Vascular

VI002-EB-X

What Radiologists Need to Know: From Wires and Catheters to Balloons and Stents

All Day Location: VI Community, Learning Center

Participants
Cheng Fang, MBBS, BSC, London, United Kingdom (*Presenter*) Nothing to Disclose
Mohammad A. Husainy, MD, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Jason Wilkins, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The aim of this exhibit is to 1) review common types of wires, catheters, balloons and stents 2) to highlight their main characteristics 3) to illustrate when and where to use them in different clinical scenarios.

TABLE OF CONTENTS/OUTLINE

Wires Detail different characteristics including diameter, length, tip shape and stiffness, core construction and coatings Explain selection of wires in different clinical settings including support, exchange, lesion and chronic total occlusion crossing Catheters Illustrate advantages of different catheters based on their characteristic shapes, construction and how this gives handling characteristics such as trackability and pushability Discuss usage in specific clinical circumstances Balloon Present differences between a compliant and a non-compliant balloon and their examples including moulding, scoring/cutting, high pressure, drug eluting, micro-porous balloon Provide examples of their clinical application Stent Describe differences between self expandable, balloon mounted and covered stents Explain why, when and where to use a stent

VI003-EB-X

The Concept of Flow Diversion for Intracranial Aneurysm Treatment

All Day Location: VI Community, Learning Center

Participants
Anna Luisa Kuhn, MD, PhD, Worcester, MA (*Presenter*) Nothing to Disclose
Francesco Massari, Worcester, MA (*Abstract Co-Author*) Nothing to Disclose
Juan Diego Lozano, MD, Worcester, MA (*Abstract Co-Author*) Nothing to Disclose
Mary Howk, Worcester, MA (*Abstract Co-Author*) Nothing to Disclose
Mary Perras, Worcester, MA (*Abstract Co-Author*) Nothing to Disclose
Christopher Brooks, Worcester, MA (*Abstract Co-Author*) Nothing to Disclose
Matthew J. Gounis, PhD, Worcester, MA (*Abstract Co-Author*) Research Consultant, Johnson & Johnson Research Grant, Stryker Corporation Research Grant, Johnson & Johnson Research Grant, Medtronic, Inc Research Grant, sanofi-aventis Group Research Grant, Neuravi, Ltd Research Grant, Neurointerventional Therapeutics, Inc Research Grant, Thrombolytic Science, LLC
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Ajit Singh Puri, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

-To appreciate and understand the new treatment concept of flow diversion -To understand important angiographic findings and possible complications associated with the use of flow diverters

VI005-EB-X

Variceal Embolization: A Resident's Guide to the Many Options for Treating Varices Secondary to Portal Hypertension

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Ankaj Khosla, MD, Dallas, TX (*Presenter*) Nothing to Disclose
Benjamin White, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Anil K. Pillai, MD, Coppell, TX (*Abstract Co-Author*) Nothing to Disclose
Sanjeeva P. Kalva, MD, Dallas, TX (*Abstract Co-Author*) Consultant, CeloNova BioSciences, Inc

TEACHING POINTS

Varices are a common manifestation of portal hypertension that can result in severe morbidity and mortality. Important early identification and coordination with clinical care teams can result in improved patient outcomes. Multiple options exist for the treatment of varices which vary depending on indication and clinical scenario.

TABLE OF CONTENTS/OUTLINE

Underlying causes of varices; physiology and pathology Identifying the most common types of varices Treatment options TIPS BRTO Direct embolization (glue, coil and others) Splenic embolization Treatment of portal vein thrombosis and/or stenosis Treatment of hepatic vein thrombosis and/or stenosis Follow up and post treatment management.

VI008-EB-X

Necessity for Real-time Measurement of the Occupational Radiation Dose in Interventional Radiology

All Day Location: VI Community, Learning Center

Participants
Yohei Inaba, PhD, Sendai, Japan (*Presenter*) Nothing to Disclose
Koichi Chida, PhD, Sendai, Japan (*Abstract Co-Author*) Nothing to Disclose
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Masakatsu Tano, Minato-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
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Shigeru Tachibana, Sendai, Japan (*Abstract Co-Author*) Nothing to Disclose
Isao Yanagawa, Sendai, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

-To understand the importance of radiation protection for interventional radiology(IR) staff, given the recent regulatory changes in the dose limit for the eye lens(from 150mSv to 20mSv per year) -To understand the need for managing the occupational dose -To understand the fundamental characteristics of a real-time occupational dosimetry and display system(i2 system)

TABLE OF CONTENTS/OUTLINE

Fundamental performance of an i2 system Energy dependence, dose linearity, and dose-rate dependence were compared. Clinical benefits of the i2 system The i2 system provides real-time dose measurement and visualization. The dose information is sent wirelessly to the base station. Comparison of fundamental performance among several occupational real-time dosimeters(i2 system, pocket dosimeter, etc.) SUMMARY: Real-time monitoring of the radiation doses received by IR staff has become highly desirable. However, occupational doses are rarely measured in real time, due to the lack of a feasible method for use in IR. In general, the i2 system exhibited excellent performance. In occupational dose measurements, the fundamental performance of the i2 system was equivalent to those of other occupational dosimeters. Furthermore, the i2 system demonstrated real-time visualization of the dose rate, which other occupational dosimeters cannot provide.

VI009-EB-X

Embolisation Materials - What Interventional Radiologists Need to Know

All Day Location: VI Community, Learning Center

Participants
Mohammad A. Husainy, MD, London, United Kingdom (*Presenter*) Nothing to Disclose
Cheng Fang, MBBS, BSC, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
C. Jason Wilkins, MD, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Farhina Sayyed, MRCS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The aim of this exhibit is to 1) review indications for embolisation 2) to highlight the common types of embolization materials available 3) to discuss when and where to use them in different clinical scenarios.

TABLE OF CONTENTS/OUTLINE

Indications for embolisation therapy• Review common clinical conditions where embolisation therapy is indicated ie. control of various type of haemorrhages, treatment of benign and malignant tumours, endoleaks, arterio-venous malformations (AVMs) and as a pre operative step to devascularise the surgical bed.Embolisation Materials• Highlight physical properties of coils, particles, glue, gel foam, liquid embolics and plugs • Illustrate various types of embolic agents available and their biophysical properties. Explain why, when and where to use different agents. Clinical scenarios• Describe various clinical scenarios and techniques to illustrate practical real world use of different embolics

VI010-EB-X

Lymphatic Intervention for Various Kinds of Lymphorrhea: How to Access and Treat

All Day Location: VI Community, Learning Center

Participants
Masanori Inoue, MD, Shinjuku-Ku, Japan (*Presenter*) Nothing to Disclose
Seishi Nakatsuka, MD, Shinjuku-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Yosuke Suyama, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Masashi Tamura, Shinjuku-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Jitsuro Tsukada, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Sota Oguro, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Hideki Yashiro, MD, Shinjuku-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Masahiro Jinzaki, MD, Tokyo, Japan (*Abstract Co-Author*) Support, Toshiba Corporation; Support, General Electric Company
Nobutake Ito, MD, Yokohama, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Techniques of lymphangiographyThe lymphatic intervention consist of diagnostic lymphangiography followed by embolization or sclerotherapy. Intranodal lymphangiography is technically feasible. An inguinal node was directly accessed under ultrasound guidance using a needle followed by lipiodol injection. Intrahepatic lymphangiography is the only method, which could visualize lymphorrhea from hepatic lymphatics. We puncture the liver close to the right portal vein using a needle under ultrasound guidance . We withdraw the chiba needle slowly while injecting small volumes of Urografin until hepatic lymphatic channels are opacified. This usually needs multiple-puncture of the liver.How to access thoracic duct Access from the cistern chyli : Following lymphangiography, the cistern chyli/thoracic duct is punctured under fluoroscopic or CT guidance. A guidewire was inserted into the thoracic duct, then 2.0-Fr micro catheter was advanced over the wire. Access from venous angle : 4-Fr sheath is inserted from left cephalic vein. A 4-Fr catheter is advance near the venous angle and cannulated the lymphatic vessel flowing into the subclavian vein. Then, microcatheter is advanced into the thoracic duct coaxially.

