Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joon Koo Han, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic performance of new MDCT criteria for TNM staging in gastric cancer patients after neoadjuvant chemotherapy.

METHOD AND MATERIALS

This retrospective study was approved by our institutional review board and the requirement for informed consent was waived. We included thirty-seven patients with initially unresectable gastric cancers who underwent neoadjuvant chemotherapy followed by surgery. MDCT images were reviewed to determine the TNM staging of gastric cancers using new criteria dedicated to assessment after chemotherapy. In the new criteria, non-enhancing perigastric infiltrations do not affect T-staging; non-enhancing lymph nodes are regarded as negative lymph nodes; and subtle remaining infiltrations after marked decrease in distant metastasis size are regarded as M0. Using pathologic stages or operation records as the reference standard, the diagnostic performance of MDCT using the new criteria was assessed.

RESULTS

According to histologic analysis, T-staging was confirmed in 34 patients including 5 ypT4b cases and N-staging was confirmed in 37 patients including 17 ypN-positive cases. Using histology or operation records, 10 patients were confirmed as M1 and 26 patients as M0. Sensitivity, specificity, and accuracy of MDCT for the diagnosis of adjacent organ invasion (T4b); regional LN metastases (N-positive); and distant metastases (M1) were 80.0% (4/5), 96.6% (28/29), 94.1% (32/34); 70.6% (12/17), 70.0% (14/20), 70.3% (26/37); and 60.0% (6/10), 100% (26/26), 88.9% (32/36), respectively.

CONCLUSION

By applying new criteria for initially unresectable gastric cancers after neoadjuvant chemotherapy, MDCT demonstrated good diagnostic performances for the determination of adjacent organ invasion or distant metastases.

CLINICAL RELEVANCE/APPLICATION

In unresectable gastric cancer patients, MDCT may be useful in selecting resection candidates after neoadjuvant therapy as it shows high specificity for adjacent organ invasion and distant metastases.

SSQ08-07 A Prediction Model using Computed Tomographic Findings for Peritoneal Carcinomatosis in Patients with Advanced Gastric Cancer

Thursday, Dec. 1 11:30AM - 11:40AM Room: E353C

Participants
Mimi Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Woo Kyoung Jeong, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Dongil Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kyoung Doo Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Soon Jin Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Won Jae Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Samsung Electronics Co, Ltd

PURPOSE

The sensitivity of computed tomography (CT) for detection of peritoneal carcinomatosis (PC) of advanced gastric cancer (AGC) before surgery is relatively low. The purpose of our study is to develop a predictive model derived from the CT features of PC in the patients with AGC.

METHOD AND MATERIALS

94 patients (M:F=54:40; mean age, 56.0 years; range, 24-83 years) with PC and randomly sampled 120 patients (M:F=82:39; mean age, 59.4 years; range, 31-83 years) among the 360 AGC patients without PC, who underwent preoperative CT and undergoing surgery between January 2012 and December 2014 were included in the study. A radiologist retrospectively analyzed tumor size, presence of lymph node metastasis, and subtle findings of PC including peritoneal thickening without enhancement, stranding, plaque and small bowel wall thickening or irregularity on a five-point scale and presence of ascites. The definitive CT finding of PC including omental cake and rectal shelf was also evaluated. A prediction model named as PC score was constructed by CT features independently associated with PC with use of multiple logistic regression analysis and diagnostic performance was compared with that of the definitive findings of PC using ROC curve analysis.

RESULTS

Three imaging features of were independently associated with PC: Tumor size larger than 4.2cm (odds ratio [OR]=11.42 [4.02–32.45]), lymph node metastasis (OR=2.20 [1.19–4.06]) and plaque (OR=4.38 [2.86–6.70]). The PC score could be calculated by following formula: PC score = 0.79×lymph node metastasis + 1.48×grades of peritoneal plaque + 2.44×tumor larger than 4.2cm. The PC score showed higher area under the receiver operating characteristic curve (AUC) of 0.915 in the prediction of the PC with higher sensitivity(88.3%) than definitive finding of PC (AUC=0.694, sensitivity=38.3%)

CONCLUSION

Tumor size, lymph node metastasis and peritoneal plaque grading are independently associated with PC of AGC and the derived prediction model shows higher AUC and sensitivity for prediction of PC than definitive finding.

CLINICAL RELEVANCE/APPLICATION

We developed a robust model with high sensitivity to predict PC with the use of preoperative CT findings, and this model may be helpful in customizing the treatment for AGC patients.

SSQ08-08 CT Perfusion Evaluation of Gastric Cancer: Correlation with Histologic Type

Thursday, Dec. 1 11:40AM - 11:50AM Room: E353C

Participants
Dong Ho Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Se Hyung Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joon Koo Han, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To prospectively evaluate if the perfusion parameters of gastric cancer can provide information regarding histologic types of gastric cancers.

METHOD AND MATERIALS

Our institutional review board approved this study and informed consent was obtained from all patients. Between October 2015 and March 2016, 19 patients who underwent preoperative perfusion CT (PCT) and subsequent curative gastrectomy were enrolled. PCT data were analyzed using dedicated software program (VPCT body, Siemens Medical System). We calculated blood flow, blood volume, mean transit time, time-to-peak, and permeability surface value of gastric cancers. Perfusion parameters were compared according to histologic type (poorly cohesive carcinoma [PCC] versus non-PCC), tumor differentiation (well or moderately differentiated versus poorly differentiated) and N-staging (positive versus negative lymph node metastasis) using Mann-Whitney U test. Receiver operating characteristic analysis was used to determine the optimal cut-off value of significant parameters.

RESULTS

Permeability surface value of PCC was significantly higher than other histologic types (44.9 ml/100g/min in PCC versus 25.2 ml/100g/min in non-PCC, P=0.005). The area under the curve for permeability surface value to predict PCC was 0.875. Sensitivity of 88.9% (8/9) and specificity of 90.9% (10/11) were achieved with a cut-off value of 37.9 ml/100g/min. Other perfusion parameters were not significantly different according to histologic type, tumor differentiation, and N-staging of gastric cancers.

CONCLUSION

Obtaining perfusion parameters from PCT was feasible in all patients with gastric cancers. A preoperative imaging diagnosis of PCC type gastric cancers could be possible with a permeability surface value of PCC which was significantly higher than non-PCC.

CLINICAL RELEVANCE/APPLICATION

Exact preoperative differentiation between poorly cohesive carcinoma (PCC) and non-PCC by perfusion CT may be clinically useful as CT can overcome the sampling error by endoscopic biopsy.

SSQ08-09 A Comparison Between 3.0T MRI and Histopathology for Preoperative T Staging of Potentially Resectable Esophageal Cancer

Thursday, Dec. 1 11:50AM - 12:00PM Room: E353C

Participants
Zhaoqi Wang, Zhengzhou, China (*Presenter*) Nothing to Disclose
Hui Liu, Shanghai, China (*Abstract Co-Author*) Employee, Siemens AG
Hongkai Zhang, zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jinrong Qu, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To explore the value of 3.0T MRI using multiple sequences (star VIBE, Blade and Diffusion-weighted imaging/DWI) in evaluating the preoperative T staging for potentially resectable espophageal cancer (EC) with pathologic confirmation.

METHOD AND MATERIALS

Sixty-six patients with endoscopically proven EC and indeterminate T1/T2/T3/T4a staging by CT were examined on a 3T scanner. Two independent readers assigned a T staging on MRI according to the 7th edition of UICC-AJCC TNM Classification, and post-operative pathologic confirmation was considered the gold standard. Inter-reader agreement was also calculated.

RESULTS

The accuracy of MRI T staging was: 82% (54/66) for reader 1, 86% (57/66) for reader 2, Inter-reader agreement is excellent (kappa=0.951). For the EC with invading lamina propria, muscularis mucosae, or submucosa (T1 staging), the T staging of MRI achieved 82% (14/17) agreement for both reader 1 and 2; For invasion of muscularis propria (T2 staging), MRI agreement achieved 90%(20/22)for reader 1 and 100%(22/22)for reader 2; while for the invasion of adventitia (T3 staging), MRI could achieve

agreement in 86%(18/21) for two readers; then for the invasion of pleura, pericardium, diaphragm, or adjacent peritoneum (T4a staging), MRI could achieve agreement is 33%(2/6) and 50%(3/6) for reader 1 and 2, respectively.

CONCLUSION

3.0T MRI using multiple sequences (star VIBE、Blade and DWI) showed high accuracy for patients with potentially resectable EC in T staging. The T staging accuracy of lamina propria or submucosa, muscularis proria and adventitia is better than adjacent membrane structure. 3.0T MRI using multiple sequences could be used as a noninvasive imaging method for pre-operative T staging of EC.

CLINICAL RELEVANCE/APPLICATION

3.0T MRI using multiple sequences (star VIBE、Blade and DWI) could be used as a noninvasive imaging method for pre-operative T staging of EC.

GIS-THA

Gastrointestinal Thursday Poster Discussions

Thursday, Dec. 1 12:15PM - 12:45PM Room: GI Community, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants

Bhavik N. Patel, MD,MBA, Durham, NC (*Moderator*) Nothing to Disclose

Sub-Events

GI403-SD-THA3 Preclinical Spectral Detector CT Scanner Derived Iodine-Based Spectral Images reveal Improved Image Quality Metrics Compared to Conventional CT

Station #3

Participants
Suhny Abbara, MD, Dallas, TX (*Presenter*) Author, Reed Elsevier; Editor, Reed Elsevier; Institutional research agreement, Koninklijke Philips NV; Institutional research agreement, Siemens AG
Lakshmi Ananthakrishnan, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
William A. Moore, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Luna Fahoum, Andover, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Zimam Romman, MSc, Haifa, Israel (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Julia R. Fielding, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Xinhui Duan, PhD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Several types of Iodine-based spectral derived images (SDIs) can be reconstructed from a preclinical prototype Spectral Detector CT (SDCT) scanner (IQon, Philips Healthcare) at no additional radiation dose. The potential incremental value over conventional filtered back projection (FBP) images alone has not been evaluated to date. We aim to determine image quality parameters and potential incremental value of iodine-based SDIs obtained from a SDCT scanner.

METHOD AND MATERIALS

This prospective IRB approved study consists of 562 individual CT DICOM dataset reconstructed from 73 unique SBIs in 53 patients (some had multiple contrast phases). Reconstructions included conventional CT, and the following spectral derived images: Iodine-No-Water and quantitative Iodine-Density image datasets.Image quality and lesion detectability was evaluated on Likert scales (much worse, worse, similar, moderately better, much better) for 1) iodine enhancement 2) hypodense lesion/structure detection, 3) hyper dense lesion/structure detection.Diagnostic reader confidence was evaluated on a 4 point scale (low, moderate, good, high). Comparative statistics were performed.

RESULTS

Iodine enhancement seen in Iodine-No-Water scored 'moderately better' (3.9±0.9, n=31) and 'similar' to 'moderately better' on Iodine-Density SDIs (3.6±1.0, n=35) compared to FBP.Detection of hyper dense structures on Iodine-No-Water and Iodine-Density images was 'similar' to 'moderately better' (3.5±1.1, n=31 and 2.9±1.5, n=34).Compared to conventional images, no added value was found in the detection of hypo dense structures (Iodine-No-Water 2.2±1.2, n=30, Iodine-Density 2.0±1.3, n=34).Diagnostic confidence rating averages scored 'good' to 'high' for iodine enhancement on the Iodine-no-Water images (3.1±0.8) and 'moderate' to 'good' on the Iodine-Density images. Hyper dense structure detection was 'moderate' to 'good' on the Iodine-No-Water images.

CONCLUSION

Iodine-based spectral derived images can be obtained from a novel detection based spectral CT scanner. This study shows that these SDIs improved high attenuation structure detectability due to improved contrast enhancement compared to conventional FBP images.

CLINICAL RELEVANCE/APPLICATION

Iodine-based spectral derived images from a novel detection based spectral CT scanner have favourable image quality parameters and incremental value for lesion detectability compared to conventional CT images alone.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Suhny Abbara, MD - 2014 Honored Educator

GI404-SD-THA4 The Prognostic Value of Gadoxetic-acid Enhanced MRI in Prediction of Patients' Survival Following Liver Transplantation for Hepatocellular Carcinoma

Station #4

Participants
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Tae Wook Kang, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Given the limited availability of donor organs for liver transplantation (LT) and recent attempt to expand the Milan criteria, careful patient selection is mandatory to reduce tumor recurrence and maximize the effectiveness. We hypothesized that preoperative magnetic resonance imaging (MRI) can provide prognostic power in prediction of tumor recurrence and survival rate in patient with LT for hepatocellular carcinoma (HCC).

METHOD AND MATERIALS

HCC patients (n=65) with preoperative gadoxetic-acid enhanced MRI underwent LT between Jan. 2009 to Jun. 2012. MRI parameters including signal intensity of the tumor, enhancement pattern and diffusivity were evaluated retrospectively by two radiologists. Overall and disease-free survival rates were analyzed. Uni- and multivariate analyses with MRI parameters, serum alpha-fetoprotein (AFP), and pathologic findings were performed for prediction of overall survival and HCC recurrence. And relationship between selected variables in imaging and pathologic findings was evaluated.

RESULTS

The 3-year overall and recurrence-free survival rate were 76.7% and 70.4%, respectively. In multivariate analyses, only peritumoral hypointensity on hepatobiliary phase (HBP) (hazard ratio [HR], 8.77; p<0.001) on MRI and intrahepatic metastasis (HR, 2.89; p=0.03) on pathology were significant predictable factor for overall survival. And both the presence of satellite nodule (HR, 5.56; p=0.006) and peritumoral hypointensity on HBP (HR, 11.90; p<0.001) on MRI and histologic grade (HR, 4.98; p =0.006) and absence of fibrous capsule (HR, 3.03; p=0.018) on pathology were significant risk of tumor recurrence. AFP was an independent prognostic factor for both overall survival (HR, 1.26; p=0.025) and tumor recurrence (HR, 1.47; p<0.001). Among the significant predictive variables on preoperative MRI, peritumoral hypointensity on HBP was correlated to the tumor grade on pathologic finding (p=0.015). And presence of satellite nodule on preoperative MRI was correlated to the intrahepatic metastasis on pathology (p<0.001).

CONCLUSION

Peritumoral hypointensity on HBP on preoperative MRI was significant predictable factor for overall survival and tumor recurrence after LT for HCC, and correlated to the tumor grade on pathologic finding.

CLINICAL RELEVANCE/APPLICATION

Prediction of tumor recurrence and survival after LT for HCC can be attempted using preoperative MRI, and this might be helpful in selection of best candidate for LT.

GI405-SD-THA5 Dynamic Enhancement Pattern of Insulinomas on Volume Perfusion CT

Station #5

Participants
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PURPOSE

To assess the enhancement pattern of insulinomas on volume perfusion CT (VPCT), and to select phases for optimal tumor-parenchyma contrast.

METHOD AND MATERIALS

From August 2014 to December 2015, consecutive patients who underwent VPCT of the pancreas (80kV) with clinically suspected insulinomas were identified. Patients who received surgery and had pathological diagnosis of insulinomas were included, and patients with known multiple endocrine syndrome were excluded. Two experienced radiologists retrospectively evaluated tumor enhancement patterns on VPCT and analyzed the time-attenuation curve of the tumor and pancreatic parenchyma in consensus. The tumors were identified on CT with reference to surgical reports. Tumor-parenchyma contrast at each time point was measured and phases for optimal tumor-parenchyma contrast were selected.

RESULTS

Sixty-three patients were included,with 63 tumors.Five tumors were isoattenuating (tumor-parenchyma contrast <20HU in all 25 dynamic phases), 19 tumors had transient hyperenhancement (tumor-parenchyma contrast >20HU, duration < 10s), and 39 tumors had persistent hyperenhancement. Optimal tumor-parenchyma contrast was observed 9 s after abdominal aorta arriving at threshold of 200HU (AAT), with mean tumor-parenchyma attenuation difference of 77.6±57.2HU. At 9 s after AAT, 14 tumors were isoattenuating, including 5 tumors with intrinsic low contrast and 9 tumors with missed transient hyperenhancement. Complementary phases could be 12 s after AAT (detects another 4 tumors), 4 s after AAT and 1s after AAT (both detect another 3 tumors).

CONCLUSION

VPCT enables detection of insulinomas even if the hyperenhancement is transient. Optimal tumor-parenchyma contrast occurs 9 s after AAT. Tumors that are inconspicous on single- or biphasic contrast enhanced CT are mainly due to missed transient hyperenhancement.

CLINICAL RELEVANCE/APPLICATION

By analyzing dynamic enhancement of insulinomas, a single opitmal phase was selected, which yeilded the maximum tumor-parenchyma contrast and facilitates detection of insulinomas with low radiation dose. It was also found that transient hyperenhancement was the main reason that some insulinomas were inconspicuous on single- or biphasic enhanced CT.VPCT could detect insulinomas even if the hyperenhancement was transient.

GI406-SD-THA6 3D Dynamic Contrast-Enhanced Ultrasound of Liver Metastases from Gastrointestinal Tumors: First-in-Human Assessment of Feasibility and Reproducibility

Station #6

Participants
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PURPOSE

Dynamic contrast enhanced ultrasound (DCE-US) is a low-cost tool proposed for identifying early responders to cancer therapy. To date, sampling errors resulting from 2D imaging have restricted DCE-US when used to assess highly heterogeneous tumors. The purpose of this study was to perform a first-in-human clinical assessment of 3D DCE-US feasibility and reproducibility, and as a way to overcome sampling errors.