TABLE OF CONTENTS/OUTLINE

Target of lymphatic intervention Management of lymphorrhea Procedure details Embolization and Sclerotherapy

VI011-EB-X

Not all Colic is Calculi: Ureteric Obstruction from Mycotic Aneurysm

All Day Location: VI Community, Learning Center

Participants
Anthony M. Cox VI, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Jeevan Kumaradevan, MBChB, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Saurabh Singh, MBBCHIR, MA, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Shian Patel, london, United Kingdom (*Presenter*) Nothing to Disclose

TEACHING POINTS

1. Renal colic is a common presenting complaint, but in this case occurring secondary to a rare pathology- mycotic aneurysm.2. The case considers the complex challenges faced when treating multiple mycotic aneurysms, including the role of diagnostic/interventional radiology.

TABLE OF CONTENTS/OUTLINE

1. Presentation of mycotic aneurysm as renal colic on imaging. No previously described cases of common iliac mycotic aneurysm, presenting as renal colic, were found in the literature. The patient presented as left renal colic with blood in the urine, a 6 month history of arthralgia, visual disturbances and low grade pyrexia and a background of blood culture positive bacteraemia post bilateral breast augmentation. 2. Imaging review in advanced bacterial endocarditis causing mycotic aneurysms. 3. Management of mulitple mycotic aneuryms, including images from interventional procedures. A high index of suspicion is essential for the diagnosis of this rare condition, since septic emboli cause devastating sequelae and all untreated infected aneurysms eventually rupture. Furthermore, although aneurysmectomy and antibiotics is the treatment of choice, complicating factors prohibited this gold standard and necessitated immediate aneurysm exclusion by endovascular treatment.

VI012-EB-X

Preparing for Call by IR Residents: Perspectives from a Large Urban Academic Medical Center

All Day Location: VI Community, Learning Center

Participants
Stephen Fisher, MD, Dallas, TX (*Presenter*) Nothing to Disclose
Stephen P. Reis, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Mark Reddick, MD, MS, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Matthew E. Anderson, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Sanjeeva P. Kalva, MD, Dallas, TX (*Abstract Co-Author*) Consultant, CeloNova BioSciences, Inc

TEACHING POINTS

1. Potential structures of call coverage over a 5 year IR residency. Benefits and drawbacks of each.2. Understand barriers to establish a separate interventional radiology call pool.3. Discuss unique challenges to resident preparation for IR call in the upcoming residency programs.4. Familiarize with possible methods to prepare IR residents for independent diagnostic and interventional call.

TABLE OF CONTENTS/OUTLINE

1. Review a 5 year plan for IR resident call coverage.2. Review potential didactic and case based IR pre-call curriculum to administer during the PGY4 year prior to beginning IR call during the PGY5 year.3. IR residents will naturally desire early, advanced procedural training, but development of clinical patient management skills should be a priority during the first dedicated IR year, PGY5. Explore how to best layer skill sets throughout earlier DR and IR rotations to best prepare residents for call.4. An ICU month is required in the new structure, so the optimal timing of this experience will be discussed. A logical place in the curriculum is early during the PGY5 year to facilitate higher level clinical education during the first dedicated year of IR training.

VI013-EB-X

Changes in Visceral Abdominal Arteries: Pictorial Essay

All Day Location: VI Community, Learning Center

Participants
Carlos A. Ventura, PhD, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Thiago D. Saraiva, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
George C. Dantas, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
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Daniel C. Luz, MD, Brazil, Brazil (*Abstract Co-Author*) Nothing to Disclose
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Marcelo B. Funari, MD, Ribeirao Pires, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Diagnosis of changes in visceral andominal arteries (VAA) is unusual, but has become more common due to the increased number of performing exams and ultrasound plays an important role. Aneurysms are more common in splenic artery, which affects more middle-aged women, most isolated and asymptomatic, with risk of rupture when greater than 2 cm, and hepatic, which may have atherosclerotic or fungal origin, with no gender preference and about 80% extrahepatic, and up to 1/3 present epigastric pain, hemobilia and obstructive jaundice triad. The spontaneous dissection of the superior mesenteric artery (SMA) affects more middle-aged men and can occur isolated or associated with aortic dissection. The most common symptom is vague abdominal pain. Renal artery stenosis is the most common cause of secondary hypertension, caused by atherosclerosis with a location proximal to the ostium in middle-aged patients, or fibromuscular dysplasia affecting the middle or distal third in young patient. The proper recognition of major changes in VAA allows the early diagnosis and appropriate treatment, which are fundamental in the setting of a higher number of tests ordered by other causes even non-vascular.

TABLE OF CONTENTS/OUTLINE

Diagnosis of changes in VAA Aneurysms in splenic and hepatic arteries Spontaneous dissection of the SMA Renal artery stenosis

VI015-EB-X

Revisiting Rokitansky: The Basics of Superior Mesenteric Artery Syndrome

All Day Location: VI Community, Learning Center

Participants
Keshav M. Menon, MD, Dallas, TX (*Presenter*) Nothing to Disclose
Ankaj Khosla, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Patrick D. Sutphin, MD, PhD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Stephen P. Reis, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Anil K. Pillai, MD, Coppell, TX (*Abstract Co-Author*) Nothing to Disclose
Clayton K. Trimmer, DO, Irving, TX (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Revisit Superior Mesenteric Artery (SMA) Syndrome presentation and pathogenesis.2. Examine multimodality imaging technologies and associated radiographic findings that suggest chronic duodenal ileus.3. Review updated Gastroenterological and Surgical literature on the current standards-of-care for the treatment of patient's with SMA Syndrome.

TABLE OF CONTENTS/OUTLINE

1. Overview of the clinical course of SMA Syndrome.2. Cased-based review of the imaging findings suggestive duodenal obstruction from chronic duodenal ileus.3· Review of medical and surgical literature on the current standard of care for the treamtent of patients with SMA Syndrome.

VI016-EB-X

Application of Particle Image Velocity for Confirming Abnormal Hemodynamic Features in the Suspicious Stroke Region Found in Clinical Imaging

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Hojin Ha, Pohang, Korea, Republic Of (*Presenter*) Nothing to Disclose
Bum Joon Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Guk-Bae Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Namkug Kim, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Stockholder, Coreline Soft, Inc
Dong-Wha Kang, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sun Uck Kwon, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

We will review a basic principle of particle image velocity (PIV) focused on the application for hemodynamic analysis. We will introduce when PIV measurement is clinically needed and how it can help revealing the blood flow features focused on the stoke disease. We will introduce applications of PIV for analyzing abnormal hemodynamics in cooperation with MR-TOF imaging.

TABLE OF CONTENTS/OUTLINE

1. Introduction of PIV: basics, principle and state of the art system.2. What kinds of study needs PIV3. Procedure for PIV: image preparation, phantom fabrication and experimental set-up.4. What can be obtained from PIV: quantification method of blood flow, estimation of wall shear stress and turbulent intensity5. Prospect of 4D PC-MRI: current outcomes, technical obstacles and potentials.

VI017-EB-X

Strategies for Reducing Thermal Collateral Injuries in Ultrasound-guided Radiofrequency Ablation of Liver Tumors; Emphasis on Artificial Ascites Technique

All Day Location: VI Community, Learning Center

Participants
Jin Woong Kim, MD, Jeollanamdo, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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Jun Hyung Hong, Gwang-Ju, Korea, Republic Of (*Presenter*) Nothing to Disclose
Suk Hee Heo, MD, Hwasun-Gun, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyo Soon Lim, MD, Jeollanam-Do, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young Hoe Hur, Jeollanam-Do, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yong-Yeon Jeong, MD, Chonnam, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To overview the current strategies for reducing thermal collateral injuries in US-guided radiofrequency (RF) ablation of liver tumors 2. To provide comprehensive review of artificial ascites technique 3. To discuss the correlation between artificial ascites and development of pleural effusion

TABLE OF CONTENTS/OUTLINE

A. Overview of the current strategies for minimizing thermal collateral injuries 1. Artificial ascites technique 2. Purposeful patient positioning 3. Cooling bile duct with endoscopic nasobiliary tube 4. OthersB. Comprehensive review of artificial ascites technique 1. Steps to make artificial ascites 2. Infusion routes of artificial ascites according to the tumor location in the liver 3. Tips to enhance the role of artificial ascites 4. Comparison between 5% dextrose solution and physiologic saline as artificial ascitesC. Correlation between artificial ascites and the development of pleural effusion 1. Mechanism of the development of pleural effusion after RF ablation with artificial ascites a. Current understanding of the development of pleural effusion: a literature review b. Suggested new concept regarding how pleural effusion may occur 2. The fate of pleural effusion

VI018-EB-X

Drainage Flow from Hypervascular Hepatocellular Carcinoma: Importance in Intervention

All Day Location: VI Community, Learning Center

Participants
Tetsuya Minami, MD, Kanazawa, Japan (*Presenter*) Nothing to Disclose
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Kotaro Yoshida, MD, Kanazawa, Japan (*Abstract Co-Author*) Nothing to Disclose
Norihide Yoneda, Kanazawa, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

This presentation is based on our previous researches and experiences. Some of the data have already been published as articles. The teaching points of this presentation is To review the pathophysiology and imaging of the drainage flow from hepatocellular carcinoma (HCC) To review the importance of the drainage flow in the progression of HCC To discuss the importance of the drainage area in local recurrence of HCC following RFA and/or TACE To discuss how to treat the drainage area in RFA and TACE

TABLE OF CONTENTS/OUTLINE

1. Drainage flow from HCC: pathologic-imaging correlation-Changes of blood supply and drainage flow during multi-step heaptocarcinogenesis-Drainage flow from a hypervascular HCC with pseudocapsule and imaging findings of drainage area2. Importance of the drainage area in the progression of HCC-Drainage area and microsatellites of HCC-Case presentations with daughter nodules within drainage area3. Local recurrence in the drainage area following RFA and/or TACE -Case presentations4. How to treat the drainage area in intervention -TACE with special references to the function of iodized oil -RFA5. Summary

VI020-EB-X

Pay Attention to What Patients Say: Provocation Test during Angiography for Arterial Thoracic Outlet Syndrome

All Day Location: VI Community, Learning Center

Awards
Cum Laude

Participants
Seun Ah Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Seung Wha Lee, Ansan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jisung Han, MD, Ansan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hwan Hoon Chung, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Baek Hyun Kim, MD, Ansan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To review arterial thoracic outlet syndrome; including the anatomy of the thoracic outlet, various provocation tests, and typical imaging features of arterial thoracic outlet syndrome. 2. To introduce patient history based provocation test during angiography and to understand that actively listening to what patients say is one of the most important aspects of diagnosing arterial thoracic outlet syndrome.

TABLE OF CONTENTS/OUTLINE

Our exhibit will be divided into 4 sections and present relevant illustrations and cases:1. Thoracic outlet syndrome(1) Anatomy of the thoracic outlet(2) Definition of thoracic outlet syndrome(3) Classification of thoracic outlet syndrome2. Provocation test for diagnosing arterial thoracic outlet syndrome3. Typical angiographic features of arterial thoracic outlet syndrome4. Several cases of patient history based provocation test during angiography

VI021-EB-X

Venous Sampling in Interventional Radiology: Pearls, Pitfalls, and Advances

All Day Location: VI Community, Learning Center

Participants
Matthew Neill, New York, NY (*Presenter*) Nothing to Disclose
Barry A. Sacks, MD, Chestnut Hill, MA (*Abstract Co-Author*) Nothing to Disclose
Amy R. Deipolyi, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Venous sampling performed in interventional radiology aids in accurate diagnosis and localization of endocrine disease. 2. Understanding the relevant venous and cross sectional anatomy and anatomical variants is essential for accurate interpretation of venous sampling findings.3. Specific techniques and emerging technologies will allow for more accurate and reliable diagnosis.

TABLE OF CONTENTS/OUTLINE

1. Adrenal vein sampling (AVS)-Describe causes of hyperaldosteronism with relevant pathophysiology and anatomy.-Discuss the role of AVS in the diagnostic algorithm for evaluating primary aldosteronism.-Review techniques for performing AVS including common difficulties, focusing on emerging technologies. 2. Inferior petrosal sinus sampling (IPSS)a. Discuss the pathophysiology of Cushing syndrome.b. Describe role of IPSS in diagnosing Cushing disease.c. Review techniques for performing IPSS emphasizing newer techniques to increase accuracy. 3. Parathyroid hormone (PTH) venous samplinga. Review pathophysiology of hyperparathyroidism, discussing relevant anatomy.b. Describe the role PTH sampling has in localization for surgical planning.c. Discuss the use of 4D CT in conjunction with PTH sampling to improve localization of ectopic parathyroid.

VI022-EB-X

Critical Role of Visceral Arteriography in Diagnosis of Hepatic Malignancy and Planning of Liver-Directed Therapies: Illustrative Case Review

All Day Location: VI Community, Learning Center

Participants
Matthew Neill, New York, NY (*Presenter*) Nothing to Disclose
Sagan Schultz, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Hearns W. Charles, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Sean Farquharson, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Amy R. Deipolyi, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Interventional Radiology (IR) procedural planning for liver-directed therapy is primarily based on cross-section imaging with contrast-enhanced CT and MRI.2. Intraprocedural angiography can reveal unexpected anatomic and pathologic findings, and accurately depicts vascular supply to target lesions.3. Interventionalists must be able to revise their approach in real-time to accommodate unexpected findings.4. Percutaneous arteriography adds critical diagnostic value beyond cross-sectional imaging.

TABLE OF CONTENTS/OUTLINE

1. Role of pre-procedural cross-sectional imaging prior to chemoembolization (TACE) and transarterial radioembolization (TARE).-Assessment of vascular anatomy, including hepatic arterial supply and portal vein patency.-Assessment and localization of tumor burden and target lesions. 2. Intraprocedural angiography-Technique-Description of vascular anatomy and frequently encountered anatomic variants. 3. Series of cases demonstrating how intraprocedural angiography contributed to diagnosis of hepatic malignancy and altered procedural approach and treatment.

VI023-EB-X

Magnetic Resonance Angiography of the Lower Extremity Arterial Vasculature

All Day Location: VI Community, Learning Center

Participants
James R. Costello, MD, PhD, Tucson, AZ (*Presenter*) Nothing to Disclose
Puneet Sharma, PhD, Tucson, AZ (*Abstract Co-Author*) 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
Iva Petkovska, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Ferenc Czeyda-Pommersheim, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Surya Chundru, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Gregory J. Woodhead, MD, PhD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Diego R. Martin, MD, PhD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Magnetic Resonance Angiography (MRA) represents a powerful imaging technique to detail information related to the vessel wall, vessel lumen, and surrounding non-vascular soft tissue. This technique is performed without damaging ionizing radiation and the risk of contrast induced nephrotoxicity. This exhibit aims to educate the viewer on the various techniques available for MRA imaging of the lower extremity and the ability of these techniques to assess atherosclerotic disease and to accurately diagnose cystic adventitial disease, popliteal artery entrapment syndrome, and vasculitis.

TABLE OF CONTENTS/OUTLINE

-Summary of angiographic techniques using digital subtraction and computed tomography.-Description of MRA techniques. This discussion will focus upon bright blood techniques using 3D, gadolinium-enhanced, GRE imaging coupled with a bolus chase algorithm. Analysis using source images, multiplanar reconstructions, and 3D reconstruction using a MIP algorithm will also be detailed. Lastly, non-contrast techniques incorporating balanced steady state free precession algorithms will also be outlined.-MRA imaging features of atherosclerosis.-MRA diagnosis of cystic adventitial disease.-MRA description of popliteal artery entrapment syndrome.-MRA anatomic evaluation for fibular graft procurement.-MRA imaging features of vasculitis.

VI024-EC-X

Interventional Radiology Procedures: A Comprehensive Resource for Image-guided Intervention

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Sukhvinder S. Dhillon, MRCP, FRCR, Edmonton, AB (*Presenter*) Speaker, AbbVie Inc
Richard J. Owen, MBBCh, FRCR, Edmonton, AB (*Abstract Co-Author*) Nothing to Disclose
Marney Hals, Edmonton, AB (*Abstract Co-Author*) Nothing to Disclose
Tracey Clare, Sturgeon County, AB (*Abstract Co-Author*) Nothing to Disclose
Paul Filipow, Edmonton, AB (*Abstract Co-Author*) Nothing to Disclose
Robert G. Lambert, MBBCh, Edmonton, AB (*Abstract Co-Author*) Research Consultant, Abbott Laboratories

TEACHING POINTS

This exhibit demonstrates a new educational website that will provide a resource for in-training and practicing interventional radiologists, provide a resource for other health care professionals, provide patient information literature, and facilitate a competency based approach to assessment of trainees

TABLE OF CONTENTS/OUTLINE

IR Procedures provides a high quality standard of interventional radiology (IR) educational material. It provides relevant information and links for quick access to information. This is a collaborative venture of interventional radiologists, IR and educational facilities, and supporters of IR. The site is organized into modules, which present information for a specific procedure or type of intervention. An experienced IR radiologist authors each module and an independent IR radiologist reviews each module for further editing prior to web publication. Resources included on the site: pre-procedure patient workup check list, pre and post procedure care information, specifics of the procedure, patient orientated information brochures, module specific quizzes, competency statements which can be adopted for trainee assessment. Users may also provide feedback as the technical approach to procedures may vary and evolve. This resource is on line and open access for any user.