METHOD AND MATERIALS

Patients with liver metastases from gastrointestinal cancers were imaged with a Philips EPIQ7 coupled to an X6-1 matrix transducer. A total of 16 scan sessions were carried out over 10 patients. Pairs of repeated bolus and disruption-replenishment images were acquired within each scan session to determine reproducibility of parameters. Bolus consisted of intravenous injection of 0.2 ml Definity microbubbles followed by saline. Disruption-replenishment was carried out by infusing 0.9 ml of Definity microbubbles in 35.1 ml of saline over 8 min. Volumes-of-interest (VOI) and regions-or-interest (ROI) were segmented in each image to extract time-intensity curves (TICs). Parameters were quantified for the whole VOI and 4 sub-ROIs. Bolus parameters were: time-to-peak (TP), peak enhancement (PE), area-under-the-curve (AUC), mean-transit-time (MTT). Disruption-replenishment parameters were: relative blood volume (rBV), relative blood flow (rBF) and regional mean flow velocity (rMFV).

RESULTS

A large coefficient of variation (CV) was for ROIs from the same volume confirming potential sampling errors. The TP and MTT had the lowest CV while the rBF, rBV and rMFV parameters had the largest plane-to-plane variations with CVs up to 54%. Measurements made in 3D were consistently different than measurements made in 2D with an average percent difference of 60%. Reproducibility, evaluated by the concordance correlation coefficient (CCC) between repeated measurements, was good (0.80) to excellent (0.95). The TP and MTT were the least reproducible with CCCs lesser than 0.80.

CONCLUSION

This first in human study confirms 2D DCE-US sampling errors and demonstrates that 3D DCE-US imaging with a matrix array transducer is feasible and reproducible in the clinic.

CLINICAL RELEVANCE/APPLICATION

DCE-US is inexpensive, exempt from radiation exposure and available at the bedside. Eliminating sampling errors through 3D imaging further potentiates its role as a clinical tool to identify early response to cancer therapy.

GI286-ED-THA7 Collateral Damage: Unintended Consequences of Oncologic Therapy in the Chest, Abdomen, and Pelvis

Station #7

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
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Lori M. Watumull, MD, Dallas, TX (*Abstract Co-Author*) Research Grant, Toshiba Corporation
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TEACHING POINTS

Radiologists must differentiate effects of various oncologic therapies to help direct management and improve patient outcomes. GI complications from oncologic therapies include inflammation, pneumatosis, fistulae, perforation, graft-versus-host disease (GVHD). Unintended liver abnormalities from oncologic therapy include steatosis, hepatitis, fibrosis, vascular changes. Pancreaticobiliary, GU, vascular, and other systemic complications may manifest on imaging.

TABLE OF CONTENTS/OUTLINE

Chemotherapy- cytotoxic, molecular, immunotherapy GI - inflammation, pneumatosis, necrosis, perforation, fistula, bleed Liver - Steatosis, pseudocirrhosis, autoimmune hepatitis, Hepatic Veno-Occlusive Disease (HVOD) Pancreaticobiliary - Pancreatitis, cholangitis, strictures Genitourinary - Nephrotoxicity, cystitis Vascular – Arterial/venous thrombosis, atherosclerosis Other organs, pseudoprogression, radiation recall Local/regional Rx (ablation, trans-arterial chemoembolization, radiation therapy) GI - Gastritis, radiation enteritis Liver - Radiation injury, fibrosis Biliary - Cholangitis, stricture, biloma, gallbladder injury GU - renal, bladder, fistula Other - infection, dehiscence Bone Marrow Transplant Liver - HVOD, portal hypertension GI - inflammation, pneumatosis, fistula Systemic – PTLD, GVHD

Awards

GI208-ED-THA8 HIV below the Belt: Infections, Tumors and Everything in Between

Station #8

Certificate of Merit

Participants
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Cecilia M. Jude, MD, Los Angeles, CA (*Abstract Co-Author*) Author, UpToDate, Inc
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Shaden F. Mohammad, MD, Sylmar, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Because HIV can remain undiagnosed or untreated, abdominal manifestations of HIV-associated diseases may be a main presenting feature. Familiarity with these diseases can lead to correct diagnosis and treatment.The purpose of this exhibit is to: Review the pathophysiology and clinical presentations of HIV-associated infections and neoplasms in the abdomen and pelvis. Illustrate the characteristic imaging features of these entities, including treatment related abnormalities. Integrate clinical and radiographic findings to guide appropriate management.

TABLE OF CONTENTS/OUTLINE

HIV-related infections and neoplasms can have a variety of manifestations and involve multiple organ systems. Treatment response may mimic worsening of an underlying disease. Opportunistic infections Bacterial Mycobacteria Clostridium difficile Typhlitis: gram-positive organisms Bartonella henselae Fungal Candida Histoplasma capsulatum Viral Cytomegalovirus Herpes simplex virus 3 Protozoal infections: Cryptosporidium Pneumocystis jirovecii AIDS-related neoplasia Kaposi sarcoma Non-Hodgkin's lymphoma HIV-related organ manifestations Treatment related Immune reconstitution inflammatory syndrome (IRIS)

GI183-ED-THA9 Abdominal Masses with Central Scar: No Organ Left Behind

Station #9

Participants
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Daniel Kowal, MD, Sturbridge, MA (*Presenter*) Nothing to Disclose

TEACHING POINTS

To present abdominal mass lesions associated with a central scar (CS). To emphasize that while CS is important to recognize, it is not always pathognomonic for diagnosis, but is often useful as a supplemental diagnostic feature.

TABLE OF CONTENTS/OUTLINE

Numerous abdominal masses contain a CS which may guide a differential diagnosis. A clear understanding of imaging characteristics of not only the scar, but of the mass itself is imperative to avoid pitfalls and mimics. Focal nodular hyperplasia, fibrolamellar hepatocellular carcinoma, giant hemangioma, and metastases are hepatic masses that may be associated with CS. MRI signal characteristics, enhancement patterns, hepatocyte-specific gadolinium-based contrast agents, and presence of calcification aid to differentiate hepatic masses. Pancreatic serous cystadenoma is a benign lesion with a CS which may be calcified. Sclerosing angiomatoid nodular transformation is a rare splenic lesion often associated with a CS which is T2 hyperintense and hypoenhancing on MRI. Splenic pseudotumor is also a rare benign entity with a central stellate scar. CS is seen in 50% of cases of benign renal oncocytoma, but renal cell carcinoma may also exhibit a scar. CS in an abdominal mass is important to recognize, but its presence or absence should not preclude the diagnosis of certain abdominal tumors.

GIS-THB

Gastrointestinal Thursday Poster Discussions

Thursday, Dec. 1 12:45PM - 1:15PM Room: GI Community, Learning Center

GI

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
Bhavik N. Patel, MD,MBA, Durham, NC (*Moderator*) Nothing to Disclose

Sub-Events

GI407-SD-THB1 Diagnostic Performance of Surveillance US and Influencing Factors on US Visibility of HCCs: A Prospective Study in Patients with Cirrhosis at High Risk of HCC

Station #1

Participants
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PURPOSE

To investigate diagnostic performance, the characteristics of nodules detected on surveillance US and influencing factors on US visibility of HCCs in patients with cirrhosis at high risk of HCC.

METHOD AND MATERIALS

A prospective surveillance study included 407 consecutive patients with an estimated annual risk of HCC >5% who underwent one to three, biannual surveillance US examinations combined with US elastography between November 2011 and August 2014. The findings of lesions detected on US were recorded in a predefined standardized way using a four-point scale indicating the likelihood of HCC, i.e. suspicious, equivocal, probably benign or definitely benign/negative, corresponding to categories 4, 3, 2, and 1, respectively. The confirmation of HCC was based on the results of a histologic examination and/or typical CT images of HCC. The detection rate of HCC and the false-positive rate were calculated. The characteristics of category 4 nodules detected on US were determined using the simultaneous or follow-up gadoxetic acid-enhanced MRI and CT. We investigated clinical factors, including the Child-Pugh class and body mass index as well as imaging characteristics such as liver stiffness, US image quality, tumor location, and tumor size, all of which possibly influenced the US visibility of HCCs.

RESULTS

Among the 43 patients with HCCs found during 1100 US screening sessions, the detection rate of HCC was 27.9% (12/43) and the false positive rate was 5.6% (59/1057). Among the 71 category 4 lesions, 12 were HCC, 27 were not matched with any lesions seen on MRI or CT, 20 were confirmed as cirrhosis-related nodules, four were exophytic hepatic parenchyma, four were hemangiomas, three were complicated cysts, and one was abnormal vasculature. Among the clinical and imaging characteristics, a subcapsular location was the only significant factor related to the failure to detect HCC on US (P=0.019). Among 20 HCCs in subcapsular locations, US detected only two HCCs.

CONCLUSION

In patients with cirrhosis at high risk of HCC, surveillance US did not show satisfactory diagnostic performance. The subcapsular location of HCC can be the cause of the suboptimal detection rate.

CLINICAL RELEVANCE/APPLICATION

US is a suboptimal surveillance tool for HCC in patients with cirrhosis at high risk of HCC. The subcapsular area of the liver is where strict scrutiny should be applied when US is performed in these patients.

GI408-SD-THB2 Diagnostic Accuracy of Colonic Lesions in Ultra-low Dose CT Colonography: Is Diagnosis in Sub-mSv Possible?

Station #2

Participants
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Takahiro Yasaka, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Kenichi Utano, MD, Aizuwakamatu-shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Takashi Kato, MD, Sapporo, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic accuracy of ultra-low dose CT Colonography (CTC).

METHOD AND MATERIALS

Two hundred patients, (98 male and 102 female, average age 67.5 years), who were scheduled for total colonoscopy (TCS), underwent ultra-low dose CTC. These patients were scanned in prone and supine positions by the 80-slices MDCT with the scanning conditions set to 120 kV, SD45-50, and an adaptive iterative reconstruction algorithm was applied . The targeted size of lesions, which were pathologically diagnosed as adenoma and adenocarcinoma, were 10 mm or larger. A radiologist (R) and a gastroenterologist (G), who had extensive experience of reading CTC images and did not know the endoscopy results, performed the reading independently. By using TCS as a gold standard, the Sensitivity, Specificity, PPV and NPV were calculated.

RESULTS

DLP (mGy/cm) was 21.31 (0.32 mSv) for supine and 21.27 (0.32 mSv) for prone (converted using an effective dose conversion coefficient of 0.015).
The CTC per-lesion sensitivity R 73% / G 71% and PPV R 79% / G 94% for lesions larger than 10 mm (n = 45). None of the flat lesions was identified in CTC, but the accuracy for elevated lesions excluding flat lesions was sensitivity R 87% / G 84% and PPV R 85% / G 94%. For the per-patient, sensitivity, specificity, PPV and NPV were R 74% / G 74%, R 96% / G 99%, R 83% / G 94% and R 94% / G 94%, respectively.

CONCLUSION

Detecting elevated lesions in ultra-low dose CTC is possible with a good diagnostic accuracy; however, detecting flat lesions in ultra-low dose CTC is not possible due to the poor accuracy. It is considered as a limitation.

CLINICAL RELEVANCE/APPLICATION

We have reduced the radiation dose as much as possible by utilizing scanning technology clinically available today. Accuracy for detecting elevated lesions was good at sub-mSv CT scan, and the results of this study will provide an indicator for the most suitable ways to achieve dose reduction in the future.

GI409-SD-THB3 Radiology-pathology Box: A Tool for MRI Guidance of Ex Vivo Histopathologic Analysis

Station #3

Participants
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Timothy Colgan, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Emily Winslow, MD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Scott B. Reeder, MD, PhD, Madison, WI (*Abstract Co-Author*) Institutional research support, General Electric Company Institutional research support, Bracco Group

PURPOSE

Ex vivo pathologic analysis and lesion identification in resected specimen is demanding due to tissue deformation and altered orientation. Small lesion in particular can therefore be missed during tissue sectioning potentially impacting the staging of malignancies. As delineation of resection margins and tumor burden is of utmost importance, we aimed to develop an MRI compatible localization device and test its feasibility for localizing small lesions in explanted liver tissue.

METHOD AND MATERIALS

An MR-compatible localization device was entirely constructed from Plexiglas consisting of two stationary and one removable MR-visible grid, creating a 3D matrix (Figure). Laser-edged grid lines and labels filled with silicone gel for MR visibility in three dimensions. Alginate is used to fix and stabilize tissue during imaging and cutting. Slicing of the specimen within the box is enabled in a guided fashion through prefabricated grooves corresponding to the grid lines of the device (y-direction). To test the device, five specimen of swine liver with a random number of lesions created by thermoablation (lesion size: 5-15 mm) were imaged on a 3T MR scanner. The MR protocol consisted of a high-resolution T1 SPGRE-sequence (0.5x0.5x0.4mm3). Two readers independently evaluated lesion coordinates and size, which was then correlated with results from cutting.

RESULTS

Imaging with the device was feasible and all images were of high diagnostic quality. All 38 lesions were detected in the expected localization with the exception of one lesion incorrectly localized by one of the two readers. Inter-reader agreement of lesion localization was excellent (0.92). Size (5-12mm) was correct within +/-2mm, in 34/35 lesions.

CONCLUSION

The MR-visible device proved feasible for detection and localization of liver lesions, and has potential to play an important role in lesion identification and in radiologic-pathologic evaluation. Assuming that a comparably high sensitivity can be achieved in clinical trials, this device may enable image-guided pathologic analysis . In addition, this tool might give further insight into radiologic-pathologic correlation of lesions if in vivo-, ex vivo MR data and histopathology is available.

CLINICAL RELEVANCE/APPLICATION

This tool enables ex vivo lesion detection and localization in resected specimen. This might lead to focused histopathologic analysis which has the potential to impact tumor staging and grading.

GI410-SD-THB4 Value of Advanced Virtual Monoenergetic Images with Third-generation Dual-Energy CT in Detecting Early Gastric Cancer

Station #4

Participants
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Jingjuan Liu, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
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Zheng Yu Jin, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the impact of advanced monoenergetic dual-energy computed tomography (DECT) datasets on detection rate and contrast-to-noise ratio (CNR) of early gastric cancer (EGC) on the third generation DECT.

METHOD AND MATERIALS

20 patients suspected of EGC were prospectively enrolled in this study. Arterial phase (AP) and portal phase (PP) imaging were acquired in dual-energy mode (80/Sn150KV) using third-generation DECT (SOMATOM Force, Siemens Healthcare, Germany). Monoenergetic images (MEIs) (range 40-100keV) were calculated from the 80 and Sn150KV image data using monoenergetic software (Dual energy Mono+, syngo via, Siemens). Differences in detection rates of EGC and CNR numbers were compared between different MEIs from 40 to 100 keV and conventionally reconstructed polyenergetic images (PEIs) at 120 kVp. Histopathologic analysis of resected gastric specimens was used as reference standard. Radiation metrics were compared with those obtained in the second-general DECT (Definition Flash, Siemens Healthcare, Germany) from published reports.

RESULTS

MEIs at 40keV and 50keV showed the highest detection rates (60.0% and 60.0% respectively) for EGC, which showed no significant difference with PEIs(35%)(P=0.205). For EGC lesions of less than 2cm, an increase in the detection rates was observed from MEIs at 40keV and 50keV(53.8%,7/13 and 53.8%,7/13) as compared to PEIs(23.1%,3/13), though no statistical significance was found (P=0.226). MEIs at 40keV and 50keV revealed statistical higher CNR-AP and CNR-PP compared to PEIs (all P<0.05). The CTDIvol of the AP and PP were 4.28 ± 0.92 mGy and 4.67 ± 0.95 mGy respectively, which was about 35% of the radiation dose when using routine second-generation DECT (100/Sn140KV) from literatures.

CONCLUSION

Virtual 40keV and 50keV monoenergetic images calculated using the Mono+ algorithm significantly increase the CNR of EGC, which was helpful to enhance the EGC detection rate. Third-generation DECT could potentially allow for radiation dose reduction in EGC detection as compared to the second-general DECT.

CLINICAL RELEVANCE/APPLICATION

The third-generation DECT with Mono+ technique could improve the detection rate of early gastric cancer and result in substantial radiation dose reduction for patients.

GI278-ED-THB7 Computed Tomography (CT) Imaging of Abdominal Hernias Following Mesh Repairs

Station #7

Participants
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Belen Tesfaye, MD, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
Daniel Tran, MD, Washington, DC (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

At the end of this presentation, participants will be able to: Identify normal findings on CT images after abdominal hernia repairs Understand the importance of CT imaging in the identification of mesh displacement, mesh migration, abscess formation, pseudo-abscess formaion, and other complications Better detect and manage complications following hernia repairs in the early post-mesh repair period

TABLE OF CONTENTS/OUTLINE

Review the use of mesh repairs following abdominal hernias and the normal post-op imaging appearance Describe the types of complications that may ensue as a result of hernia repairs and review CT findings of such complications State the relevance of monitoring patients in the early post-mesh repair period and early detection of complications

GI298-ED-THB8 Hepatic Lesions that Mimic Metastasis on Radiological Imaging during Chemotherapy for Gastrointestinal Malignancy: Recent Updates

Station #8

Awards
Certificate of Merit

Participants
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TEACHING POINTS

For multidisciplinary teams involved in cancer care, the precise imaging validation of a newly detected hepatic nodule has become

For multidisciplinary teams involved in cancer care, the precise imaging validation of a newly detected hepatic nodule has become crucial to achieve optimal treatment during chemotherapy for malignancies. Hepatic incidentaloma arising from chemotherapy–induced parenchymal injury, tumor-associated eosinophilic abscess, and fungal infection should be considered a mimicker of metastasis in patients with gastrointestinal malignancy. We have reviewed widely used causative chemo-agents, the updated concept of chemotherapy–induced hepatopathies, and other hepatic pseudometastasis focusing on their pathological and radiological findings for accurate diagnosis.

TABLE OF CONTENTS/OUTLINE

A. The concept of imitator of hepatic metastasis during chemotherapyB. Chemotherapy-induced focal hepatopathy *Chemotherapy for gastrointestinal malignancy Chemotherapy-induced focal sinusoidal injury* Pathophysiology / Clinical issues/ Imaging Features ***Chemotherapy-induced focal steatosis/steatohepatitis*** Pathophysiology / Clinical issues/ Imaging features**C. Tumor-associated eosinophilic abscess in the liver** Pathophysiology / Clinical issues/ Imaging features**D. Compromised immunity-associated fungal abscess in the liver** Pathophysiology / Clinical issues/ Imaging features**E. The Take-home message**

GI113-ED-THB9 **The Ever-Changing Landscape of Medical Devices Found in the Abdomen and Pelvis: What the Radiologist Can Tell the Clinician**

Station #9

Participants
Everett Gu, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Ashish P. Wasnik, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Ravi K. Kaza, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Mahmoud M. Al-Hawary, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

While viewing this exhibit, participants will: Review common medical devices and gain exposure to newer or more uncommon medical devices found in the abdomen and pelvis. Appreciate the physical appearance of a spectrum of medical devices as portrayed in photographs, and be comfortable recognizing these devices on plain radiographs and CT. Understand how to properly evaluate various medical devices, including appropriate positioning and potential complications.

TABLE OF CONTENTS/OUTLINE

Introduction explaining the importance of identifying and evaluating medical devices Overview of various medical devices found in the abdomen and pelvis, grouped into five major categories: Gastrointestinal (e.g. Sengstaken-Blakemore tubes, esophageal stents, over-the-scope clips) Hepatobiliary (e.g. cholecystostomy tubes, biliary stents, cystogastrostomy stents) Genitourinary (e.g. vaginal pessaries, tubal ligation clips, artificial urinary sphincters) Vascular (e.g. endografts, endovascular cooling catheters) Body wall (e.g. spinal cord stimulators, baclofen pumps) Dedicated slides for each medical device, which will focus on the purpose of the device, appropriate placement, and potential complications, supplemented with photographs and radiology images Summary emphasizing the role of radiology in evaluating medical devices

MSCA51

Case-based Review of the Abdomen (An Interactive Session)

Thursday, Dec. 1 1:30PM - 3:00PM Room: S406A

GI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Julie H. Song, MD, Providence, RI (*Director*) Nothing to Disclose

Sub-Events

MSCA51A Pancreatic Imaging

Participants
Jay P. Heiken, MD, Saint Louis, MO, (heikenj@wustl.edu) (*Presenter*) Patent agreement, Guerbet SA; Patent agreement, Bayer AG

LEARNING OBJECTIVES

1) Identify the differential imaging features of solid and cystic pancreatic neoplasms. 2) Make appropriate recommendations for characterization, follow-up and/or treatment of an incidentally discovered pancreatic mass. 3) Recognize and appropriately characterize pancreatitis and its complications.

MSCA51B Hepatobiliary Disorders

Participants
Jeong Min Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Grant, Guerbet SA; Support, Siemens AG; Grant, Bayer AG; Grant, General Electric Company; Grant, STARmed Co, Ltd; Grant, RF Medical Co, Ltd; Grant, Toshiba Corporation; Grant, Samsung Medical Healthcare

LEARNING OBJECTIVES

1) Demonstrate typical and atypical imaging appearances of common hepatobiliary diseases. 2) Illustrate key imaging findings that aid in differential diagnosis. 3) Learn to avoid pitfalls and misdiagnoses of hepatobiliary lesions.

MSCA51C Congenital Abdominal Pathology that Can be Seen in Adults

Participants
Sudha A. Anupindi, MD, Philadelphia, PA, (anupindi@email.chop.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the essential imaging techniques used to diagnose important congenital abdominal pathology seen into adulthood. 2) Identify the imaging features of these entities. 3) Apply this knowledge into their clinical practice.

ABSTRACT

VSIO51

Interventional Oncology Series: Management of Hepatic Metastases from Colorectal Cancer, Neuroendocrine Tumors and more

Thursday, Dec. 1 1:30PM - 6:00PM Room: S405AB

GI IR

AMA PRA Category 1 Credits ™: 4.50
ARRT Category A+ Credit: 0

FDA Discussions may include off-label uses.

Participants
Sarah B. White, MD,MS, Philadelphia, PA, (sbwhite@mcw.edu) (*Moderator*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, IO Rad

LEARNING OBJECTIVES

The overall objective of this session is to get a better understanding of multimodality, multidisciplinary treatment hepatic dominant metastatic disease. We will accomplish this by:1.) Defining the alphabet soup of the cancer treatments2.) Highlighting the general algorithm for the treatment of mCRC and mNETs3.) Briefly discuss the evidence basis behind medical, surgical, radiation and liver directed therapies4.) Exploring the clinical outcomes and adverse events with the different treatment modalities5.) Demonstrate the necessity of multidisciplinary tumor boards for the treatment of patients with dominant hepatic metastases

Sub-Events

VSIO51-01 Setting the Stage: NCCN/ESMO Guidelines for mCRC

Thursday, Dec. 1 1:30PM - 1:45PM Room: S405AB

Participants
Emily Bergsland, MD, San Francisco, CA (*Presenter*) Institutional research support, Lexicon Pharmaceuticals, Inc; Institutional research support, Merck & Co, Inc; Institutional research support, Novartis AG; Consultant, Ipsen SA; Consultant, Lexicon Pharmaceuticals, Inc;

LEARNING OBJECTIVES

1) Review the general approach to the treatment of metastatic colorectal cancer (mCRC). 2) Summarize the current systemic treatment options for mCRC. 3) Identify the clinical and molecular subgroups of patients with mCRC which have implications in terms of choice of therapy. 4) Examine the differences between published guidelines for the care of patients with mCRC.

ABSTRACT

VSIO51-02 Role of PVE in the Surgical Management of Colorectal Liver Metastases

Thursday, Dec. 1 1:45PM - 2:00PM Room: S405AB

Participants
David C. Madoff, MD, New York, NY (*Presenter*) Advisory Board, RenovoRx

VSIO51-03 Advances in the Surgical Toolbox for Colorectal Liver Metastases

Thursday, Dec. 1 2:00PM - 2:15PM Room: S405AB

Participants
T. Clark Gamblin, MD, MS, Milwaukee, WI (*Presenter*) Nothing to Disclose

VSIO51-04 SBRT for Isolated Hepatic Metastases

Thursday, Dec. 1 2:15PM - 2:30PM Room: S405AB

Participants
Mary U. Feng, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

VSIO51-05 Radiation Map Fusion Guided Combination of External Radiation with Thermal Ablation for up to 5 Liver Tumors & Up to 10cm in Diameter

Thursday, Dec. 1 2:30PM - 2:40PM Room: S405AB

Awards
Student Travel Stipend Award

Participants
Hayet Amalou, MD, Bethesda, MD (*Presenter*) Nothing to Disclose
Deborah Citrin, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Sheng Xu, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Holly Ning, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Robert W. Miller, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, W. L. Gore & Associates, Inc ; Researcher, Cook Group Incorporated; Patent agreement, VitalDyne, Inc; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; ; ; ;
Victoria L. Anderson, MS, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

External beam radiation therapy (XRT) and thermal ablation (RFA or microwave ablation) have complementary risk profiles and synergistic mechanisms. XRT works better with blood flow, but ablation is impaired by perfusion due to convection. XRT is safer in the porta hepatis, but ablation with hydrodissection is safer adjacent to bowel. XRT is typically not given for liver lesions larger than 6 cm due to integral radiation dose toxicities, and ablation is less effective for > 3cm tumors.

METHOD AND MATERIALS

Inclusion criteria included up to 5 liver tumors, each up to 10 cm in diameter. Patients were treated with 5 total fractions (50 Gy total) of XRT over 2 weeks, and RFA or microwave ablation was between fractions 3 and 4. A navigation system for ablation was developed fusing radiation dose map, multiple imaging modalities, and probe locations. Following multi-modality liver registration, the software populated a planned ablation treatment volume by overlapping the expected ablation zone of each probe to define tumor coverage. 3 patients were enrolled.

RESULTS

Fusion software guidance combines XRT with ablation for synergistic treatment of large and/or multiple liver tumors. This combination allows respecting the limitations, while taking advantage of the strengths, of each modality. Multi-modality registration overlays CT images, radiation dose map, planned ablation probe insertion paths, and expected overlapping ablation treatment volumes from multiple probes. Two patients received spatially synergistic treatment, using XRT and ablation to achieve an overall larger lesion coverage compared to what each modality might achieve alone. One patient received temporally synergistic treatment (RFA and radiation to same volume), which resulted in an ablation volume of 59 cm3 after 12 minutes of RFA, (nearly 3 times greater than the expected volume of 20.5 cm3 seen in porcine studies). On most recent follow-up, one of three patients (1 of 5 tumors) had local recurrence and one hepatocellular carcinoma patient remains disease-free over two years after treatment for a 10 cm tumor.

CONCLUSION

Fusion navigation guided by radiation dose map input may facilitate combination of complementary therapies of XRT and thermal ablation, Both spatial and temporal synergy are feasible but speculative..

CLINICAL RELEVANCE/APPLICATION

Complementary combination therapy with XRT + RFA allows treatment of larger liver lesions in otherwise risky locations.

VSIO51-06 New Angles on Ablating Colorectal Liver Metastases

Thursday, Dec. 1 2:40PM - 2:55PM Room: S405AB

Participants
Paul B. Shyn, MD, Boston, MA, (pshyn@bwh.harvard.edu) (*Presenter*) Research Consultant, Galil Medical Ltd; Research Grant, Siemens AG

LEARNING OBJECTIVES

ABSTRACT

LEARNING OBJECTIVES

1) Assess the indications for and efficacy of image-guided ablation of liver metastases in patients with colorectal cancer. 2) Examine the spectrum of ancillary techniques and ablation technologies that expand eligibility for liver tumor ablation. 3) Assess the capabilities of current liver ablation strategies through case examples.

ABSTRACT

VSIO51-07 Prospective MonoIstitutional Study on Safety and Efficacy of dRug-eluting Microspheres Loaded with Irinotecan in Patients with Colorectal Liver mEtastases (Miracle III Trial)

Thursday, Dec. 1 2:55PM - 3:05PM Room: S405AB

Participants
Giovanni Mauri, MD, Milan, Italy (*Presenter*) Consultant, Esaote SpA
Gianluca M. Varano, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Riccardo Foa, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Maria Zampino, Milan, Japan (*Abstract Co-Author*) Nothing to Disclose
Paola Ravenda, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Paolo Della Vigna, MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Lorenzo Monfardini, Brescia, Italy (*Abstract Co-Author*) Nothing to Disclose
Guido Bonomo, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Franco Orsi, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Primary endpoints of the study were the evaluation of the safety of the drug-eluting microspheres loaded with Irinotecan and the liver control rate at three months in patients with colorectal liver metastases. Secondary endpoints were the liver control rate at 6 and 12 months, time to progression and overall survival.

METHOD AND MATERIALS

18 patients with colorectal liver or liver-dominant disease (11 M, 7 F, mean age 62 years, range 47-79) were prospectively enrolled between November 2013 and February 2015. Main characteristics: all patients received > 2 prior lines of systemic therapy (containing Fluoropyrimidines/Oxaliplatin and Irinotecan), 13 were treated with liver surgery or ablation, 14 had extra-hepatic spread at the time of first embolization, 11 had liver bilobar involvement disease with a mean of 9 (range 1-30) hepatic metastases and with mean diameter of 47.6 mm (range 12-161 mm). The study procedure was performed by using 40mm microparticles loaded with 100 mg of Irinotecan and recycled every 4 weeks, at least twice per each lobe and repeated up to

disease progression. Adverse events (AEs) were evaluated according to the NIH-CTC V 4.0 criteria. Response to treatment was evaluated according to RECIST 1.1criteria. Estimated median for time to local tumor progression was calculated using Kaplan-Meyer analysis

RESULTS

Overall, 69 treatments were performed (mean of 3.8/patient, range 2-9);G1/G2 AEs occurred in 42/69 (60.8) procedures while G3, G4 or G5 complications did not occurred.Liver tumor control was achieved in 14/18 (77.8%) patients at 3 months and in 10/18 (55.6%) patients at 6 months. Median time to liver progression was 7 months.

CONCLUSION

Drug-eluting microspheres loaded with Irinotecan are safe and effective in treatment of patients affected by colorectal cancer with predominant hepatic involvement unresponsive to standard therapies.

CLINICAL RELEVANCE/APPLICATION

drug-eluting microspheres loaded with Irinotecan represent a safe and effective option for treating patients with colorectal liver metastases that could be tested in a larger series and early clinical setting.

VSIO51-08 Embolotherapy for CRLM

Thursday, Dec. 1 3:05PM - 3:20PM Room: S405AB

Participants
Michael C. Soulen, MD, Philadelphia, PA, (michael.soulen@uphs.upenn.edu) (*Presenter*) Royalties, Cambridge University Press; Consultant, Guerbet SA; Research support, Guerbet SA; Consultant, BTG International Ltd; Research support, BTG International Ltd; Consultant, Merit Medical Systems, Inc; Speaker, Sirtex Medical Ltd; Consultant, Terumo Corporation; Consultant, Bayer AG

LEARNING OBJECTIVES

1) Learn to select appropriate patients with metastatic colorectal cancer for liver directed therapies. 2) Understand the data for conventional and drug-eluting chemoembolization for treatment of mCRC.

ABSTRACT

VSIO51-09 Detectability of Liver Metastases by Dual Phase Cone-Beam Computed Tomography during Liver-directed Liver Interventions: Comparison with Conventional Contrast-enhanced Computed Tomography

Thursday, Dec. 1 3:20PM - 3:30PM Room: S405AB

Participants
Geert Maleux, MD, PhD, Leuven, Belgium (*Presenter*) Nothing to Disclose
Maria-Louisa Izamis, Best, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Cedric Werbrouck, Leuven, Belgium (*Abstract Co-Author*) Nothing to Disclose
Alessandro G. Radaelli, PHD, MS, Best, Netherlands (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Vincent R. Vandecaveye, MD, Leuven, Belgium (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the diagnostic performance of intra-arterial dual phase cone-beam computed tomography (DP-CBCT) and contrast-enhanced computed tomography (CE-CT) in accurately characterizing tumor burden in patients with metastatic liver cancer.

METHOD AND MATERIALS

This retrospective study included patients with liver metastases, referred for catheter-directed liver intervention. Demographic and radiological data were gathered, including type of tumor, number, maximum size, type and degree of contrast enhancement of liver metastases.

RESULTS

29 patients with colorectal (n=10), breast (n=9) and neuroendocrine (n=10) liver metastases were included. DP-CBCT and CE-CT were in agreement on number and distribution of liver metastases in 18 out of 29 patients (62%). In 9 out of 11 patients DP-CBCT and CE-CT identified a mean of 7.2 and 10 metastases, respectively (P=0.025). In 2 out of 11 patients DP-CBCT identified less (n=1) or more (n=1) metastases than CE-CT. Metastases were larger in diameter on DP-CBCT than on CE-CT regardless of origin: colorectal: 57 +/- 9.5 mm vs 43 +/- 8.3 mm, P=0.02; breast: 57 +/- 10 mm vs 43 +/- 8.5 mm, P=0.03 and neuroendocrine: 56 +/- 6.3 mm vs 51 +/- 5.8 mm, P= 0.01. In colorectal metastases, rim enhancement appeared in 100% of cases on DP-CBCT, but was variable on CE-CT. In breast metastases, DP-CBCT displayed thick, hyper-dense rims while CE-CT did not, or had rims of variable thickness and density. Neuroendocrine tumors had variable rim enhancement within the same patient and differed between DP-CBCT and CE-CT in 40% of patients.

CONCLUSION

DP-CBCT appears to identify the vast majority of liver metastases, demonstrates a larger diameter and a peripherally enhancing tumoral rim compared to CE-CT; in more than 30% of patients, DP-CBCT identified more tumors than CE-CT. DP-CBCT provides additional information to CE-CT that may impact treatment decisions and dosimetry for catheter-directed liver interventions.

CLINICAL RELEVANCE/APPLICATION

DP-CBCT provides additional information, including number, diameter and pattern of contrast enhancement of liver metastases, to CE-CT which may impact treatment decisions for catheter-directed liver interventions.