VI101-ED-X

"It's Complicated": The Role of Diagnostic and Interventional Radiology for Pediatric Organ Transplant Complications

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Whitney Feltus, MD, New York, NY (*Presenter*) Nothing to Disclose
Sophie Chheang, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Peter Schlossberg, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To list the common complications following pediatric organ transplantion To compare different imaging modalities in their evaluation To review interventional procedures used in treating post-operative complications

TABLE OF CONTENTS/OUTLINE

Common complications following liver, kidney, lung, and heart transplantation in pediatric patients: Vascular: thrombosis, stenosis, aneurysm, shunt Fluid collections: abscess, biloma, urinoma, ascites Ductal: biliary and ureteral strictures Parenchymal disease: rejection/failure, disease recurrence, post-transplant lymphoproliferative disorder Diagnostic imaging tools used to monitor and diagnose post-operative complications: US, X-ray, CT, MRI/MRA/MRCP, fluoroscopy Interventional radiology procedures performed on post-operative patients to help diagnose and treat complications: angiography, angioplasty, stent, embolization, drainage, biopsy, central venous access Sample cases Summary: Wide array of complications following pediatric organ transplantation can be variably imaged and often well managed with interventional radiology

VI102-ED-X

Diagnosing and Managing Endoleak Complications after Endovascular Abdominal Aortic Aneurysm Repair: Understanding the Critical Role of Radiology

All Day Location: VI Community, Learning Center

Participants
Ahmed Fadl, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Daniel C. Phung, BS, Stony Brook, NY (*Presenter*) Nothing to Disclose
Amanjit S. Baadh, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
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S. William Stavropoulos, MD, Bryn Mawr, PA (*Abstract Co-Author*) Research, Cook Group Incorporated; Research, B. Braun Melsungen AG; Consultant, C. R. Bard, Inc
Jason C. Hoffmann, MD, Mineola, NY (*Abstract Co-Author*) Consultant, Merit Medical Systems, Inc; Speakers Bureau, Merit Medical Systems, Inc
Nicholas A. Georgiou, MD, Westbury, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Cross-sectional imaging plays a critical role in pre- and post-endovascular aortic repair patient management.2. Diagnostic and interventional radiologists must understand the endoleak classification system and how this guides management decisions.3. Interventional radiology plays a critical role in managing endoleaks, particularly Type II endoleaks.

TABLE OF CONTENTS/OUTLINE

Background-Aneurysm definition-Risk factors-Prevelance-AAA screening guidelinesDescription of AAA treatment optionsHow patients are selected for endovascular aneurysm repair (EVAR) versus open repairImportance of imaging surveillance after EVARReview complications of EVAR, with a focus on the importance of imaging in these diagnosesDetailed review of endoleak classification system, including verbal description, pictoral/cartoon images, and correlation with cross-sectional imaging-Also correlate with angiographic findings, where appropriateHighlight the role of interventional radiology in confirming diagnosis and management of various types of endoleaks, with a focus on Type II endoleaks (including literature review)IR management of endoleaks with:-Transarterial embolization-Translumbar puncture and embolization-Placement of additional stent and/or stent-grafts-"Peri-graft" access in treating complex endoleaksDiscussion and Conclusions

VI103-ED-X

Simulation in CT-Guided Biopsy Resident Training: Review of the Literature and Description of the Use of a Home-made Phantom for Training

All Day Location: VI Community, Learning Center

Participants
Amanjit S. Baadh, MD, New York, NY (*Presenter*) Nothing to Disclose
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TEACHING POINTS

1. Simulation training has become an integral component of medical education. 2. Phantoms for simulation are typically very expensive, so the ability to make a simple, reusable, inexpensive phantom that is an effective teaching tool is of great value to radiology education.3. Hands-on biopsy training allows for increased learner competence and confidence, thus improving patient care and safety.

TABLE OF CONTENTS/OUTLINE

Review the benefits of simulation training for physicians.Describe the current role of simulation training for CT guided procedures, including literature review.Detail the development of a home-made CT-guided biopsy phantom that is reusable, inexpensive, and easy to make.Provide comparison of this home-made phantom to commercially available phantom.Report the initial experience with this home-made phantom for resident training:-Pilot study conducted with small group of residents-After training session, all subjects reported improved understanding of XY and XYZ axis and comfort in performing CT-guided biopsySuggest future uses for this phantom, as well as potential improvement or changes to the phantom.

VI104-ED-X

New Frontiers In Ureteral Stenosis Percutaneous Treatment

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Esteban Peghini, MD, Madrid, Spain (*Presenter*) Nothing to Disclose
Enrique Rico, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose
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Guillermo Parga, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose
Ricardo San Roman, MD, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the different modalities in ureteral stenosis treatment by means of percutaneous approach including ureteral stents and ureteroplasty. To compare the advantages and disadvantages of classic and cutting balloon devices in ureteroplasty. To introduce technique, benefits, difficulties and complications as well as short term results of the use of drug eluting (paclictaxel) balloons in ureteroplasty.

TABLE OF CONTENTS/OUTLINE

Retrospective review of 15 cases (during a 5 year period) of post-surgical ureteral stenosis of various origins managed by percutaneous ureteroplasty. Initial success rate, patency at 1 and 5 years and complications were analyzed and compared with the results of 44 cases from a previous revision our institution made 5 years before. This results were later compared with the ones achieved with drug eluting (paclitaxel) balloon ureteroplasty (currently being performed and having 3 cases so far). This technique, currently in process of being accepted by the scientifical community, can soon become a promising therapy in ureteral stenosis. Finally we made a bibliographic review on technique advantages and disadvantages as well as on success rate and complications of all three modalities of ureteroplasty and of ureteral stent placement.

VI105-ED-X

Saving Mothers' Lives: Uterine Artery Embolization for Obstetrical Hemorrhage

All Day Location: VI Community, Learning Center

Participants
Yilun Koethe, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Maureen P. Kohi, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review clinical presentations, risk factors and common etiologies of obstetrical hemorrhages Describe imaging findings and clinical presentations of post-partum hemorrhage Review pelvic vascular anatomy Detail the techniques for uterine artery embolization (UAE) Review indications, short- and long-term outcomes, and post-procedural management following uterine artery embolization

TABLE OF CONTENTS/OUTLINE

Background: Clinical presentation, morbidity and mortality of obstetric hemorrhages Risk factors and common etiologies of obstetric hemorrhages (including: uterine atony, placental implantation abnormality and ectopic pregnancy) Traditional treatments of postpartum hemorrhage Current and tried image-guided techniques for controlling bleeding Uterine artery embolization (UAE) for obstetric hemorrhage: Indications and contraindications to embolizatio Review pelvic vascular anatomy Pictorial demonstrations of proper steps and techniques Efficacy of UAE for different bleeding etiologies Complications, adverse effects, and post-procedural management Long-term fertility and pregnancy outcomes

VI106-ED-X

The Important Role of Radiology in the Diagnosis and Treatment of Placenta Accreta

All Day Location: VI Community, Learning Center

Participants
Yilun Koethe, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Maureen P. Kohi, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Describe imaging findings and clinical presentations of placenta accreta Discuss the use of US and MRI for diagnosis Detail the role of radiology in the management of placenta accreta through internal iliac artery balloon occlusion catheter placement and arterial embolization Review indications, outcomes and post-procedural managements

TABLE OF CONTENTS/OUTLINE

What is placenta accreta? The role of US and MR for early diagnosis of placenta accreta Indications for imaging Pictorial demonstrations of US and MR Imaging features Sensitivity and Specificity of imaging features Overall effectiveness of US and MRI in the diagnosis and detection of placenta accreta Use of imaging for patient risk stratification Why is placenta accreta important? Clinical risk factors and presentation Morbidity and mortality Role of Interventional Radiology (IR) for the management of placenta accreta Conventional management Role of IR and discussion of image-guided techniques Pre-op bilateral internal iliac artery balloon occlusion catheter placement Arterial embolization Staged intra-op arterial embolization after delivery followed by delayed hysterectomy Pictorial demonstrations of above techniques Post-procedural imaging and management of complication and adverse effects