VSIO51-10 Y-90 for CRLM

Thursday, Dec. 1 3:30PM - 3:45PM Room: S405AB

Participants
Robert J. Lewandowski, MD, Chicago, IL, (r-lewandowski@northwestern.edu) (*Presenter*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc

LEARNING OBJECTIVES

1) Learn the evidence for radioembolization in patients with mCRC (salvage setting). 2) Learn the evidence for radioembolization in patients with mCRC (combined with systemic therapy). 3) Discuss optimal timing of radioembolization in patients with mCRC.

VSIO51-11 Differences between Hepatic Distribution of Tc99m MAA and Y-90 Microspheres Could Complicate 3D Image Based Dosimetry

Thursday, Dec. 1 3:45PM - 3:55PM Room: S405AB

Participants
Julien S. Wonderlick, MD, Burlington, VT (*Presenter*) Nothing to Disclose
Christopher A. Ford, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose
Sean Reynolds, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose
Joseph T. Shields, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose
Anant D. Bhave, MD, Richmond, VT (*Abstract Co-Author*) Nothing to Disclose
Marleen Moore, MS, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose
Janusz K. Kikut, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Selective internal radiation therapy is radioembolization of malignant tumors in the liver with microspheres carrying Y90. 2 products (SIR-Spheres and TheraSpheres) are approved for use in the USA. Prior to injection of either product, treatment planning scintigraphy is performed by selective arterial injection of Tc99m MAA. MAA distribution is taken into account for dose calculations with a goal of delivering a minimum of 100 Gy to the tumor. There is extensive literature on predictive dosimetry based on the pre-treatment scan. However, such calculations are only valid if the MAA scan is highly predictive of the distribution of SIRT particles post-embolization. A semi-quantitative scale was used to compare the pre-treatment MAA scan to the post-treatment Bremsstrahlung scan in 30 SIRT cases to determine how well the MAA-planned target volume approximated the Treated Liver Volume on Bremsstrahlung SPECT.

METHOD AND MATERIALS

Consecutive 17 SIRsphere (1 HCC,12 colon, 4 carcinoid) and 13 TheraSphere treatments (12 HCC, 1 neuroendocrine) were reviewed from 2012 to present. Comparison of MAA distribution in the liver vs.Y90 TheraSphere and Y90 SIRSphere was done based on the following score:0: TLV-Y90 matches PTV-MAA and are isogenous
1: TLV-Y90 matches PTV-MAA with varying pattern of internal heterogeneity
2: TLV-Y90 smaller than PTV-MAA
3: TLV-Y90 larger than PTV-MAA

RESULTS

MAA and Y90 microsphere distribution matched in 7 (53%) Theraspheres and 2 (12.5%) SIRspheres treatments. In 6 (47%) Theraspheres and 10 (62.5%) SIRspheres treatments the treated volume matched MAA but the implanted Y90 microspheres demonstrated a different pattern of distribution within the volume. In 4 (25%) SIRspheres treatments the treated volume was different from the pretreatment MAA scan.

CONCLUSION

Differences in particle number and injection technique are likely culprits for hepatic distribution of implanted Y90 Theraspheres and SIRspheres inconsistently matching the pretreatment MAA scan. This study supports recommendations for post-treatment imaging with both products and calls into question routine use of MAA Quantitative SPECT scans for voxel by voxel based dosimetry, particularly for SIRspheres.

CLINICAL RELEVANCE/APPLICATION

Significant disagreement between pretreatment MAA and post-treatment Bremsstrahlung scan can lead to less than optimal Y-90 dose for radioembolization.

VSIO51-12 Question and Answer

Thursday, Dec. 1 3:55PM - 4:10PM Room: S405AB

Participants
William S. Rilling, MD, Milwaukee, WI (*Presenter*) Research support, B. Braun Melsungen AG; Research support, Sirtex Medical Ltd; Research support, Siemens AG; Consultant, B. Braun Melsungen AG; Consultant, Cook Group Incorporated ; Consultant, Terumo Corporation; Advisory Board, Terumo Corporation
Sarah B. White, MD,MS, Philadelphia, PA, (sbwhite@mcw.edu) (*Presenter*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, IO Rad
Emily Bergsland, MD, San Francisco, CA (*Presenter*) Institutional research support, Lexicon Pharmaceuticals, Inc; Institutional research support, Merck & Co, Inc; Institutional research support, Novartis AG; Consultant, Ipsen SA; Consultant, Lexicon Pharmaceuticals, Inc;
David C. Madoff, MD, New York, NY (*Presenter*) Advisory Board, RenovoRx
T. Clark Gamblin, MD, MS, Milwaukee, WI (*Presenter*) Nothing to Disclose
Mary U. Feng, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Paul B. Shyn, MD, Boston, MA (*Presenter*) Research Consultant, Galil Medical Ltd; Research Grant, Siemens AG
Michael C. Soulen, MD, Philadelphia, PA, (michael.soulen@uphs.upenn.edu) (*Presenter*) Royalties, Cambridge University Press; Consultant, Guerbet SA; Research support, Guerbet SA; Consultant, BTG International Ltd; Research support, BTG International

Ltd; Consultant, Merit Medical Systems, Inc; Speaker, Sirtex Medical Ltd; Consultant, Terumo Corporation; Consultant, Bayer AG
Robert J. Lewandowski, MD, Chicago, IL, (r-lewandowski@northwestern.edu) (*Presenter*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc

LEARNING OBJECTIVES

1) Discuss real-word cases as part of a multi-discipline team. 2) Understand importance of a multi-discipline approach to cancer care.

VSIO51-13 Setting the Stage mNET

Thursday, Dec. 1 4:10PM - 4:25PM Room: S405AB

Participants
Emily Bergsland, MD, San Francisco, CA (*Presenter*) Institutional research support, Lexicon Pharmaceuticals, Inc; Institutional research support, Merck & Co, Inc; Institutional research support, Novartis AG; Consultant, Ipsen SA; Consultant, Lexicon Pharmaceuticals, Inc;

LEARNING OBJECTIVES

1) Review the epidemiology and classification of gastroenteropancreatic neuroendocrine tumors (GEPNETS). 2) Discuss the role of somatostatin analogs for the treatment of GEPNETS. 3) Summarize the current systemic treatment options for metastatic GEPNETs. 4) Examine commonly applied treatment algorithms/guidelines for advanced GEPNETS.

ABSTRACT

VSIO51-14 Aggressive Surgical Management in mNET

Thursday, Dec. 1 4:25PM - 4:40PM Room: S405AB

Participants
T. Clark Gamblin, MD, MS, Milwaukee, WI (*Presenter*) Nothing to Disclose

VSIO51-15 Intra-arterial Therapies of GEP-NET

Thursday, Dec. 1 4:40PM - 4:55PM Room: S405AB

Participants
William S. Rilling, MD, Milwaukee, WI (*Presenter*) Research support, B. Braun Melsungen AG; Research support, Sirtex Medical Ltd; Research support, Siemens AG; Consultant, B. Braun Melsungen AG; Consultant, Cook Group Incorporated ; Consultant, Terumo Corporation; Advisory Board, Terumo Corporation

VSIO51-16 Comparing cTACE, DEB-TACE and 90Yttrium Radioembolization as Treatment Options for Patients with Neuroendocrine Tumor Liver Metastases

Thursday, Dec. 1 4:55PM - 5:05PM Room: S405AB

Participants
Duc Do Minh, BSc, Berlin, Germany (*Presenter*) Nothing to Disclose
Julius Chapiro, MD, New Haven, CT (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV
Boris Gorodetski, MD, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Susanne Smolka, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Qiang Huang, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Cuihong Liu, Jinan, China (*Abstract Co-Author*) Nothing to Disclose
David Wainstejn, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Ming De Lin, PhD, Cambridge, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Lynn J. Savic, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Todd Schlachter, MD, Farmington, CT (*Abstract Co-Author*) Nothing to Disclose
Bernhard Gebauer, MD, Berlin, Germany (*Abstract Co-Author*) Research Consultant, C. R. Bard, Inc ; Research Consultant, Sirtex Medical Ltd; Research Grant, C. R. Bard, Inc; Research Consultant, PAREXEL International Corporation; Travel support, AngioDynamics , Inc
Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC

PURPOSE

To compare efficacy, survival outcomes and identify prognostic factors of conventional transarterial chemoembolization (cTACE), drug-eluting beads TACE (DEB-TACE), and 90Yttrium-radioembolization (Y90) for the treatment of gastro-entero-pancreatic (GEP) neuroendocrine tumor liver metastases (NELMs).

METHOD AND MATERIALS

This retrospective single center-study included 192 patients (58.6 years mean age, 56% men) with NELM of known GEP origin treated with cTACE (N=122), DEB-TACE (N=26), or Y90 (N=44) between 2000 and 2014. Follow-up imaging studies were compared with baseline imaging to determine the radiologic response. Median overall survival (OS) and hepatic progression-free survival (HPFS) were evaluated. Propensity score analysis (PSA) was performed to minimize selection bias. Survival analysis was calculated using the PS-adjusted Kaplan-Meier method with the PS-adjusted log-rank test and the uni- and multivariate (MVA) Cox proportional hazards model.

RESULTS

Median OS and HPFS were 28.8 and 18.1 months for entire study group, 34.0 and 20.1 months after cTACE, 23.6 and 12.4 months after Y90, 21.7 and 13.3 months after DEB-TACE treatment, respectively. In PSA, cTACE demonstrated significant prolonged

median OS compared to Y90 (p=0.035) but not compared to DEB-TACE (p=0.198). Five-year survival time after first intra-arterial treatment (IAT) for cTACE, DEB-TACE and Y90 were 28.2%, 10.3% and 18.5%, respectively. No significant differences in HPFS were seen among evaluated IAT. MVA of the entire study cohort identified extra-hepatic metastasis (HR, 1.63, p<0.01) and tumor burden >50% (HR, 1.93, p<0.01) as predictive for reduced OS whereas 3≥ embolization sessions were related to prolonged OS (HR, 0.59, p<0.05). Among all IAT options the response rates (RR) and the incidence of adverse effects were not significantly different. In MVA, DEB-TACE corresponded with improved RR compared to cTACE (OR, 1.2, p=0.04).

CONCLUSION

Due to significantly improved OS cTACE revealed to be the preferable IAT option compared to Y90. DEB-TACE vs. cTACE and DEB-TACE vs. Y90 appeared equally effective according to OS. Prospective studies are warranted to determined the optimal IAT option for patients with unresectable NELM.

CLINICAL RELEVANCE/APPLICATION

NELM decreases OS dramatically. IAT appealed as an indispensable mainstay in palliative treatment of unresectable NELM to increase OS. Thus, choice of IAT with greatest improved OS still needs to be investigated.

VSIO51-17 Theranostic Approaches to the Management of Neuroendocrine Tumors

Thursday, Dec. 1 5:05PM - 5:20PM Room: S405AB

Participants
Neeta Pandit-Taskar, MD, New York, NY (*Presenter*) Nothing to Disclose

VSIO51-18 Impact of Experience on Oncologic and Quality Outcomes of Hepatic Artery Embolization for Metastatic Neuroendocrine Tumors

Thursday, Dec. 1 5:20PM - 5:30PM Room: S405AB

Participants
Adrian J. Gonzalez, MD, New York, NY (*Presenter*) Nothing to Disclose
Hooman Yarmohammadi, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Franz E. Boas, MD,PhD, New York, NY (*Abstract Co-Author*) Co-founder, ClariPACS
George I. Getrajdman, MD, New York, NY (*Abstract Co-Author*) Medical Advisory Board, CareFusion Corporation
Etay Ziv, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Joseph P. Erinjeri, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Stephen B. Solomon, MD, New York, NY (*Abstract Co-Author*) Research Grant, General Electric Company
Majid Maybody, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of this study was to evaluate the oncologic and quality outcomes of hepatic artery embolization (HAE) based on the years of experience (YOE) of the operator in patients with liver metastasis from neuroendocrine tumors (NET)

METHOD AND MATERIALS

We collected data on patients with metastatic NET to the liver that underwent HAE from 01/01/2012 to 01/31/2015. Only patients whose treatments were performed by a single operator were included.Demographics, tumor characteristics, % of liver involvement, presence of extrahepatic disease, non-locoregional treatment as well as technical aspects of embolization and complications were captured.YOE was measured in years after completion of IR Fellowship and date of first HAE for each patient. Patients were assigned to one of five groups depending on the years of operator's experience : G1) <5 YOE, G2) 5-10 YOE, G3) 10-15 YOE, G4) 15 to 20 YOE and G5) > 20 YOE.Means were compared using Students T. X2 was used for categorical variables. Kaplan Meier curves and Mantel-Cox statistics were used for TLTP and OS.

RESULTS

91 patients were included. G1, 14 patients; G2, 17 patients; G3, 27 patients; G4, 3 patients; G5, 30 patients.There were no significant differences between groups in terms of demographics, tumor grade, primary site, % of liver involvement, presence of extrahepatic disease and non-locoregional treatments. On technical aspects of embolization G5 used more vials (mean 3.7 vs. G1=2.9, G2=2.1, G3=2.2 and G4= 2.1) of embolization material than the rest (p=0.002). There were no differences on major post HAE complications.OS (days) grouped by YOE was 1786(95%CI: 1139 - 2432) for G1 , 1097(95%CI: 677 - 1516) for G2 , 1893(95%CI: 1534 - 2252) for G3 , 813 (95%CI: 670 - 955) for G4 and 1585 (95%CI: 1160 - 2010) for G5; p = 0.310.TLP(days) grouped by YOE was 372 (95%CI: 238 - 506) for G1, 625(95%CI: 411 - 839) for G2 , 557(95%CI: 354 - 760) for G3 , 440(95%CI: 269 - 968) for G4 and 605 (95%CI: 474 - 736) for G5; p = 0.226.

CONCLUSION

Based on analysis of this population composed of patients with metastatic NET efficiency of treatment, as measured by OS and TTLP was similar for all experience groups indicating no learning curve effect. Additionally, complication rates were similar between different experience groups.

CLINICAL RELEVANCE/APPLICATION

HAE can be performed safely and with similar oncologic and quality outcomes by all experience groups

VSIO51-19 Emerging Data for Embolotherapy of 'other' Metastases

Thursday, Dec. 1 5:30PM - 5:45PM Room: S405AB

Participants
Rajesh P. Shah, MD, Stanford, CA (*Presenter*) Research support, Merit Medical Systems, Inc

LEARNING OBJECTIVES

1.) Describe the different intra-arterial treatments options available for metastatic disease to the liver. 2) Develop an understanding

of which intra-arterial treatment options are best for various different non-colorectal/neuroendocrine metastases to the liver based on available evidence.

VSIO51-20 Question and Answer

Thursday, Dec. 1 5:45PM - 6:00PM Room: S405AB

Participants
William S. Rilling, MD, Milwaukee, WI (*Presenter*) Research support, B. Braun Melsungen AG; Research support, Sirtex Medical Ltd; Research support, Siemens AG; Consultant, B. Braun Melsungen AG; Consultant, Cook Group Incorporated ; Consultant, Terumo Corporation; Advisory Board, Terumo Corporation
Sarah B. White, MD,MS, Philadelphia, PA, (sbwhite@mcw.edu) (*Presenter*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, IO Rad
Emily Bergsland, MD, San Francisco, CA (*Presenter*) Institutional research support, Lexicon Pharmaceuticals, Inc; Institutional research support, Merck & Co, Inc; Institutional research support, Novartis AG; Consultant, Ipsen SA; Consultant, Lexicon Pharmaceuticals, Inc;
T. Clark Gamblin, MD, MS, Milwaukee, WI (*Presenter*) Nothing to Disclose
Neeta Pandit-Taskar, MD, New York, NY (*Presenter*) Nothing to Disclose
Rajesh P. Shah, MD, Stanford, CA (*Presenter*) Research support, Merit Medical Systems, Inc

MSCA52

Case-based Review of Abdomen (An Interactive Session)

Thursday, Dec. 1 3:30PM - 5:00PM Room: S406A

GI ER

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Julie H. Song, MD, Providence, RI (*Director*) Nothing to Disclose

Sub-Events

MSCA52A Imaging of Abdominal Trauma

Participants
Michael N. Patlas, MD, FRCPC, Hamilton, ON, (patlas@hhsc.ca) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss common mistakes in interpretation of cases of blunt and penetrating abdominal trauma. 2) Analyze factors leading to errors. 3) Discuss advantages of intraluminal contrast, delayed phase of imaging and multiplanar reconstructions for detection of traumatic injuries.

ABSTRACT

This case-based presentation will focus on uncommon abdominal blunt and penetrating traumatic injuries including bowel, pancreatic, biliary, adrenal, ureteric and vascular injuries. Misses and misinterpretations in the diagnosis of traumatic injuries on MDCT will be illustrated, based on lessons learned from Morbidity & Mortality Rounds. Optimised imaging protocols will be reviewed. Multimodality imaging evaluation of complications related to missed abdominal injuries will be discussed.

MSCA52B Imaging of the Acute Abdomen

Participants
Douglas S. Katz, MD, Mineola, NY, (dkatz@winthrop.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Demonstrate and review a series of challenging cases of CT of the acute abdomen and pelvis, in a case-based review session. 2) Review the differential diagnosis and potential pitfalls in the diagnosis of these entities. 3) Briefly review the further workup/management of these entities.

ABSTRACT

This presentation, in conjunction with several other speakers demonstrating case-based examples of various aspects of abdominal/pelvic imaging, will review a series of challenging CT cases of the acute abdomen and pelvis, with an emphasis on differential diagnosis and potential pitfalls. The literature of these entities - clinical and imaging - will be briefly reviewed, and the optimal management/further workup of these entities will be briefly discussed.

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Douglas S. Katz, MD - 2013 Honored Educator
Douglas S. Katz, MD - 2015 Honored Educator

MSCA52C Abdominal Pain in Pregnancy

Participants
Ana P. Lourenco, MD, Providence, RI, (alourenco@lifespan.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe a differential diagnosis for abdominal pain in pregnancy, as well as the best initial imaging study depending upon the leading differential diagnosis. 2) Recognize diagnostic findings across multiple modalities, including US, CT and MRI. 3) Explain some of the imaging pitfalls associated with each modality.

ABSTRACT

In this session, we will review the varied differential of abdominal pain in pregnancy, both gynecologic and non-gynecologic. Cases will be used to illustrate the imaging findings across multiple modalities, highlighting the importance of making the diagnosis at the first opportunity whenever possible.

RC709

Advances in Abdominal CT

Thursday, Dec. 1 4:30PM - 6:00PM Room: N227B

GI CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC709A Radiation Dose Reduction in CT

Participants
Amy K. Hara, MD, Scottsdale, AZ (*Presenter*) Royalties, General Electric Company;

LEARNING OBJECTIVES

1) Compare advantages and disadvanatages of various techniques to reduce radiation dose for abdominal CT. 2) Describe how iterative reconstruction techniques work and how they can improve image quality of low dose exams. 3) Develop a strategy to implement low dose techniques in clinical practice.

Active Handout:Amy Kiyo Hara

http://abstract.rsna.org/uploads/2016/15001880/RC709A.pdf

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Amy K. Hara, MD - 2015 Honored Educator

RC709B Intravenous Contrast Issues

Participants
Ramit Lamba, MD, Sacramento, CA, (rlamba@ucdavis.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the current status with respect to iodinated contrast medium induced acute kidney injury.2) Understand key concepts with respect to management of moderate and severe acute reactions to iodinated contrast medium.3) Understand key concepts with respect to reducing the volume of injected contrast for CT exams.

ABSTRACT

Active Handout:Ramit Lamba

http://abstract.rsna.org/uploads/2016/16001264/RC709B IV Contrast Issues_RSNA 2016.pdf

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Ramit Lamba, MD - 2014 Honored Educator

RC709C Dual Energy CT

Participants
Alvin C. Silva, MD, Scottsdale, AZ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the basic principles and different approaches for Dual-Energy CT. 2) Review common Dual-Energy CT post-processing displays. 3) Describe strategies for implementing Dual-Energy CT in clinical practice.

ABSTRACT

RC709D Advances in Oncologic Imaging

Participants
Meghan G. Lubner, MD, Madison, WI (*Presenter*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;

LEARNING OBJECTIVES

1) Briefly define established size-related oncologic response criteria used in CT. 2) Discuss application of volumetric assessment of tumor burden at diagnosis and in assessing response to therapy. 3) Briefly describe selected examples of response assessment criteria looking at other tumor imaging characteristics such as tumor attenuation or enhancement in addition to size. 4) Examine CT tumor texture analysis as an additional tool to evaluate tumor heterogeneity at baseline and during therapy.

ABSTRACT

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Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator

RC712

Acute Abdominal Vascular Diseases (An Interactive Session)

Thursday, Dec. 1 4:30PM - 6:00PM Room: N229

GI VA ER

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Dominik Fleischmann, MD, Palo Alto, CA, (d.fleischmann@stanford.edu) (*Moderator*) Research support, Siemens AG;

Handout:Dominik Fleischmann

http://abstract.rsna.org/uploads/2016/13012007/Fleischmann_RSNA2016_RC712_Aortic_Branch_Dissections_HANDOUT.pdf

Sub-Events

RC712A Aortic Branch Dissections

Participants
Dominik Fleischmann, MD, Palo Alto, CA (*Presenter*) Research support, Siemens AG;

LEARNING OBJECTIVES

1) Review the epidemiology of aortic side-branch dissections, which can occur as a complication of aortic dissection, or as isolated spontaneous dissections of the visceral or renal arteries. 2) Explain the pathophysiology of side branch malperfusion syndromes in aortic dissection. 3) Present the spectrum of imaging findings in spontaneous aortic branch dissections, including the differential diagnosis (vasculitis, connective tissue diseases, fibromuscular dysplasia, segmental arterial mediolysis).

ABSTRACT

Dissections of aortic side branches is a common complication of Type A and Type B acute aortic dissection which substantially increases mortality. It is important to understand the pathophysiology and the two principle mechanisms of side branch malferfusion in aortic dissection: flow obstruction can be due to (A) local abnormalities, such as occlusive dissection flaps, blind ending false lumen with true lumen occlusion ('windsock'), or frank thrombosis. Side-branch malperfusion may also occur due to (B) limited inflow: The classic situation is complete true lumen collapse in the upstream aorta, resulting in underperfusion of all downstream branches supplied by the true lumen. Wile local obstructions are most commonly treated by stent placement into the diseased side branch, inflow-lesions typically require surgical or endovascular repair of the upstream aorta.
Spontaneous dissections of the celiac, mesenteric, or renal arteries are relatively rare events, and typically present with acute abdominal or flank pain. Dissections of side branch arteries can lead to ischemic complications or to frank rupture with intra- or retroperitoneal hemorrhage. Patients presenting with mesenteric or renal artery dissection require a thorough workup to identify genetic disorders (notably Ehlers Danlos IV), inflammatory conditions (vasculitis), and other entities such as fibromuscular dysplasia and segmental arterial mediolysis (SAM). Imaging findings range from non-obstructive lesions such as intramural hematoma, double-barrel lumen, to partial or complete obstruction ('windsock'). Complications include rupture or ischemia. Spontaneous dissections may heal, or evolve into aortic branch aneurysms.

RC712B Symptomatic Aneurysms

Participants
Phillip M. Young, MD, Rochester, MN, (young.phillip@mayo.edu) (*Presenter*) Nothing to Disclose

ABSTRACT

Symptomatic aneurysms cover the spectrum of arterial aneurysms presenting with a) localized symptoms secondary to aneurysm expansion and possible rupture b) regional symptoms secondary to dissection and embolism and c) systemic cardiovascular dysfunction related to hypotension and organ dysfunction. Common clinical scenarios include aneurysm rupture – most commonly abdominal aortic, popliteal and abdominal visceral aneurysms as well as thoracoabdominal aortic dissection. Symptomatic aneurysms may also occur in patients with known arterial pathology including connective tissue disorders such as Marfan's and Ehlers-Danlos syndrome and Takayasu aortitis/arteritis. Patients with suspected rupture of abdominal aortic or ileofemoropopliteal artery aneurysms may initially be evaluated by sonography. However, in all circumstances, CT angiography due to its robust implementation and high-resolution imaging of the vasculature and regional anatomy that allows for planning of endovascular and surgical intervention is the preferred technique. CT Angiographic protocols appropriate to the suspected anatomic location of the aneurysm that provide an adequate roadmap for endovascular or surgical intervention are employed. Extended coverage is particularly important in patients with suspected thoracoabdominal aortic dissection or aneurysms associated with peripheral embolism. Cardiac gating should be utilized in any patient with a suspected type A aortic dissection or rupture of an ascending aortic aneurysm. Aortic, cardiac and coronary artery imaging are integral to the evaluation and management of these patients. A particular subset of the "symptomatic aneurysm" is post-trauma aortic disruption, usually thoracic in which diagnosis of traumatic aneurysm is critical and the aneurysm is associated with additional sites of soft tissue and skeletal trauma. Guidelines for endovascular or surgical intervention or non invasive management with serial CT Angiographic imaging will be discussed.

RC712C Mesenteric Ischemia

Participants
Iain D. Kirkpatrick, MD, Winnipeg, MB, (kirkpatrick_iain@hotmail.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the various categories of mesenteric ischemia (arterial occlusive, embolic, venous thrombotic, and nonocclusive), and

the pathophysiologic basis behind the imaging findings in each case. 2) Understand the basis behind modern CT protocols for mesenteric ischemia, particularly the biphasic examination with CT mesenteric angiography. 3) Demonstrate techniques to rapidly analyze a mesenteric CT angiographic dataset. 4) Review the CT signs of mesenteric ischemia and their sensitivity and specificity. 5) Evaluate the current literature on mesenteric ischemia and discuss optimal diagnostic criteria.

ABSTRACT

Acute mesenteric schema (AMI) is a life-threatening condition said to affect up to 1% of patients presenting with an acute abdomen, and it carries a mortality rate ranging between 59-93% in the published literature. Time to diagnosis and surgical treatment are the only factors which have been shown to improve mortality, and evidence shows that the clear test of choice for AMI is now biphasic CT. Water is preferably administered as a negative contrast agent, followed by CT mesenteric angiography and then a portal venous phase exam. Diagnostic accuracy is significantly improved by analysis of the CT angiogram for arterial stenoses or occlusions, evidence of emboli, or angiographic criteria of nonocclusive ischemia. It is the use of CT angiography in addition to routine portal phase imaging which has pushed the sensitivity and specificity of the test to >90% in recent published articles. Other nonangiographic CT findings that are relatively specific for AMI in the appropriate clinical setting include pneumatosis intestinalis, portal or mesenteric venous gas or thrombosis, and decreased bowel wall enhancement. Bowel wall thickening, mesenteric stranding, ascites, and mucosal hyperenhancement are more nonspecific findings which may also be seen. Nonocclusive schema may be the most difficult form to diagnose, and findings of shock abdomen can aid in identification. Knowledge of the patient's clinical history is critical not only for the selection of an appropriate study protocol but also for interpretation of the imaging findings in context.

RC712D Gastrointestinal Bleeding

Participants
Jorge A. Soto, MD, Boston, MA (*Presenter*) Royalties, Reed Elsevier

LEARNING OBJECTIVES

1) To review the appropriate implementation of CT angiography in the evaluation of patients presenting with acute lower intestinal bleeding. 2) To describe the technical details that are necessary for acquiring good quality CT angiography examinations. 3) Illustrate the characteristic CT angiographic findings of active or recent bleeding with specific examples of multiple etiologies.

ABSTRACT

Acute gastrointestinal bleeding is a serious condiition that may threaten a patient’s life depending on the severity and duration of the event. Precise identification of the location, source and cause of bleeding are the primary objectivse of the diagnostic evaluation. Implementation of colonoscopy in the emergency setting poses multiple challenges, especially the inability to adequately cleanse the colon and poor visualization owing to the presence of intraluminal blood clots. Scintigraphy with technetium 99m–labeled red blood cells is highly sensitive but also has some limitations, such as the inability to precisely localize the source of bleeding and determine its cause. Properly performed and interpreted CT angiography examinations offer logistical and diagnostic advantages in the detection of active hemorrhage. A three-phase examination (non-contrast, arterial and portal venous) is typically performed. Potential technical and interpretation pitfalls should be considered and will be explained. The information derived from CT angiography helps direct therapy and select the most appropriate hemostatic intervention (when necessary): endoscopic, angiographic, or surgical. Precise anatomic localization of the bleeding point also allows a targeted endovascular embolization. The high diagnostic performance of CT angiography makes this test a good alternative for the initial emergent evaluation of patients with acute lower intestinal bleeding.

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Jorge A. Soto, MD - 2013 Honored Educator
Jorge A. Soto, MD - 2014 Honored Educator
Jorge A. Soto, MD - 2015 Honored Educator

RC714

Transplant Interventions

Thursday, Dec. 1 4:30PM - 6:00PM Room: S105AB

GI IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Brian S. Funaki, MD, Riverside, IL (*Moderator*) Data Safety Monitoring Board, Novate Medical Ltd
Ron C. Gaba, MD, Chicago, IL (*Moderator*) Research Grant, Guerbet SA; Research Grant, NeuWave Medical, Inc

LEARNING OBJECTIVES

1) To familiarize interventional radiologists with patient selection for interventions related to liver, kidney, and pancreas transplantation. 2) To review procedural technique for transplant-related interventions, including tips, tricks, and pitfalls. 3) To describe clinical outcomes of interventional therapies in the setting of organ transplantation.

ABSTRACT

Not applicable.

Sub-Events

RC714A Islet Cell Transplant

Participants
Ron C. Gaba, MD, Chicago, IL (*Presenter*) Research Grant, Guerbet SA; Research Grant, NeuWave Medical, Inc

LEARNING OBJECTIVES

View learning objectives under the main course title.

ABSTRACT

Not applicable.

RC714B Liver: Vascular

Participants
Bulent Arslan, MD, Chicago, IL (*Presenter*) Advisory Board, Nordion, Inc Advisory Board, Angiotech Pharmaceuticals, Inc Speakers Bureau, Nordion, Inc Speakers Bureau, W. L. Gore & Associates, Inc Consultant, Bayer AG

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC714C Liver: Nonvascular

Participants
Nicholas Fidelman, MD, San Francisco, CA (*Presenter*) Research Grant, BTG International Ltd

LEARNING OBJECTIVES

1) To provide an overview of current approaches to diagnosis and treatment of common non-vascular complications following liver transplantation including 1) Biliary stricture; 2) Bile duct leak; 3) Biloma.

ABSTRACT

RC714D Renal

Participants
Ryan P. Lokken, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC718

Imaging Cancer Treatment Complications: New Challenges (An Interactive Session)

Thursday, Dec. 1 4:30PM - 6:00PM Room: S103AB

CH GI MK OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

Sub-Events

RC718A Pulmonary Complications

Participants
Michelle S. Ginsberg, MD, New York, NY, (ginsberm@mskcc.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To recognize complications in the postoperative thoracic patient in both immediate and late periods. In the immediate period this will include lobar collapse, hemorrhage, pulmonary edema, pneumonia, as well as rarer complications such as bronchopleural fistula, chylothorax and lung torsion. In the later period it is important to follow these patients and to recognize and distinguishing recurrent tumor from treatment changes and new primary tumors.

ABSTRACT

RC718B GI Complications

Participants
Nina Tunariu, MD, Sutton, United Kingdom, (nina.tunariu@icr.ac.uk) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be familiar with classification of novel targeted and standard anticancer drugs. 2) Able to identify GI toxicity imaging appearances by understanding the mechanisms of action of the chemotherapeutic agents. 3) Be aware that toxicities can be asymptomatic and that radiologists are instrumental in identifying and reporting early manifestations of toxicities. 4) Describe the imaging appearance of GI complications of anti-cancer therapy. 5) Differentiate between post-therapeutic changes and disease progression.

ABSTRACT

RC718C Musculoskeletal Complications

Participants
Hassan Douis, MRCP, FRCR, Birmingham, United Kingdom (*Presenter*) Spouse, Grant, Eisai Co, Ltd; Spouse, Grant, Pharma Mar SA

LEARNING OBJECTIVES

1) To describe common chemotherapy-induced, radiation-therapy induced and surgical complications of the musculoskeletal system2) To recognize early and late musculoskeletal complications of oncological treatment3) To describe the imaging features of common musculoskeletal complications of oncological treatment

ABSTRACT

RC729

Pancreatic Imaging Update: Spotlight on MRI (An Interactive Session)

Thursday, Dec. 1 4:30PM - 6:00PM Room: N230B

GI MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

LEARNING OBJECTIVES

1) Discuss a systematic approach to diagnosing and staging pancreatic cancer and discuss template reporting for preoperative planning. 2) Discuss potential mimics and pitfalls related to diagnosis and staging of solid pancreatic neoplasms. 3) Describe the imaging features of pancreatic cysts and the impact of multidisciplinary approach to diagnosis and management. 4) To review the imaging features of a vast array of inflammatory conditions that may involve the pancreas..Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC729A Systematic Approach to Pancreatic Cancer

Participants
Elizabeth M. Hecht, MD, New York, NY, (eh2560@cumc.columbia.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss a systematic approach to diagnosing and staging pancreatic cancer and discuss template reporting for preoperative planning. 2) Discuss potential mimics and pitfalls related to diagnosis and staging of solid pancreatic neoplasms

ABSTRACT

Treatment of pancreas cancer requires a multidisciplinary approach. Imaging interpretation and reports play a critical role in managing patients with pancreatic pathology. Accurate staging of pancreatic neoplasms is paramount to determining management and imaging plays a central role in stratifying patients for treatment. The goal of surgery is to achieve resection margins free of tumor to maximize survival benefit. Unnecessary surgery and accompanying morbidity need be minimized in patients with no added survival benefit from resection. Structured reporting and standardized terminology enhances communication with the clinic team and imparts key elements into a diagnostic report that will help determine appropriate management.

RC729B Pancreatic Cyst: A Multidisciplinary Approach to Diagnosis and Management

Participants
Ihab R. Kamel, MD, PhD, Baltimore, MD (*Presenter*) Research Grant, Siemens AG

LEARNING OBJECTIVES

1) Describe the imaging features of pancreatic cysts and the impact of multidisciplinary approach to diagnosis and management.

ABSTRACT

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Ihab R. Kamel, MD, PhD - 2015 Honored Educator

RC729C The Inflamed Pancreas: Pearls and Perils

Participants
Koenraad J. Mortele, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the imaging features of a vast array of inflammatory conditions that may involve the pancreas.