VI107-ED-X

What the Heck is Wrong with Those Vessels in the Neck: A Pictorial Review of Disease Entities Associated with Arterial Vasculature in the Neck

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
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Thaddeus M. Yablonsky, MD, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose
Sean K. Calhoun, DO, Long Valley, NJ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: Review the normal and variant anatomy of the aterial vasculature within the neck Discuss the various disease entities that can affect the arteries within the neck and diagnostic clues. Atherosclerotic disease is a major contributor to carotid stenosis which can be assessed morphologically on CT and physiologically on ultrasound. Intimal flap or double lumen is pathognomonic for a dissection. Fibromuscular Dysplasia has 3 types, of which type 1 is the most common and demonstrates a 'string of beads' appearance. Iatrogenic injury can result in pseudoaneurysms or fistulas and must be taken into consideration. Explain the utility of ultrasound and CTA/MRA in evaluating the various conditions

TABLE OF CONTENTS/OUTLINE

Normal Vascular Anatomy of the Neck Embryogenesis CTA/MRA appearance Ultrasound appearance with reference values Variations of Aterial Vasculature in the neck Tortuous carotid artery medialization of the carotid Persistent hypoglassal artery/ Bovine Arch Disease entities with sample cases Atherosclerotic disease Thrombus Dissection Pseudoaneurysm Fistula Fibromuscular Dysplasia Subclavian Steal Carotid Body Tumor Summary

VI108-ED-X

Advanced Novel Cone-Beam CT Imaging Techniques in Trans-Radial Interventional Oncology Procedures.

All Day Location: VI Community, Learning Center

Participants
Paul J. O'Connor, 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, Nordion, Inc
Scott Nowakowski, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Nora Tabori, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Robert A. Lookstein, MD, New York, NY (*Abstract Co-Author*) Consultant, Johnson & Johnson; Consultant, Boston Scientific Corporation; Consultant, The Medicines Company

TEACHING POINTS

Discuss the benefits and limitations of advanced Cone-Beam CT (CBCT) imaging techniques in liver interventional oncology (IO) procedures from a transradial (TR) approach. Demonstrate the application and benefits of a newly developed CBCT imaging technique for IO procedures utilizing radial artery access.

TABLE OF CONTENTS/OUTLINE

Review of liver vascular and tumor anatomy. Review of TR access for liver directed IO therapies. Discuss advanced IO imaging techniques, including benefits and limitations of CBCT versus 2D angiography in TR liver directed IO therapies. Demonstration of the newly developed of open trajectory CBCT technique and benefits in procedures utilizing radial artery access. Discuss our institutional experience using open trajectory CBCT versus the standard 'Closed' CBCT in trans-radial artery access cases. Case presentations of open trajectory CBCT in liver IO procedures.

VI109-ED-X

TIPS and TIPS on ICE (Intracardiac Echography Catheter); A Pictorial Review and Guide on TIPS and How to Use The ICE Catheter

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Oren T. Herman, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Amit Daftari, MD, Bronx, NY (*Presenter*) Nothing to Disclose
Yosef Golowa, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Jacob Cynamon, MD, Suffern, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1.General review of the TIPS procedure including; indications, contraindications, conventional TIPS technique2. Pictorial review of the ICE catheter and how using groin access with the catheter in the IVC can help with portal vein access and lower possible complications (no need for wedge venography and decreesed amount of needle passes)3. Case based review of common indications for TIPS; Portal hypertension (refractory ascites and varcieal bleeding), portal vein thrombolysis and Budd Chiarri

TABLE OF CONTENTS/OUTLINE

1. General overview of the TIPS procedure including a pictorial review of the standard technique 2. Overview of the ICE catheter including liver anatomy and how it helps guide stent creation and placement. Hepatic vein anatomy is not as intuitive on fluoroscopic imaging. Included in this presentation will be how ICE can help guide the operator in selecting the correct hepatic vein and portal vein3. Case based review of common indications for TIPS creation including portal hypertension, portal vein thrombolysis and Budd Chiarri

VI110-ED-X

Pop It Open: The Interventionalist's Guide to Lower Extremity Recanalization by Retrograde Popliteal Artery Approach for Chronic Total Occlusion

All Day Location: VI Community, Learning Center

Participants
Jason C. Ni, MS, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Jonathan K. Park, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Alice S. Chen, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Matthew K. Walsworth, MD, MS, Santa Monica, CA (*Abstract Co-Author*) Nothing to Disclose
Hsin-Yi Lee, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. The conventional method for performing lower extremity arterial intervention is the contralateral retrograde (up-and-over) technique. However, the failure rate in recanalizing chronic total occlusions (CTOs) approximates 20% from this approach. In these cases (and even for primary intervention), ultrasound-guided retrograde popliteal arterial access can be performed to facilitate endovascular recanalization. The aims of this exhibit are thus as follows.2. To review the indications and rationale for performing retrograde popliteal artery access to perform femoral arterial CTO recanalization.3. To guide the reader through the pre-procedural diagnostic imaging, interventional methods, benefits, and potential complications of popliteal artery access.4. Case examples will be presented to highlight the technique.

TABLE OF CONTENTS/OUTLINE

A. Pictorial review of anatomy, pathophysiology, and diagnostic imaging of lower extremity arterial CTO.B. Review of rationale for patient selection.C. Graphic and radiographic guide to the popliteal artery access and recanalization technique, with case examples.D. Overview of relevant inventory for arterial recanalization via popliteal artery access.E. Visual overview of outcomes and complications.

VI111-ED-X

Uterine Arteriovenous Malformations: Endovascular Management and Outcomes

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Ahmed K. Abdel Aal, MD, PhD, Birmingham, AL (*Presenter*) Consultant, St. Jude Medical, Inc Consultant, Baxter International Inc Consultant, C. R. Bard, Inc
Amr S. Moustafa, MBBCh, MSc, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Rachel F. Oser, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Nathan W. Ertel, MD, Hoover, AL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Teaching points: 1- Review the causes and clinical presentation of uterine arteriovenous malformations. 2- Describe the imaging findings seen on ultrasound (gray-scale and color Doppler), catheter angiography, as well as MRI. 3- Demonstrate the endovascular management of uterine arteriovenous malformation. 4- Highlight the potential complications and outcomes of endovascular management.

TABLE OF CONTENTS/OUTLINE

Outline: 1- Introduction and incidence.2- Causes and presentation of uterine arteriovenous malformations.3- Radiologic appearance of uterine arteriovenous malformations on different imaging modalities.4- Endovascular management of uterine arteriovenous malformations.5- Potential complications.6- Summary and conclusion.

VI112-ED-X

Peritoneal Dialysis Catheter Placement Technique Using Fluoroscopy and Ultrasound Guidance

All Day Location: VI Community, Learning Center

Participants
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Amr S. Moustafa, MBBCh, MSc, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Nathan W. Ertel, MD, Hoover, AL (*Abstract Co-Author*) Nothing to Disclose
Rachel F. Oser, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Teaching points: 1- Discuss the indications and contraindications of peritoneal dialysis (PD) catheter placement in the new era of urgent-start PD. 2- Review the pre-procedure patient preparation. 3- Demonstrate a minimally invasive technique for placement of PD catheters. 4- Highlight the importance of the use of ultrasound (including gray-scale and color/power Doppler ultrasound) as well as fluoroscopy to guide safe placement of PD catheter and minimize complications. 5- Describe the essential methods of catheter care after placement. 6- Highlight the complications, as well as, how to avoid and how to manage them.

TABLE OF CONTENTS/OUTLINE

Outline: 1- Introduction. 2- Indications and contraindications. 3- Pre-procedure patient preparation. 4- Fluoroscopy and ultrasound guidance technique for placement of PD catheters. 5- Post procedure catheter care. 6- Potential complications. 7- Summary and conclusion.