RC809

Six Common Difficult Problems in GI and GU MRI: The Expert's Approach

Friday, Dec. 2 8:30AM - 10:00AM Room: E353B

GI GU CT MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Hero K. Hussain, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

Sub-Events

RC809A The CT Indeterminate Lesion in the Non-Cirrhotic Liver: Extracellular or Hepatobiliary Contrast-Enhanced MRI

Participants
Reena C. Jha, MD, Washington, DC, (jhar@gunet.georgetown.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Compare the advantages and limitations of extracellular and hepatocellular contrast agents for indeterminate liver lesion. 2) Apply the most appropriate radiological guidance based on clinical context.

ABSTRACT

RC809B Is MRI Needed to Further Evaluate a CT Indeterminate Renal Mass?

Participants
Maryellen R. Sun, MD, Boston, MA, (msun@bidmc.harvard.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the heterogeneity of renal masses and importance of renal mass diagnosis to treatment planning and prognosis. 2) Discuss MRI technique and interpretation in characterization of renal masses. 3) Learn scenarios in which MRI evaluation of renal masses can further enhance diagnosis and clinical management of previously indeterminate lesions.

ABSTRACT

RC809C Perianal Fistulae: What Does the Surgeon Want to Know?

Participants
Mahmoud M. Al-Hawary, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify normal pelvic muscles, pelvic spaces and anal sphincter complex on MRI examination. 2) Differentiate and classify types of perianal fistulas and associated complications. 3) Develop a system of reporting the findings to clinical providers.

ABSTRACT

RC809D How Do I Perform and Interpret MRI of Pelvic Floor Weakness?

Participants
Victoria Chernyak, MD, Bronx, NY, (vichka17@hotmail.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Familiarize themselves with MR protocols for assessment of pelvic floor dysfunction. 2) Learn techniques for improving patient cooperation for dynamic images. 3) Identify normal anatomy of anterior, middle and posterior compartments. 4) Apply reference lines and angles used in assessment of pelvic floor dysfunction. 5) Identify and grade the severity of pelvic floor relaxation. 6) Identify and grade the severity of pelvic organ prolapse.

ABSTRACT

Active Handout:Victoria Chernyak

http://abstract.rsna.org/uploads/2016/16000436/RC809D V Chernyak - MRI.pdf

RC809E Is MRI the Next Step after US to Evaluate Non-Obstetric Pelvic Pain in Pregnancy?

Participants
Keyanoosh Hosseinzadeh, MD, Winston Salem, NC, (khossein@wakehealth.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss non-obstetric etiologies of pelvic pain in pregnancy. 2) Highlight indeterminate or inconclusive sonographic appearance of

1) Discuss non-obstetric etiologies of pelvic pain in pregnancy. 2) Highlight indeterminate or inconclusive sonographic appearance of pathologies. 3) Discuss technique and added value of MRI for certain conditions.

ABSTRACT

RC809F **How Do I Perform a Diagnostic MRI in a Non-cooperative Patient?**

Participants
Mustafa R. Bashir, MD, Cary, NC, (mustafa.bashir@duke.edu) (*Presenter*) Research support, Siemens AG; Research support, Guerbet SA; Research support, General Electric Company; Imaging Core Lab, NGM Biopharmaceuticals; Imaging Core Lab, TaiwanJ Pharma

LEARNING OBJECTIVES

1) Describe patient and technical factors that may contribute to suboptimal or nondiagnostic body MRI examinations. 2) Assess methods for reducing the impact of the above factors.

ABSTRACT

SPHT61

Novel Concepts in Hepatobiliary Tumor Imaging Symposium: Current Concerns (In Conjunction with Society of Abdominal Radiology (SAR), Japanese Society of Abdominal Radiology (JSAR), Korean Society of Abdominal Radiology (KSAR), and French Society of Abdominal Radiology (SIAD))

Friday, Dec. 2 8:30AM - 9:30AM Room: E253BCD

GI OI

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Judy Yee, MD, Clayton, CA, (judy.yee@ucsf.edu) (*Moderator*) Research Grant, EchoPixel, Inc
Won Jae Lee, MD, Seoul, Korea, Republic Of (*Director*) Research Grant, Samsung Electronics Co, Ltd
Takamichi Murakami, MD, PhD, Osakasayama, Japan (*Director*) Nothing to Disclose
Judy Yee, MD, Clayton, CA, (judy.yee@ucsf.edu) (*Director*) Research Grant, EchoPixel, Inc
Marc Zins, MD, Paris, France, (mzins@hpsj.fr) (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

ABSTRACT

URL

Sub-Events

SPHT61A How to Screen and Diagnose HCC: American, Asian, and European Guidelines; Why are They Different and What are the Consequences?

Participants
Alain Luciani, MD,PhD, Creteil, France, (alain.luciani@aphp.fr) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To describe and compare current international guidelines for the non-invasive diagnosis of HCC. 2) To understand how to apply current international guidelines in clinical practice for the diagnosis of HCC. 3) To highlight the role of a multimodal approach for the optimisation of HCC diagnosis

ABSTRACT

The Amercian Association for the Study of Liver Disease (AASLD), the European Association for the Study of the Liver (EASL) the Asian Pacific Association for the Study of the Liver (APASL) and the Japanese Society of Hepatology (JSH) all provide recommendations for the use of non invasive imaging for the diagnosis of HCC. The lecture will review differences between these current guidelines, addressing specific issues such as the potential use of CEUS and Hepatobiliary specific contrast agents, the importance of size and / or vascular profile for establishing an HCC diagnosis.

URL

SPHT61B Advanced HCC, Diagnosis, Present and Future Treatment

Participants
Carmen Ayuso, MD,PhD, Barcelona, Spain, (cayuso@clinic.ub.cat) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To define the stage "advanced HCC"2) To discuss the need of pathological sampling for diagnosis3) To explain the current therapies with prognosis impact4) To debate the different used response criteria

SPHT61C Why We Need LI-RADS and Future Directions

Participants
Claude B. Sirlin, MD, San Diego, CA (*Presenter*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;

LEARNING OBJECTIVES

1) Understand the need for standardized terminology, interpretation, and reporting for clinical care. 2) Understand the need for standardized terminology, interpretation, and reporting for research. 3) Become familiar with LI-RADS terminology, interpretation, and reporting.

SPHT61D Unusual Appearances of HCC and Lesions that Simulate HCC: How to Put These in Clinical Perspective

Participants
Richard L. Baron, MD, Chicago, IL, (rbaron@uchicago.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Appropriately utilize the noninvasive imaging based diagnosis criteria for hepatocellular carcinoma in patients with chronic liver

disease. 2) Differentiate imaging appearances of unusual benign vascular liver lesions and atypical hepatocellular carcinoma in patients with cirrhosis.

ABSTRACT

Current treatment of patients with chronic liver disease rely on noninvasive, imaging based diagnosis of hepatocellular carcinoma (HCC). These criteria are meant to be very specific, but are known to have low sensitivity due to the broad spectrum of imaging appearances of HCC. This lecture will review unusual appearances of HCC in patients with chronic liver disease that can be detected at imaging and confirmed with biopsy to allow timely effective treatment. Atypical presentations of common benign processes that can simulate HCC will be presented to aid radiologists in avoiding misdiagnosis of HCC, essential in current era of noninvasive imaging diagnosis directing patient care.

URL

SPHT62

Novel Concepts in Hepatobiliary Tumor Imaging Symposium: State-of-the-Art Imaging Techniques (In Conjunction with Society of Abdominal Radiology (SAR), Japanese Society of Abdominal Radiology (JSAR), Korean Society of Abdominal Radiology (KSAR), and French Society of Abdominal Radiology (SIAD))

Friday, Dec. 2 9:45AM - 10:45AM Room: E253BCD

GI OI US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Takamichi Murakami, MD, PhD, Osakasayama, Japan (*Moderator*) Nothing to Disclose
Won Jae Lee, MD, Seoul, Korea, Republic Of (*Director*) Research Grant, Samsung Electronics Co, Ltd
Judy Yee, MD, Clayton, CA, (judy.yee@ucsf.edu) (*Director*) Research Grant, EchoPixel, Inc
Marc Zins, MD, Paris, France (*Director*) Nothing to Disclose
Takamichi Murakami, MD, PhD, Osakasayama, Japan (*Director*) Nothing to Disclose

Sub-Events

SPHT62A Gadoxetic Acid (Gd-EOB-DTPA) Enhanced MR Imaging of Hepatocellular Carcinoma: Molecular and Genetic Background

Participants
Azusa Kitao, MD, Kanazawa, Japan (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1. Estimate the molecular background (haptocyte membrane transporter expression) of enhancement mechanism on gadoxetic acid enhanced MR imaging in hepatocellular carcinoma (HCC).2. Describe the reason of usefulness of gadoxetic acid enhanced MR imaging in early diagnosis of HCC. 3. Identify molecular subtype of HCC by gadoxetic acid enhanced MR imaging and apply to personalized medicine.

ABSTRACT

In hepatocellular carcinoma (HCC), organic anion transporting polypeptide 1B3 (OATP1B3) is the main uptake transporter of gadoxetic acid. The hepatobiliary phase of gadoxetic acid enhanced MR imaging is a molecular imaging that sensitively reflects expression of OATP1B3. From the stage of high-grade dysplastic nodule to overt HCC, the enhancement ratio on hepatobiliary phase decreases in accordance with the decline of OATP1B3 expression. The decrease of enhancement ratio on hepatobiliary phase is the most useful finding for early diagnosis of HCC among existing imaging modality. In other word, decrease of OATP1B3 is a sensitive molecular marker reflecting early stage of hepatocarcinogenesis. In addition, most of overt HCC show low contrast enhancement on hepatobiliary phase with decreased expression of OATP1B3, whereas 10% of them show high enhancement due to atypically increased expression of OATP1B3. There highly enhanced HCC may be classified into a less aggressive subtype of HCC with some particular molecular backgrounds such as beta-catenin or hepatocyte nuclear factor 4a activation. It can be applied to the future personalized medicine. In conclusion, to understand the molecular background of gadoxetic acid enhanced MR imaging is important to appropriate diagnosis and treatment for HCC.

URL

SPHT62B Hepatic Dynamic CT with Iterative Reconstruction

Participants
Takeshi Nakaura, MD, Kumamoto, Japan, (kff00712@nifty.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the technical explanation and the non-linear nature of MBIR as compared with FBP reconstruction. 2) Address the point of optimal MBIR setting for hepatic dynamic CT. 3) Display hepatic dynamic CT images reconstructed with FBP, IR and MBIR.

ABSTRACT

Image noise is a serious problem in hepatic dynamic CT because of the requirements for low-contrast detectability. Additionally low kilo-voltage (kVp) scan is recently used for low contrast and low radiation dose CT; however, increased image noise is a problem. It is difficult to achieve the high-resolution and high-quality CT images without increase in radiation dose because image noise of filtered back projection (FBP) technique is proportional to radiation dose. Iterative reconstruction (IR) techniques have re-emerged in CT reconstruction to increase image quality and decrease radiation dose. Recent introduced model based IR (MBIR) dramatically reduces image noise, offers accurate CT attenuation, and enables improvement in low-contrast detectability especially at thin slice images. CT manufacturers take unique approaches to offer the high image quality, and also provide complicated settings and the nonlinear nature for these iterative reconstruction techniques. At a glance, the principles of these reconstruction techniques seem very complicated; however, the required knowledge for clinicians about the recent advantages is not complicated. We aim to demonstrate the recent advances in CT reconstruction techniques, and the required knowledge to optimize the reconstruction setting for the hepatic dynamic CT.

URL

SPHT62C Quantitative Assessment of Tissue Perfusion in HCC and Liver Cirrhosis

Participants
Jeong Min Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Grant, Guerbet SA; Support, Siemens AG; Grant, Bayer AG; Grant, General Electric Company; Grant, STARmed Co, Ltd; Grant, RF Medical Co, Ltd; Grant, Toshiba Corporation; Grant, Samsung Medical Healthcare

LEARNING OBJECTIVES

1) To review various imaging based approaches to evaluate perfusion characteristics of the liver and hepatocellular carcinomas. 2) To address strengths and weaknesses of imaging modalities for evaluation of liver perfusion. 3) To illustrate the potential role of perfusion imaging in management of liver cirrhosis and HCC.

ABSTRACT

Recent technological development of magnetic resonance imaging (MRI) and multidetector CT(MDCT) with wide detector or dual source technology improved temporal resolution significantly, which resulted in more practical use of perfusion imaging techniques for evaluation of hepatocellular carcinoma (HCC) and liver cirrhosis. Currently, intravoxel incoherent motion (IVIM) diffusion-weighted imaging (DWI), dynamic contrast-enhanced MRI (DCE-MRI), dual energy CT and perfusion CT are common imaging based tools to evaluate perfusion properties of liver tumors. Moreover, IVIM-DWI and DCE-MRI can be performed during the same session of liver MRI, thus providing a comprehensive "one-step" morphological and functional evaluation of HCC and background liver parenchyma. These functional imaging techniques may predict prognosis or clinical outcome before treatment, and also, may play an important role for post-treatment assessment, especially after Sorafenib treatment or interventional treatments. The aim of this shorty presentation is to describe possible applications of new perfusion imaging techniques in management of patients with HCCs, with a particular emphasis on prognostic stratification and post-treatment monitoring.

SPHT62D Contrast US for HCC

Participants
Yasunori Minami, MD, PhD, Osaka-sayama, Japan (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand properties of Sonazoid contrast-enhanced ultrasonography (CEUS) and realize the differences of other contrast agents. 2) Learn the typical enhancement patterns of HCC during the vascular phase and defects during the post vascular phase on Sonazoid CEUS. 3) Understand Sonazoid CEUS improve the diagnosis of HCC using defect reinjection technique.

ABSTRACT

Two breakthroughs in the field of US technology, harmonic imaging and the development of second-generation contrast agents, have demonstrated the potential to dramatically broaden the scope of US diagnosis of hepatic lesions. Second-generation microbubbles provide stable nonlinear oscillation in a low power acoustic field because of the hard shell of these bubbles, producing great detail in the harmonic signals in real-time. Perfluorocarbon microbubbles (Sonazoid®) is the only contrast agent that can be taken up by Kupffer cells in the liver. Contrast-enhanced US (CEUS) using Sonazoid ® can provide detailed data, not only of the perfusion features during the vascular phase, but also of Kupffer imaging during the post vascular phase. The typical Sonazoid CEUS findings of typical hepatocellular carcinoma (HCC) show diffuse enhancement during the vascular phase and defects during the post vascular phase. However, Sonazoid CEUS findings of HCC can vary according to the degree of differentiation. Hepatocarcinogenesis is the step-wise development from a low-grade dysplastic nodule (DN), high-grade DN, high-grade DN with malignant foci, and well-differentiated HCC, to classical HCC. The intranodular blood supply changes in accordance with this progression. Moreover, an additional injection of Sonazoid ® is used to determine the presence or absence of arterial blood flow in the defective area (defect reinjection test). A fast wash-in of arterial flow in the Kupffer defect area can confirm the diagnosis of HCC. Worldwide, US imaging plays an important role not only in screening, evaluating, staging and monitoring disease, but also in surveillance following tumor ablation. Advances in US imaging techniques increase our ability to detect and characterize focal liver lesions.

URL

SST04

Gastrointestinal (Oncology Imaging and Response)

Friday, Dec. 2 10:30AM - 12:00PM Room: E353B

GI BQ CT OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Elizabeth M. Hecht, MD, New York, NY (*Moderator*) Nothing to Disclose
Janio Szklaruk, MD, PhD, Bala Cynwyd, PA (*Moderator*) Nothing to Disclose

Sub-Events

SST04-01 Personalized 3D-printed Transparent Liver Model Using the Hepatobiliary Phase MR Imaging: Usefulness in the Lesion-by-lesion Imaging-pathologic Matching of Focal Liver Lesions - Preliminary Results

Friday, Dec. 2 10:30AM - 10:40AM Room: E353B

Participants
Ijin Joo, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jung Hoon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sang Joon Park, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kyung Bun Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Nam-Joon Yi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the usefulness of personalized three-dimensional (3D)-printed transparent liver model using MR imaging for focal liver lesions (FLLs) in the lesion-by-lesion imaging-pathologic matching.

METHOD AND MATERIALS

This preliminary prospective study was approved by our institutional review board and written informed consents were obtained. Eleven patients with multiple FLLs who underwent gadoxetic acid-enhanced MRI for the preoperative workup of colorectal liver metastases (CRLM) or hepatocellular carcinoma (HCC) were included. A total of 51 indeterminate or malignant FLLs (13.5±14.0 mm; range, 2~80 mm) were detected on MRI. After the digital segmentation of hepatobiliary phase MR images, a transparent 3D-printed liver model with colored anatomical structures and FLLs at a 50% scale (except for too small FLLs at 100 or 150% scales) was produced. During gross sectioning of formalin-fixed liver specimen, a lesion-by-lesion matching between FLLs on liver model and on gross specimen was performed, and if needed, additional cross-section of the specimen was made.

RESULTS

Imaging-pathologic matching was successfully performed in 98.0% (50/51) of MRI-detected FLLs. On gross pathology analysis, 80.4% (41/51) of FLLs (14.8±15.1 mm) including histologically confirmed 36 CRLM, 4 HCC, and 1 no viable tumor were found on initial assessment; and 17.6% (9/51) of FLLs (7.3±3.3 mm) including 6 CRLM, 2 HCC, and 1 focal nodular hyperplasia were additionally found by second review of the specimen with an aid of 3D-printed transparent liver model with or without additional cross section (5.9%, 3/51 and 11.8%, 6/51, respectively). One FLL (2.0%, 1/51) of 2 mm was not found even after additional cross section of the specimen.

CONCLUSION

3D-printed liver model with FLLs enhances the lesion detection in the resected specimen and imaging-pathologic matching which may be helpful for making an accurate assessment of tumor burden as well as obtaining a reliable reference for imaging-detected FLLs.

CLINICAL RELEVANCE/APPLICATION

1. 3D-printed liver model with focal liver lesions (FLLs) might be helpful in the pathologic tumor staging by avoiding missed diagnosis of small FLLs.
2. A lesion-by-lesion imaging-pathologic matching using 3D-printed liver model may provide a reliable reference of standard for each FLL which is essential in the evaluation of diagnostic performance of imaging studies.

SST04-02 Automated Computed Tomography Volumetry to Predict Hemihepatectomy Specimens' Volumes in Patients with Primary or Secondary Hepatic Malignancy: Correlation with Intraoperative Volumes

Friday, Dec. 2 10:40AM - 10:50AM Room: E353B

Participants
Philipp Mayer, MD, Heidelberg, Germany (*Presenter*) Nothing to Disclose
Martin Groezinger, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose
Peter Schemmer, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose
Hans-Ulrich Kauczor, MD, Heidelberg, Germany (*Abstract Co-Author*) Research Grant, Siemens AG Research Grant, Bayer AG Speakers Bureau, Boehringer Ingelheim GmbH Speakers Bureau, Siemens AG Speakers Bureau, Novartis AG Speakers Bureau, GlaxoSmithKline plc Speakers Bureau, Almirall SA
Miriam Klauss, MD, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

One of the major causes of perioperative mortality of patients undergoing major hepatic resections is post-hepatectomy liver failure (*PHLF*). For surgical planning and preoperative appraisal of the risk of *PHLF* it is important to accurately predict the resectate

volume and the volume of the future liver remnant.

METHOD AND MATERIALS

The objective of our study is to prospectively evaluate the accuracy of hemihepatectomy resectate volumes determined by computed tomography volumetry (*CTV*) using an automated Liver Analysis Module (***S***) (syngo.CT, Siemens, Erlangen Germany) when compared with intraoperatively measured volumes and weights as gold standard in patients undergoing hemihepatectomy. Between January 2014 and November 2015, 24 patients (13 women, 11 men) scheduled for hemihepatectomy due to histologically proven primary or secondary hepatic malignancies were included in our study. Conversion factors between CT volumes one the one side and intraoperative volumes and weights on the other side were calculated using the method of least squares. Absolute and relative disagreements between CT volumes (with and without conversion factors) and intraoperative volumes were determined.

RESULTS

A conversion factor of c = 0.9057 most precisely predicted intraoperative volumes of exsanguinated hemihepatectomy specimens from CT volumes in all patients with mean absolute and relative disagreements between CT volumes and intraoperative volumes of 56.80 ml and 6.25 %. The use of operation-specific conversion factors yielded even better results.

CONCLUSION

CTV performed with ***S*** accurately predicts intraoperative volumes of hemihepatectomy specimens when applying conversion factors.

CLINICAL RELEVANCE/APPLICATION

Precise preoperative estimation of the resectate volume and the volume of the future liver remnant can help to minimize the risk of PHLF in patients undergoing major hepatic resections.

SST04-03 Differentiation of Intrahepatic Mass-forming Cholangiocarcinoma from Liver Abscess by Dual Source Dual-energy Spectral CT Quantitative Parameters

Friday, Dec. 2 10:50AM - 11:00AM Room: E353B

Participants
Ji Eun Kim, MD, Jinju, Korea, Republic Of (*Presenter*) Nothing to Disclose
Kyungsoo Bae, MD, Changwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Min Cho, MD, Jinju, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hocheol Choi, Jinju, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Dae Seob Choi, BA, Jinju, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyunok Kim, Jinju, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the use of dual source dual-energy spectral CT quantitative parameters compared with the use of conventional CT imaging features for differentiating intrahepatic mass-forming cholangiocarcinoma (IMCC) from liver abscess (LA).

METHOD AND MATERIALS

In this institutional review board-approved, retrospective study, 64 patients with IMCC and 52 patients with LA who were imaged in the portal venous phase (PVP) using dual energy-mode were included. Regions of interest were placed within each lesion to measure the mean CT value and its standard deviation (SD), normalized iodine concentration (NIC), and slope (k) of the spectral curve on virtual monochromatic spectral (VMS) images. Two observers qualitatively evaluated lesion types on the basis of conventional CT features. Independent samples t-test was used to compare quantitative parameters between IMCC sand LA. Parameters were fitted to logistic regression models. Sensitivity and specificity analyses were performed by using receiver operating characteristic curves and were compared with data from the qualitative analysis.

RESULTS

The CT value on VMS images at 50-130 keV (20 keV-interval), NIC, and k value were significantly higher in IMCCs than in LAs ($P < .0001$). The best single parameter for differentiating IMCC from LA was CT value at 90 keV, with sensitivity, specificity, accuracy, positive predictive value, and negative predictive value of 89.1%, 86.5%, 87.9%, 89.1%, and 86.5%, respectively. The best combinations of parameters were CT value at 70-130 keV and NIC, with values of 87.5-90.6%, 75.0-78.9%, 83.6%, 81.7-83.6%, and 83.7-86.7%, respectively. Compared with qualitative analysis, the CT value at 90 keV showed higher accuracy (87.9% vs 74.1%, $P = .0113$) and sensitivity (89.1% vs 71.9%, $P = .0433$) and similar specificity (86.5% vs 76.9%, $P > .05$), and the combined CT value at 110-130 keV and NIC showed higher sensitivity (90.6% vs 71.9%, $P = .0118$) and similar specificity (75.0% vs 76.9%, $P > .05$) and accuracy (83.6% vs 74.1%, $P > .05$).

CONCLUSION

Quantitative analysis of dual source dual-energy spectral CT quantitative parameters showed higher sensitivity than qualitative analysis of conventional CT imaging features for differentiating IMCC from LA.

CLINICAL RELEVANCE/APPLICATION

The results of this study suggest that quantitative parameters of dual-sorce dual energy spectral CT imaging can be complementary to conventional CT imaging for differentiating IMCC from LA.

SST04-04 Dynamic Enhancement Pattern of Insulinomas on Volume Perfusion CT

Friday, Dec. 2 11:00AM - 11:10AM Room: E353B

Participants
Liang Zhu, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Huadan Xue, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Wei Liu, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Hao Sun, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Gu Mu Yang Zhang, MD, Beijing, China (*Presenter*) Nothing to Disclose

PURPOSE

To assess the enhancement pattern of insulinomas on volume perfusion CT (VPCT), and to select phases for optimal tumor-parenchyma contrast.

METHOD AND MATERIALS

From August 2014 to December 2015, consecutive patients who underwent VPCT of the pancreas (80kV) with clinically suspected insulinomas were identified. Patients who received surgery and had pathological diagnosis of insulinomas were included, and patients with known multiple endocrine syndrome were excluded. Two experienced radiologists retrospectively evaluated tumor enhancement patterns on VPCT and analyzed the time-attenuation curve of the tumor and pancreatic parenchyma in consensus. The tumors were identified on CT with reference to surgical reports. Tumor-parenchyma contrast at each time point was measured and phases for optimal tumor-parenchyma contrast were selected.

RESULTS

Sixty-three patients were included,with 63 tumors.Five tumors were isoattenuating (tumor-parenchyma contrast <20HU in all 25 dynamic phases), 19 tumors had transient hyperenhancement (tumor-parenchyma contrast >20HU, duration < 10s), and 39 tumors had persistent hyperenhancement. Optimal tumor-parenchyma contrast was observed 9 s after abdominal aorta arriving at threshold of 200HU (AAT), with mean tumor-parenchyma attenuation difference of 77.6±57.2HU. At 9 s after AAT, 14 tumors were isoattenuating, including 5 tumors with intrinsic low contrast and 9 tumors with missed transient hyperenhancement. Complementary phases could be 12 s after AAT (detects another 4 tumors), 4 s after AAT and 1s after AAT (both detect another 3 tumors).

CONCLUSION

VPCT enables detection of insulinomas even if the hyperenhancement is transient. Optimal tumor-parenchyma contrast occurs 9 s after AAT. Tumors that are inconspicous on single- or biphasic contrast enhanced CT are mainly due to missed transient hyperenhancement.

CLINICAL RELEVANCE/APPLICATION

By analyzing dynamic enhancement of insulinomas, a single opitmal phase was selected, which yeilded the maximum tumor-parenchyma contrast and facilitates detection of insulinomas with low radiation dose. It was also found that transient hyperenhancement was the main reason that some insulinomas were inconspicuous on single- or biphasic enhanced CT.VPCT could detect insulinomas even if the hyperenhancement was transient.

SST04-05 Early Evaluation of Sunitinib for the Treatment of Advanced Gastroenteropancreatic Neuroendocrine Neoplasms via CT Imaging: RECIST or Choi Criteria?

Friday, Dec. 2 11:10AM - 11:20AM Room: E353B

Participants
Yanji Luo, Guangzhou, China (*Presenter*) Nothing to Disclose
Shiting Feng, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Zi-Ping Li, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jie Chen, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of this study was to assess and compare the Response Evaluation Criteria in Solid Tumors (RECIST) and the Choi criteria for evaluating the early response of advanced gastroenteropancreatic neuroendocrine neoplasms (GEP-NENs) treated with sunitinib.

METHOD AND MATERIALS

Eighteen patients with pathologically proven advanced GEP-NENs treated with sunitinib were enrolled in the study. Pre- and post-treatment CT scans (plain, biphasic enhanced CT scan) were performed on all patients. Changes in the target tumor size and density from pre-treatment to 1.4-3.1 months after treatment were measured and recorded for each patient. Tumor responses were identified using RECIST and the Choi criteria. The time to tumor progression (TTP) for each patient was measured and compared between groups using the Kaplan-Meier method. The expression of vascular endothelial growth factor receptor 2 (VEGFR 2) was detected in 10 GEP-NEN tissues via immunohistochemical(IHC) staining.

RESULTS

Among the 18 patients, 4 (22%) exhibited a partial response (PR), 9 (50%) exhibited stable disease (SD), and 5 (28%) experienced progressive disease (PD), according to RECIST. However, based on the Choi criteria, 8 (44%) patients exhibited a PR, 4 (22%) exhibited SD, and 6 (33%) experienced PD. According to RECIST, the TTP of the PR group was significantly longer than that of the PD group (P=0.007) but not the SD group (P=0.131). According to the Choi criteria, the TTP of the PR group was significantly longer than that of the SD (P=0.026) and PD groups (P<0.001). Among the 10 patients showing IHC staining for VEGFR 2, seven (70%) tissues showed positive results, among which 3 (42.9%) and 4 (57.1%) exhibited PR, according to RECIST and the Choi criteria at early evaluation, respectively.

CONCLUSION

The Choi criteria appear to be more sensitive and more precise than RECIST for assessing the early response of advanced GEP-NENs treated with sunitinib.

CLINICAL RELEVANCE/APPLICATION

Choi criteria might be considered as an alternative to RECIST to evaluate the effects of sunitinib in patients with advanced GEP-NENs.

SST04-06 Agreement of Six- and Composite Three-echo Magnitude PDFF-Estimation MRI Sequences in a Multi-center Clinical Trial

Friday, Dec. 2 11:20AM - 11:30AM Room: E353B

Participants
Michael S. Middleton, MD, PhD, San Diego, CA (*Presenter*) Consultant, Allergan plc Institutional research contract, Bayer AG Institutional research contract, sanofi-aventis Group Institutional research contract, Isis Pharmaceuticals, Inc Institutional research contract, Johnson & Johnson Institutional research contract, Synageva BioPharma Corporation Institutional research contract, Takeda Pharmaceutical Company Limited Stockholder, General Electric Company Stockholder, Pfizer Inc Institutional research contract, Pfizer Inc
Mary Kosinski, PhD, Nashville, TN (*Abstract Co-Author*) Employee, NuSirt Biopharma, Inc
Omar Flores, PhD,MBA, Nashville, TN (*Abstract Co-Author*) Employee, NuSirt Biopharma, Inc
Michael Zemel, PhD, Nashville, TN (*Abstract Co-Author*) Employee, NuSirt Biopharma, Inc
Claude B. Sirlin, MD, San Diego, CA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Siemens AG; Research Grant, Guerbet SA; ;

PURPOSE

Most MR scanners can acquire 6-echo and/or composite 3-echo magnitude MRI sequences to estimate proton density fat fraction (PDFF). PDFF estimated from the first 3 echos of a 6-echo sequence is nearly equivalent to that estimated from all 6-echos. However, to pool data in clinical trials, we need to show that PDFF derived from 6-echo sequences is essentially equivalent to that derived from separately-acquired composite 3-echo sequences. Hence, the purpose of this study was to calculate the agreement of baseline 6- and composite 3-echo sequences using regression and Bland-Altman analysis in a multi-center clinical trial.

METHOD AND MATERIALS

Anonymized baseline MRIs were analyzed to estimate PDFF for 64 subjects from 7 sites in an ongoing multi-center clinical trial. A multi-echo (ME) magnitude spoiled gradient-recalled-echo (6-echos) MRI sequence, and a pair of double-echo sequences were acquired for each subject. A composite 3-echo dataset was created from the double-double-echo (DDE) sequences. Two additional composite three-echo datasets (one from 1st, 2nd, an 4th echoes; one from first 3 echoes) were created directly from the ME sequence. Three co-localized regions of interest were placed in the right lobe of the liver for all sequences. PDFF was calculated for each dataset using a custom MatLab algorithm. Regression and Bland-Altman analysis was performed to evaluate agreement between PDFF derived from the three composite DDE datasets, and the ME sequence.

RESULTS

ME sequence-derived PDFF ranged from 2.11 to 35.07%. PDFFs from separately- acquired ME and composite DDE sequences showed strong agreement (slope near 1, intercept near 0), but were slightly different (mean difference 0.46%; difference range -2.01 to 1.96%; $p < 0.0001$). Agreement was even stronger for the composite DDE sequences derived directly from the ME sequence, with best agreement for the composite DDE sequence derived from the first 3 echos of the ME sequence (mean difference 0.14%; difference range -0.86 to 0.69%).

CONCLUSION

PDFFs derived from ME sequences showed strong agreement with those derived from separately-acquired and derived composite DDE sequences, with small differences that are likely to be considered negligible in clinical trials.

CLINICAL RELEVANCE/APPLICATION

Our data support that PDFFs from 6-echo and separately-acquired composite 3-echo magnitude MRI sequences may be pooled, given their strong agreement in a multi-center clinical trial.

SST04-07 Diagnostic Value of Low Dose CT-protocol with 4th Generation Iterative Reconstruction Algorithm in Assessment of Mesorectal Fascia Invasion in Rectal Cancer: Comparison with Magnetic Resonance

Friday, Dec. 2 11:30AM - 11:40AM Room: E353B

Participants
Silvia Girolama Drago, Monza, Italy (*Presenter*) Nothing to Disclose
Davide Ippolito, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Cammillo R. Talei Franzesi, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Alessandra S. Casiraghi, Casatenovo, Italy (*Abstract Co-Author*) Nothing to Disclose
Sandro Sironi, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the diagnostic efficacy in terms of radiation dose and image quality of low dose CT protocol combined with iterative reconstruction algorithm (iDose4) in the assessment of mesorectal fascia (MRF) invasion in rectal cancer patients in comparison with standard dose CT, using MRI as reference standard.

METHOD AND MATERIALS

Ninety-one patients with biopsy proven primary rectal adenocarcinoma underwent CT whole-body staging: 42 of them underwent low-dose CT while 49 underwent standard CT protocol. Low dose contrast-enhanced MDCT scans were performed on a 256 (ICT, Philips) scanner with tube voltage 120 KV, automated mAs modulation and slice thickness 2 mm, using iDose4 iterative reconstruction algorithm. The control group of 49 patients underwent standard dose (120 KV, 200-300mAs) contrast-enhanced MDCT examination on the same scanner. All patients were also evaluated with standard lower abdomen MR study, performed on 1.5 T magnet, including standard multiplanar sequences, considered as reference standard. Diagnostic accuracy in terms of MRF assessment was determined on CT images in portal venous phase for both CT protocol and compared with MRI imaging finding. Dose length product (DLP) calculated for both groups was compared and statistically analyzed.

RESULTS

Low-dose protocol combined with iDose4 showed high diagnostic quality in assessment of MRF involvement, also in comparison with standard MR studies. Total DLP was significantly ($p<0.0081$) lower for low dose protocol studies (2453.4 mGy*cm), as compared to standard dose examinations (3194.3 mGy*cm), allowing an overall dose reduction of 23 %. Image noise was slightly higher in low dose images but the difference was not statistically significant.

CONCLUSION

Low-dose CT-protocol combined with iDose4 reconstruction algorithm offers high quality images with significant reduction of

Low-dose CT protocol combined with iDose4 reconstruction algorithm offers high quality images with significant reduction of radiation dose, being a useful tool in the evaluation of MRF involvement in rectal cancer patients.