VI113-ED-X

The New Age of DAVF (Dural ArterioVenous Fistula)

All Day Location: VI Community, Learning Center

Participants
Diego Preciado, MD, Sabadell, Spain (*Presenter*) Nothing to Disclose
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Jordi Branera, MD, Sabadell, Spain (*Abstract Co-Author*) Nothing to Disclose
Beatriz Consola, MD, Sabadell, Spain (*Abstract Co-Author*) Nothing to Disclose
Viviana P. Beltran Salazar, MD, Sabadell, Spain (*Abstract Co-Author*) Nothing to Disclose
David Canovas, Sabadel, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To give an overview of the etiopathology and clinical findings that suggest DAVF (Dural ArterioVenous Fistula). To illustrate the imaging findings, specially on angiography. To emphasize the differential diagnosis. To familiariarize with general approaches for the treatment of DAVFs, indications and new technical developments in the field.

VI114-ED-X

Basic Guide for Colonic Stenting: Indications, Technique and Clues

All Day Location: VI Community, Learning Center

Participants
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Eva Criado, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
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Beatriz Consola, MD, Sabadell, Spain (*Abstract Co-Author*) Nothing to Disclose
Viviana P. Beltran Salazar, MD, Sabadell, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Based on our experience, the purpose of the pictorial review is the following: To familiariarize radiology residents with the accepted indications and contraindications of colonic stenting. To give the residents an overview of the stenting procedure an its technical tricks and tips, and to provide an overview of all radioprotection concerns. To illustrate the post-procedure management, possible complications, and ways to deal with them. To emphasize uncommon indications and new technical developments in the field.

TABLE OF CONTENTS/OUTLINE

In this exhibit, we illustrate the following points in a case-based style: Indications and contraindications. Pre-procedure management. Technical tricks and tips. Radioprotection concerns. Post-procedure management. Complications and how to deal with them. New developments in the technique.

VI116-ED-X

Clinical Utility of Non-Contrast-Enhanced Magnetic Resonance Angiography at 1.5T

All Day Location: VI Community, Learning Center

Participants
Takafumi Naka, Kawasaki-Shi, Japan (*Presenter*) Nothing to Disclose

TEACHING POINTS

- To introduce the role of non-contrast-enhanced(NCE)-MRA. - To explain the basic principles of each NCE-MRA methods. - To explain the features and how to choose optimal methods.1) Comparing NCE-MRA and contrast-enhanced-MRA 2) The principle of NCE-MRA methods 2-1 Time-of-Flight 2-2 Phase Contrast 2-3 Fast Spin Echo 2-4 Balanced Steady-State Free Precession

TABLE OF CONTENTS/OUTLINE

Since the FDA issued warnings linking gadolinium-based contrast agents used in MRI and nephrogenic systemic fibrosis(NSF), CE-MRA is no longer considered safe for patients with impaired renal function. TOF is based on the phenomenon of flow-related enhancement of spins entering into an imaging slice. As a result of being unsaturated, these spins give more signal that surrounding stationary spins. However, slow flow or flow from a vessel parallel to the scan-plane, may become de-saturated just like stationary tissue. TOF is most commonly used in the head. In the PC pulse sequence, bipolar gradients are used to encode the velocity of the spins. Stationary spins undergo no net change in phase after the two gradients are applied. Moving spins will experience a different magnitude of the second gradient compared to the first. This results in a net phase shift. PC is most commonly used in the body.

VI117-ED-X

Type V Endoleak after Endovascular Aortic Abdominal Aneurysm Repair: What Radiologists Need to Know

All Day Location: VI Community, Learning Center

Participants
Eijun Sueyoshi, MD, Nagasaki, Japan (*Presenter*) Nothing to Disclose
Hiroki Nagayama, Shimabara, Japan (*Abstract Co-Author*) Nothing to Disclose
Ichiro Sakamoto, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Masataka Uetani, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To know the definition and various imaging findings of type V endoleak after endovascular aortic abdominal aneurysm repair 2. To know the clinical significances of imaging of type V endoleak. 3. To know the therapeutic strategy based on imaging findings of type V endoleak.

TABLE OF CONTENTS/OUTLINE

1. Explanation of imaging findings and clinical significances of type V endoleak after endovascular aortic abdominal aneurysm repair2. Illustrative cases- Presentation of various imaging findings of type V endoleak.- Presentation of imaging findings after management type V endoleaks3. Discussion4. Directions and summary The major teaching points of this exhibit are:1. Various imaging findings of type V endoleaks can be seen after endovascular aortic aneurysm repair.2. The serial changes of type V endoleaks can be seen after endovascular aortic aneurysm repair..3. The therapeutic strategies are different based on imaging findings of of type V endoleak.

VI118-ED-X

CTA Imaging of State-of-the-art Fenestrated and Branched Aortic Endografts: What the Radiologist Needs to Know

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Awards
Magna Cum Laude

Participants
Thanila A. Macedo, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Terri J. Vrtiska, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Gustavo S. Oderich, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) Learn the latest indications and advanced techniques for fenestrated and branched endovascular aortic repair (EVAR)2) Understand the optimum imaging follow-up using Computed Tomography Angiography (CTA)3) Review critical common and uncommon CTA findings including key dictation terminology for clear communication to Vascular Surgeons and Interventionalists.

TABLE OF CONTENTS/OUTLINE

BACKGROUND: Describe fenestrated and branched EVAR including the indications, techniques and key differences between approaches. Movie animations of each technique will demonstrate step-by-step approaches for device implantation.IMAGING FINDINGS: CTA is the recommended imaging for complex EVAR surveillance to detect correctable complications and avoid morbidity and mortality. CTA protocols as well as common and uncommon CTA findings will be reviewed. These include: endoleaks (including classification and variant examples), device malposition, occlusions, dissections and aneurysmal enlargement/rupture. Examples of confirmatory conventional angiograms and treatment will be included.CONCLUSION: Advances in EVAR continue to evolve and radiologists must be familiar with the CTA findings associated with the latest surgical management. Early detection of correctable EVAR complications and accurate communication of CTA findings is critical for optimal patient care.

VI119-ED-X

Transarterial Embolization of Renal Angiomyoliplomas: Clinical Considerations, Technical Details, Outcome, and Post-Therapy Management

All Day Location: VI Community, Learning Center

Participants
Ali Gholamrezanezhad, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Jon Davidson, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Timothy R. Whitehead, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Eric D. McLoney, MD, Chapel Hill, NC (*Abstract Co-Author*) Nothing to Disclose
Indravadan J. Patel, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) To explain basic principles of transarterial ambolization treatment for renal angiomyolipomas (AMLs)2) To review multiple clinical applications and indications of embolization of AMLs3) To discuss details of the embolization procedures with pictorial correlates4) To explain outcome of the treatment, potential complications, and post-therapy management

TABLE OF CONTENTS/OUTLINE

1) Epidemiology2) Clinical presentation3) Clinical significance4) Associated syndromes; lymphangioleiomyomatosis and tuberous sclerosis5) Imaging features and diagnostic approach Ultrasound CT MRI Radiologic classification, including triphasic, classic, and fat poor subtypes6) Surgical versus non-surgical therapeutic options7) Patient selection for embolization therapy8) Clinical advantages and applications of transarterial embolization9) Contra-indications for transarterial embolization therapy10) Rate and predictors of response to treatment11) Step by step procedure of embolization· Patient preparation· Devices and equipments, including embolization agents· Transarterial catheterization and embolization technique details12) Complications, including post-embolization syndrome, abscess, bleeding, and their optimal management13) Post-therapy management and follow-up14) Limitations15) Controversies/developments16) Conclusions

VI121-ED-X

Endovascular Management of Bleeding Rectal Varices

All Day Location: VI Community, Learning Center

Participants
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Amr S. Moustafa, MBBCh, MSc, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Nabila Dawoud, MBBCh, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Maysoon F. Hamed, MD, MSc, Hoover, AL (*Abstract Co-Author*) Nothing to Disclose
Osama Aglan, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Teaching points:1- Review the main causes of development of ectopic varices including rectal varices.2- Describe imaging findings seen on different imaging modalities.3- Highlight role of transjugular intrahepatic portosystemic shunt (TIPS).4. Describe the role of percutaneous transhepatic sclerotherapy techniques when TIPS fails or is contraindicated.

TABLE OF CONTENTS/OUTLINE

Outline: 1- Introduction and brief anatomy of portal circulation and rectal varices. 2- Causes of rectal variceal bleeding. 3- Imaging of bleeding rectal varices. 3- Management strategies of bleeding rectal varices. 4- TIPS for bleeding rectal varices. 5- Percutaneous transhepatic embolotherapy of bleeding rectal varices. 6- Summary and conclusion.

VI122-ED-X

Techniques for Transarterial Chemoembolization of Hepatocellular Carcinoma With Parasitic Blood Supply

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
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Souheil Saddekni, MD, Birmingham, AL (*Abstract Co-Author*) Consultant, St. Jude Medical, Inc
Sima Banerjee, MBBS, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Teaching points: 1- Review different factors that influence the development of parasitic blood supply to hepatocellular carcinoma (HCC). 2- Illustrate how to predict parasitic blood supply to HCC and which extrahepatic artery is involved. 3- Demonstrate the techniques for proper transarterial chemoembolization of the parasitic arterial supply to HCC in each individual situation to avoid complications. 4- Outline the potential complications.

TABLE OF CONTENTS/OUTLINE

Outline: 1- Introduction. 2- Risk factors for HCC parasitic blood supply. 3- Main parasitic feeders to HCC and their incidence. 4- Red alerts for HCC parasitic blood supply. 5- How to interpret parasitic blood supply to HCC by CT and catheter angiography. 6- Techniques for proper transarterial chemoembolization in individual situations. 7- Potential complications. 8- Summary and conclusion.

VI123-ED-X

Endovascular Repair for Blunt Traumatic Aortic Injury

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Koji Maruyama, Kobe, Japan (*Presenter*) Nothing to Disclose
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Mika Ohmori, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Takeki Mori, MD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Masato Yamaguchi, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Koji Sugimoto, MD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Blunt traumatic aortic injury (BTAI) is associated with a high mortality rate. Although BTAI was traditionally treated by open repair, thoracic endovascular aortic repair (TEVAR) has bring favorable early outcomes and offered several advantages in the treatment of severe concomitant injuries. At present TEVAR is useful for the treatment of BTAI patients, but some problems still remain. The purpose of this exhibit will review 1) the transition of treatments for BTAI, 2) the problems of TEVAR for BTAI, 3) the treatment algorithm to manage patients with BTAI.

TABLE OF CONTENTS/OUTLINE

A. Background: Overview about etiology and clinical features of BTAI.B. Transition of treatments for TEVAR: Current literature review of outcomes and complications associated with each treatment for BTAI (TEVAR, open repair, nonoperative management).C. Problems: Review the problems of TEVAR for BTAI and classify into resolved and unresolved.D. Treatment algorithm and strategy: Describe the treatment algorithm to manage patients with BTAI and strategy of TEVAR for BTAI.E. Case presentation: Discuss cases in our hospital (n=17 at time of abstract submission), including technical success rate, complications (post-operative, procedure-related, device deformity), short to medium term outcomes.

VI124-ED-X

Multimodality Approach to AV Fistulas and Grafts: Interpretation and Pitfalls

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Alexander Kessler, MD, Rochester, NY (*Presenter*) Nothing to Disclose
Deborah J. Rubens, MD, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Shweta Bhatt, MD, MBBS, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Talia Sasson, MD, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to: Review the normal sonographic and angiographic appearance of the various types of AV fistulas and grafts, including HERO grafts. Discuss the major clinical indications for imaging evaluation of AV fistulas and grafts. Review the imaging criteria to assess AV fistula maturation, stenosis, and steal. Review various complications associated with AV fistulas and grafts, including pseudoaneurysm, collateralization, infection, and declotting complications.

TABLE OF CONTENTS/OUTLINE

Types of AV fistulas (Ultrasound and Angiography examples) Types of AV Grafts (Ultrasound and Angiography examples) Clinical indications for imaging evaluation of AV fistulas/grafts Normal sonographic appearance of AV fistulas/grafts (Grayscale, Peak Systolic Velocities, Spectral Waveforms, Flow rates) Ultrasound evaluation for AV fistula maturation Complications associated with AV fistulas and grafts, including keys to interpretation and pitfalls (Failure to mature, Occlusion, Stenosis, Elevated velocities without stenosis, Pseudoaneurysm, Steal, Collateralization, Infection, Rupture) Summary

VI125-ED-X

Transarterial Embolization: Interventional Radiologists Role in Cancer

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Elena Inchausti, MBBS, Donostia, Spain (*Presenter*) Nothing to Disclose
Inaki Prieto JR, San Sebastian, Spain (*Abstract Co-Author*) Nothing to Disclose
Francisco Loyola, San Sebastian, Spain (*Abstract Co-Author*) Nothing to Disclose
Santiago Merino, MD, San Sebastian, Spain (*Abstract Co-Author*) Nothing to Disclose
Idoia Echegoyen, San Sebastian, Spain (*Abstract Co-Author*) Nothing to Disclose
Enaut Garmendia, Donostia, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To understand the indications and the aim of transarterial embolization of tumors, as a presurgical therapy (preoperative embolization), as well as a palliative mesure to treat or prevent tumor-associated symptoms and slow down its growth (palliative embolization).

TABLE OF CONTENTS/OUTLINE

Review of indications. Material and methods. We present different cases of transarterial embolization (TAE):PREOPERATIVE EMBOLIZATION: Renal tumors Esophagus carcinoma: left gastric artery and splenic artery embolization to prevent anastomotic leakage. Primary bone tumors giant cell tumor aneurysmal bone cyst of the sacrum. Castelman disease presenting as a mediastinic mass. Presacral neurinoma presenting as a pelvis mass. Mesenchymal lineage tumors: pelvic hemangiopericitoma, solitary fibrous tumor of the pleura amyxofibrosarcoma in the external obturator muscle. Fusocelular hemangioendotelioma on the foot. PALLIATIVE EMBOLIZATION: Renal amgiomyolipoma to prevent bleeding. Giant cavernous hemangiomas to minimize symptomatic/enlarging hemangiomas of the liver. Primary bone tumors: condromyxoid fibroma in the iliac. Secondary bone tumors: osseous metastases of renal cell carcinoma: Mesenteric fibromatosis affecting the psoas that had recurrenced.

VI126-ED-X

Novel Use of Ethylene-Vinyl-Alcohol Copolymer in Type I Endoleak Repair

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Assaf Graif, MD, Newark, DE (*Presenter*) Nothing to Disclose
Ansar Z. Vance, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Kevin Lie, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Demetrios J. Agriantonis, MD, El Paso, TX (*Abstract Co-Author*) Nothing to Disclose
Mark J. Garcia, MD, Chadds Ford, PA (*Abstract Co-Author*) Nothing to Disclose
Daniel A. Leung, MD, Newark, DE (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the pathophysiology, prognosis and treatment strategies of endoleaks after endovascular abdominal aortic aneurysm repair, while focusing on type I endoleaks. Discuss the benefits of Ethylene-Vinyl-Alcohol Copolymer, or Onyx (EV3 Inc., Plymouth, MN) as a liquid embolic agent. Pictorial description of type I endoleak repair using Onyx.

TABLE OF CONTENTS/OUTLINE

1. Short review of the 5 types of endoleaks.2. Focused review of the pathophysiology, prevalence, complications and prognosis of type I endoleaks.3. Current indications and timing for treatment of type I endoleaks.4. Short overview of "traditional" repair techniques of type I endoleaks:4a. Endograft extension4b. Ballooning4c. Stenting4d. Endostaples4e. Embolization5. Short description of Onyx and its properties.6. Pictorial overview of the technique of employing Onyx to repair type I endoleaks:6a. Approach to the aneurysm sac:i. Endovascular (proximal or distal)ii. Direct percutaneous transabdominal approach6b. Advantages, disadvantages, and principles of deployment of coils as an adjunct to Onyx.7. Comparison of the different repair techniques, in regards to:7a. Indications7b. Benefits7c. Limitations7d. Complications

VI127-ED-X

Cementing the Facts: A Review of Vertebroplasty Techniques, Patient Selection and Complications

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Mary Kristen Jesse, MD, Denver, CO (*Presenter*) Nothing to Disclose
Peter Lowry, MD, Denver, CO (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Provide a brief review vertebroplasty/kyphoplasty (VP/KP) literature and background 2. Understand key points of pre-procedural imaging, patient selection and procedural planning 3. Review vertebroplasty/kyphoplasty techniques. 4. Understand potential complications of VP/KP 5.Expectations of the postprocedure period