CLINICAL RELEVANCE/APPLICATION

MDCT with low dose protocol, due to radiation dose reduction and high image quality, should be considered a reliable tool in rectal cancer staging, especially in patient with MRI contraindications.

SST04-08 Quantitative Functional Evaluation of Advanced Hepatocellular Carcinoma: Correlation between Dual-energy Iodine Maps and Perfusion CT Parameters

Friday, Dec. 2 11:40AM - 11:50AM Room: E353B

Participants
Sebastien Mule, MBBS, Reims, France (*Abstract Co-Author*) Nothing to Disclose
Frederic Pigneur, MD, Creteil, France (*Abstract Co-Author*) Nothing to Disclose
Ronan Quelever, BUC, France (*Abstract Co-Author*) Employee, General Electric Company
Laurence Baranes, MD, Creteil, France (*Abstract Co-Author*) Nothing to Disclose
Philippe Richard, Velizy Cedex, France (*Abstract Co-Author*) Employee, General Electric Company
Alain Rahmouni, MD, Nogent Sur Marne, France (*Abstract Co-Author*) Nothing to Disclose
Valerie Vilgrain, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Alain Luciani, MD,PhD, Creteil, France (*Presenter*) Nothing to Disclose

PURPOSE

To determine whether dual-energy CT (DECT) iodine concentrations correlate with perfusion CT parameters in patients with advanced hepatocellular carcinomas (HCC).

METHOD AND MATERIALS

Sixteen patients with advanced HCC who underwent dynamic perfusion CT and multiphase DECT using a single source DECT (GE HD750) were retrospectively included. Iodine maps and blood flow (BF), blood volume (BV), hepatic arterial BF (artBF), and hepatic portal BF (portBF) maps were calculated. Circular regions of interest were manually drawn in HCC and tumor-free liver parenchyma and copied to all perfusion and iodine maps. Correlation between arterial and portal iodine maps and perfusion maps was calculated (Pearson correlation coefficient). An adjusted P value (Holm's method) < 0.05 was considered significant.

RESULTS

Mean HCC and liver-free parenchyma iodine concentrations were 22.7 mg/ml and 17.1 mg/ml at arterial phase ($p=0.02$), and 18.7 mg/ml and 24.5 mg/ml at portal phase ($p=0.07$), respectively. A significant correlation was found between BF and arterial iodine concentration ($r=0.73$, $p<0.0001$), BF and portal iodine concentration ($r=0.72$, $p<0.0001$), artBF and arterial iodine concentration ($r=0.74$, $p<0.0001$), BV and arterial iodine concentration ($r=0.56$, $p=0.0027$), BV and portal iodine concentration ($r=0.53$, $p=0.0094$).

CONCLUSION

DECT derived iodine maps correlate with perfusion parameters and may therefore allow accurate tumor functional evaluation in patients with advanced HCC.

CLINICAL RELEVANCE/APPLICATION

DECT derived iodine concentration significantly correlate with perfusion parameters and may therefore allow accurate longitudinal tumor functional evaluation in patients with advanced HCC.

SST04-09 Value of Pelvis CT during Follow-up of Patients with Pancreatic Adenocarcinoma

Friday, Dec. 2 11:50AM - 12:00PM Room: E353B

Awards
Student Travel Stipend Award

Participants
Jason J. Bailey, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
James H. Ellis, MD, Ann Arbor, MI (*Abstract Co-Author*) Consultant, General Electric Company
Matthew S. Davenport, MD, Cincinnati, OH (*Abstract Co-Author*) Royalties, Wolters Kluwer nv; ;
Richard H. Cohan, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Bin Nan, PhD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Aishwarya Parameswaran, MS, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Lin Hsu, MD, Ann Arbor , MI (*Abstract Co-Author*) Nothing to Disclose
Vaibhav Sahai, MBBS, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Isaac R. Francis, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the frequency in which the pelvis component of an abdominopelvic CT provides information that would influence clinical management in patients with previously resected or locally advanced pancreatic ductal adenocarcinoma (PDA).

METHOD AND MATERIALS

This institutional review-board approved retrospective study with waived informed consent included 247 subjects with histologically proven PDA, including 153 post-pancreaticoduodenectomy and 94 with locally advanced unresectable disease who had imaging interpreted at our cancer center between January 2005 and December 2013. Imaging reports were obtained from our institution’s Radiology Information System, reports were searched for the words “whipple” and “unresectable” to create two cohorts, and the radiology report associated with the first examination intended for oncologic treatment guidance was chosen for review. Separate abdomen and pelvis CT findings were reviewed and graded for their likelihood of representing metastatic disease. Probability of finding isolated metastatic disease on pelvic CT was determined using 95% binomial proportion confidence intervals.

RESULTS

No subjects who had undergone pancreaticoduodenectomy had an isolated pelvic metastasis on follow-up imaging (0%; 95% CI 0-2.38, p = 0.0004); 33 had metastatic disease in the abdomen, and 120 had no or equivocal evidence of abdominopelvic metastatic disease. One subject with locally advanced unresectable PDA had a possible isolated pelvic metastasis on follow-up imaging (1.1%; 95% CI 0.03-5.79, p = 0.048); 20 had metastatic disease in the abdomen, and 73 had no or equivocal evidence of abdominopelvic metastatic disease.

CONCLUSION

Isolated pelvic metastatic disease rarely occurs in patients with PDA who have had prior pancreaticoduodenectomy or have a locally advanced unresectable primary tumor, suggesting that routine pelvic CT follow-up imaging of these patients is unnecessary.

CLINICAL RELEVANCE/APPLICATION

Routine pelvic CT may not be necessary in follow-up of patients with pancreatic adenocarcinoma who have had prior pancreaticoduodenectomy or have a locally advanced unresectable primary tumor.

SPHT63

Novel Concepts in Hepatobiliary Tumor Imaging Symposium: Management Issues (In Conjunction with Society of Abdominal Radiology (SAR), Japanese Society of Abdominal Radiology (JSAR), Korean Society of Abdominal Radiology (KSAR), and French Society of Abdominal Radiology (SIAD))

Friday, Dec. 2 11:00AM - 12:00PM Room: E253BCD

GI MR OI

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Marc Zins, MD, Paris, France, (mzins@hpsj.fr) (*Moderator*) Nothing to Disclose
Won Jae Lee, MD, Seoul, Korea, Republic Of (*Director*) Research Grant, Samsung Electronics Co, Ltd
Takamichi Murakami, MD, PhD, Osakasayama, Japan (*Director*) Nothing to Disclose
Judy Yee, MD, Clayton, CA, (judy.yee@ucsf.edu) (*Director*) Research Grant, EchoPixel, Inc
Marc Zins, MD, Paris, France, (mzins@hpsj.fr) (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

ABSTRACT

URL

Sub-Events

SPHT63A Abbreviated MRI for HCC Screening and Surveillance: An Accurate Alternative to US

Participants
Bachir Taouli, MD, New York, NY, (bachir.taouli@mountsinai.org) (*Presenter*) Consultant, MEDIAN Technologies ; Grant, Guerbet SA

LEARNING OBJECTIVES

1) Review scientific evidence behind HCC screening and surveillance. 2)Review current AASLD/EASL guidelines for HCC screening/surveillance. 3) Introduce the concept of abbreviated MRI (AMRI) for HCC screening and surveillance. 4) Review early results and future directions of AMRI for HCC screening.

ABSTRACT

URL

SPHT63B Imaging-based Management Guidelines for HCC

Participants
Cynthia S. Santillan, MD, San Diego, CA, (csantillan@mail.ucsd.edu) (*Presenter*) Consultant, Robarts Clinical Trials, Inc

LEARNING OBJECTIVES

1) Review imaging guidelines for diagnosis of hepatocellular carcinoma, including AASLD, LI-RADS, and OPTN. 2) Discuss differences in intended users and patient population for these guidelines. 3) Emphasize how management options influence the desired specificity of imaging diagnosis for HCC.

ABSTRACT

URL

SPHT63C Hypovascular and Hypointense Nodule in Gadoxetic Acid-Enhanced Liver MRI: Outcome and Management

Participants
Utaroh Motosugi, MD, Yamanashi, Japan (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize a pathological category called early HCCs or hypovascular HCCs. 2) Understand the concept of hypovascular hypointense nodule in gadoxetic acid-enhanced MRI.

ABSTRACT

In a typical case, the imaging-based diagnosis of HCC is simple. However, we often encounter atypical cases: hypo vascular HCCs or early HCCs. Gadoxetic acid has advantage in hepatobiliary phase imaging, which helps distinguish HCC from pre-malignant lesion. “Hypovascular hypointense nodule in gadoxetic acid-enhanced MRI” is a new concept observed in cirrhotic patients, which is supposed to be an early HCC and will develop hypervascular (typical) HCC subsequently. According to the published articles, hypovascular hypointense nodule at high risk of hypervascularization shows large size, high signal intensity on T2WI/DWI, fat deposition in the lesion, and size increase on follow-up examination. If we treat these lesions, the cirrhotic patients can get extended HCC-free period. The hypovascular hypointense nodule is also an indicator of the carcinogenesis of the background liver. We can define imaging-based de novo development of HCC, by assessing previous MR examination with hepatobiliary phase images,

i.g. HCC develops in a place where no hypovascular hypointense nodule was observed in the previous MRI. Interestingly, de novo-type HCC also develops more frequently in the liver with hypovascular hypointense nodule (non-clean liver) than in the liver without them (clean liver).

URL

SPHT63D New Concepts in Monitoring Tumor Treatment

Participants
Yves M. Menu, MD, Paris, France, (yves.menu@sat.aphp.fr) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn the recent development of new treatments of HCC, including systemic chemotherapy and intervention. 2) To understand the rationale for an relevant follow-up of treatment efficacy. 3) To become familiar with the different standards for imaging follow-up.

ABSTRACT

Modern tretament of HCC include OLT, surgery, intervention, either percutaneouis or endovascular, and systemic chemotherapy. The role of imaging is essential, whatever is the treatment goal. Imaging looks for recurrence after curative tretament, tumour response after palliation. CT still is the work horse of evaluuation, due to its capability to evaluation tumour vascularization and whole body survey. However, MRI is increasingly associated in order to improve sensitivity for the detection of small tumours. Concerning systemic chemotherapy, it appear that RECIST is unreliable, and should be replaced with mRECIST, due to the specific modification in tumour viability that are indced by targeted agents. To a certain extent, this standard also applies to the follow-up of chemoembolization. Concerning percutaneous ablation, knowledge of short and long-term post-procedural appearance is important in order to detect early recurrence.Overall, imaging is the cornerstone of treatment evaluation of HCC

URL

SPHT64

Novel Concepts in Hepatobiliary Tumor Imaging Symposium: Benign Liver Tumors (In Conjunction with Society of Abdominal Radiology (SAR), Japanese Society of Abdominal Radiology (JSAR), Korean Society of Abdominal Radiology (KSAR), and French Society of Abdominal Radiology (SIAD))

Friday, Dec. 2 1:00PM - 2:00PM Room: E253BCD

GI MR OI

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: .50

Participants
Jean-Pierre Tasu, MD, PhD, Poitiers, France (*Moderator*) Nothing to Disclose
Won Jae Lee, MD, Seoul, Korea, Republic Of (*Director*) Research Grant, Samsung Electronics Co, Ltd
Takamichi Murakami, MD, PhD, Osakasayama, Japan (*Director*) Nothing to Disclose
Judy Yee, MD, Clayton, CA (*Director*) Research Grant, EchoPixel, Inc
Marc Zins, MD, Paris, France (*Director*) Nothing to Disclose

Sub-Events

SPHT64A Genotype-Phenotype Correlations and Management of Hepatic Adenoma

Participants
Valerie Vilgrain, MD, Clichy, France (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the different Genotypes of Hepatic Adenoma. 2) Correlate the MR imaging findings with the different genotypes. 3) Detail the most important factors involved in patient management of Hepatic Adenoma.

ABSTRACT

Hepatocellular adenomas (HCA) are a variety of solid hepatocellular lesions mostly found in the absence of underlying chronic liver disease in young patients especially women. HCA is no longer to be considered as a unique lesion but as a recollection of different entities sharing common points but most of all separated by different genotype-phenotype aspects. The best imaging technique for subtyping HCAs is magnetic resonance imaging, as specific combinations of imaging features have been associated with the different subtypes.The two most common complications of HCA are hemorrhage and malignant transformation. Large HCAs (exceeding 5 cm) are more exposed to these two complications than small HCAs. Malignant transformation is much more common in men than in women. Last, the different HCA subtypes expose to different risks of complication. Therefore patient management ranges from conservation treatment to surgical resection.

URL

SPHT64B Imaging of FNH: Role of CEUS and MRI

Participants
Olivier Lucidarme, MD, Paris, France (*Presenter*) Consultant, Bracco Group Consultant, F. Hoffmann-La Roche Ltd Consultant, Boehringer Ingelheim GmbH

SPHT64C Imaging Spectrum of Benign and Malignant Vascular Tumors: How to Avoid Misdiagnosis

Participants
Won Jae Lee, MD, Seoul, Korea, Republic Of, (wjlee@skku.edu) (*Presenter*) Research Grant, Samsung Electronics Co, Ltd

LEARNING OBJECTIVES

1) To described the imaging findings of benign and malignant vascular tumors of the liver including peliosis hepatis, hemangioma, epithelioid hemangioendothelioma and angiosarcoma, as well as the differential points among them. 2) To describe the differential points between hepatic hemangioma and non-vascular lesions or tumors of the liver mimicking a hemangioma using various imaging modalities.

ABSTRACT

Vascular tumors arising primarily from the liver encompass both benign and malignant tumors including peliosis hepatis, hemangioma, epithelioid hemangioendothelioma and angiosarcoma in the order from benignancy to malignancy. Imaging findings of hepatic hemangioma are well established, especially in terms of the enhancement pattern, though there are a wide range of its imaging spectrum. Imaging findings of other vascular tumors of the liver (e.g., peliosis hepatis, epithelioid hemangioendothelioma and angiosarcoma) are infrequently reported, revealing that some findings are characteristic and others are overlapped. Moreover, some hepatic lesions or tumors of non-vascular origin (e.g., such as cyst, hepatocellular carcinoma, cholangiocarcinoma, metastasis, etc) resemble hepatic hemangioma in some imaging modalities, necessitating further imaging evaluation. This lecture will firstly describe the imaging findings of above-mentioned vascular hepatic tumors, as well as the differential points among them so that we can avoid misdiagnosis. Secondly, non-vascular hepatic lesions or tumors mimicking a hemangioma in certain imaging modalities will be differentiated from hemangioma using other imaging modalities so that we can avoid misdiagnosis.

URL

SPHT65

Novel Concepts in Hepatobiliary Tumor Imaging Symposium: Bile Duct Tumors (In Conjunction with Society of Abdominal Radiology (SAR), Japanese Society of Abdominal Radiology (JSAR), Korean Society of Abdominal Radiology (KSAR), and French Society of Abdominal Radiology (SIAD))

Friday, Dec. 2 2:00PM - 3:00PM Room: E253BCD

GI OI

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Byung Ihn Choi, MD, PhD, Seoul, Korea, Republic Of (*Moderator*) Nothing to Disclose
Takamichi Murakami, MD, PhD, Osakasayama, Japan (*Director*) Nothing to Disclose
Judy Yee, MD, Clayton, CA, (judy.yee@ucsf.edu) (*Director*) Research Grant, EchoPixel, Inc
Marc Zins, MD, Paris, France (*Director*) Nothing to Disclose
Won Jae Lee, MD, Seoul, Korea, Republic Of (*Director*) Research Grant, Samsung Electronics Co, Ltd

Sub-Events

SPHT65A Prognostic Implications of Imaging Features in Hepatobiliary Carcinoma

Participants
Myeong-Jin Kim, MD, PhD, Seoul, Korea, Republic Of, (kimnex@yuhs.ac) (*Presenter*) Research Grant, Bayer AG

LEARNING OBJECTIVES

1) Identify imaging features for the diagnosis hepatobiliary carcinoma. 2) Illustrate the imaging features related with the prognosis of hepatobiliary carcinoma. 3) Define the independent imaging parameters to predict the outcome after the treatment.

ABSTRACT

URL

SPHT65B Intrahepatic Cholangiocarcinoma and Combined HCC/CCC in Cirrhotic Patient: How to Diagnose?

Participants
Akira Yamada, MD, Matsumoto, Japan, (a_yamada@shinshu-u.ac.jp) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the imaging features of intrahepatic cholangiocarcinoma (ICC) and combined hepatocelluar carcinoma (HCC) and cholangiocellular crcinoma (CCC) in CT and MR imaging. 2) Differentiate ICC or mixed HCC/CCC from the other hepatic lesions in CT and MR imaging.

ABSTRACT

URL

Handout:Akira Yamada

http://abstract.rsna.org/uploads/2016/16002304/RSNA2016_1202.pptx

SPHT65C Intraductal Papillary Neoplasm of the Bile Duct: Radiologic and Pathologic Correlation

Participants
Jae Hoon Lim, Goyang-si, Korea, Republic Of (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the pathologic spectrum of intrductal papillary neoplasm of the bile duct(IPNB). 2) To become familiar with distinguising image appearances of IPNB based on the pathologic types. 3) To recognize and differentiate IPNB from the more common cholangiocarcinomas and to emphasize the role of radiiology in therapeutic decision making.