TABLE OF CONTENTS/OUTLINE

Case material from our Vertebroplasty/Kyphoplasty practice to illustrate the imaging findings. Data from personal cases performed between 2006 and 2015 Table of Contents: A. Background B. What to look for? 2. When is imaging appropriate? 3. Pitfalls in imaging vertebral body fractures C. Pre-procedural planning 1. Patient selection a. Who will benefit? b. Common clinical presentations and physical exam findings c. Clinical contraindications 2. Imaging a. What to look for before you cement? b. 'Fracture morphology' c. Imaging based contraindications D. Vertebroplasty/Kyphoplasty Techniques E. Complications 1. Intradiscal cement extravasation 2. Epidural extravasation 3. Venous extravasation and cement pulmoanry embolus 4. Fat emboli syndrome/PMMA toxicity 5. Cement non-union F. My patient still has pain-Now What?? 1. Reasonable expectations in the immediate post operative period 2. Potential causes of persistent pain 3. Adjacent level fractures G. Conclusions

VI128-ED-X

Transcatheter Arterial Embolization for Type II Endoleak after Endovascular Aortic Repair

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
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Masahiro Okada, MD, Nishihara-Cho, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuko Iraha, Nishihara-Cho, Japan (*Abstract Co-Author*) Nothing to Disclose
Joichi Heianna, Nakagami-Gun, Japan (*Abstract Co-Author*) Nothing to Disclose
Fumikiyo Ganaha, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Sadayuki Murayama, MD, PhD, Nishihara-Cho, Japan (*Abstract Co-Author*) Nothing to Disclose
Keita Yamashiro, Nishihara City, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The teaching points of this exhibit are:1. To explain the concept of type 2 endoleak2. To show the potential of the computed tomography angiogaphy (CTA) for planning transcatheter sarterial embolization3. To show our techniques for embolizing type 2 endoleak using the triple coaxial system.4. Pitfalls in the endovascular treatment of type 2 endoleak

TABLE OF CONTENTS/OUTLINE

1) Concept of endoleakDefinition, Classification, Frequency2) Strategy of treatment for type 2 endoleak3) Utility of computed tomography with thin slice sections to identify a road map to endoleak4) Techniques for successful embolization using triple coaxial system5) Pitfalls in transcatheter arterial embolization for type 2 endoleak

VI129-ED-X

Role of CT Venography in the Evaluation of Portosystemic Collateral Vessels After TIPS

All Day Location: VI Community, Learning Center

Awards
RSNA Country Presents Travel Award

Participants
Ivan E. Casanova Sanchez, MD, Mexico City, Mexico (*Abstract Co-Author*) Nothing to Disclose
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Ricardo Garcia Buen-Abad, MD, Mexico City, Mexico (*Abstract Co-Author*) Nothing to Disclose
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Jorge Vazquez-Lamadrid, MD, Mexico, Mexico (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The aim of this echibit is:1.- To acknowledge the role of CT venography in assessing the portosystemic collateral vessels in untreated portal hypertension.2.- To review the TIPS procedure, its indications and the current radiological evaluation for success and patency.3.- To learn the key findings in the portosystemic collateral vessels at CT venography after TIPS placement and its usefulness.

TABLE OF CONTENTS/OUTLINE

A. Generalities of Portal hypertension. a. Definition b. Pathophysiology c. Diagnosis B. Anatomy of the portosystemic collateral vessels.C. Evaluation of portosystemic Collateral vessels with CT venography in untreated portal hypertension.D. TIPS a. Indications b. The TIPS procedure c. Role of imaging in monitoring TIPS success and patency E. Follow up of portosystemic collateral vessels with CT venography a. Key findings b. Utility of CT venography

VI130-ED-X

Ultrasonography-based Thyroidal and Perithyroidal Anatomy and its Clinical Significance

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Eun Ju Ha, Suwon, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jung Hwan Baek, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

For a safe and effective US-guided procedure such as ethanol-, radiofrequency-, laser- ablation, selective nerve block, and core needle biopsy, knowledge of neck anatomy, particularly that of the nerves, vessels, and other critical structures, is essential.Teaching point 1. To elucidate US-based thyroidal and perithyroidal anatomy, as well as its clinical significance.Teaching point 2. To provide prevention techniques for complications during the US-guided procedures.

TABLE OF CONTENTS/OUTLINE

1. Nervous system 1-1. Vagus nerve 1-2. Superior and inferior laryngeal nerves 1-2-1. Recurrent and non-recurrent inferior laryngeal nerve 1-2-2. Superior laryngeal nerve 1-3. Cervical sympathetic ganglion 1-4. Cervical plexus and brachial plexus 1-5. Spinal accessory nerve 1-6. Phrenic nerve 1-7. Traumatic neuroma2. Muscular sturcture 2-1. Anterior neck muscles 2-2. Lateral neck muscles 2-3. Posterior neck muscles3. Vascular structure 3-1. Superior and inferior thyroid artery 3-2. Common carotid artery and internal jugular vein 3-3. Superior, middle, and inferior thyroid veins 3-4. Anterior jugular vein4. Bone and cartilage 4-1. Hyoid bone and vertebrae 4-2. Thyroid cartilage and cricoid cartilage5. Esophagus and trachea6. Prevention techniques

VI131-ED-X

Endoleak : Case Based Review of Standard Classification

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
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Young Min Han, Jeonju, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Gong Yong Jin, MD, PhD, Jeonju, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To review the standard classification of endoleak. 2. To describe which types of endoleak should be treated immediately. 3. To demonstrate the cases of each endoleak types, which was treated by addiotional stent insertion, embolization, and surgery.

TABLE OF CONTENTS/OUTLINE

1. Introduction2. Standard classification of endoleak (EL), based on their source3. EL type I 1) Subtypes of EL type I (type IA,IB,IC) 2) Pictorial review of case, EL type IA treated by addiotional stent insertion 3) Significance and treatment of type I EL4. EL type II 1) Pictorial review of case, EL type II treated by embolization of two feeding vessels 2) Pictorial review of case, EL type II treated by percutaneous sac puncture and embolization 3) Significance and other treatment option of type II EL5. EL type III 1) Subbtypes of EL type III (type IIIA,IIIB,IIIC) 2) Pictorial review of case, EL type III treated by surgical remove and replacement of stent graft 3) Significance and treatment of type III EL6. EL type IV 1) Pictorial review of case, EL type IV without any clinical consequence 2) Significance of type IV EL7. EL type V 1) Pictorial review of case, EL type V treated by surgical remove and replacement of stent graft 2) Significance and management of type V EL

VI132-ED-X

Peripheral Artery: Optimization of Imaging Methods Considering Hemodynamics of Blood Flow

All Day Location: VI Community, Learning Center

Participants
Hironobu Tomita, MD, Kawaguchi, Japan (*Presenter*) Nothing to Disclose

TEACHING POINTS

Understanding different arrival times in lower extremities between patients Investigating the causes of blood flow variation Proposals for optimized imaging methods for peripheral CTA

TABLE OF CONTENTS/OUTLINE

Understanding peripheral blood flow velocity: Circulation time differences using Test Injection (abdominal aorta to ankle) Constant arrival times from ABI and Vascular Occlusion Arrival time dependency on an individual's cardiac functionOUTLINEIn Peripheral CTA, often I have experienced insufficient results due to overloading of the contrast medium. For our method to investigate the causes and factors, we enrolled 19 patients and examined using an optimum scan method for CT Examination of Arteriosclerosis Obliterans. In addition with ABI, we examined BMI, heart rate, lower leg arterial length, presence or absence of lesions, and the correlation of contrast arrival time. Two points were used to measure the contrast arrival time in the abdominal aorta, the tibial artery was P1, and the ankle was P2. The results demonstrated no correlation between the lesions and blood flow.Blood flow average was 72mm/sec (37mm/sec minimum and 200mm/sec maximum).The optimum examination is possible using our two-point method when the contrast arrival times are accurately captured and blood flow rates determined using peripheral CTA.

VI133-ED-X

Advantage of Diluted Contrast Material Concentration to Reduce Artifact in C-arm Cone Beam-CT

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
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Shigeru Nemoto, Bunkyo-ku, Japan (*Abstract Co-Author*) President, Nemoto Kyorindo Co, Ltd

TEACHING POINTS

· Usefulness of Dual type Injector for Interventional Radiology · The artifact reduction with using diluted contrast material(CM) in C-arm Cone beam-CT(CBCT) · Application to clinical with C-arm CBCT

TABLE OF CONTENTS/OUTLINE

· Dual type injector can bring injection of CM and saline at the same time. Mixing technique between CM and Saline by Connection tube optimize variety of injection through injector in terms of contrast concentration. · C-arm CBCT: Visualization improvement of stent lumen, in addition to reduction of artifact in CBCT Scan with getting the optimal image density.OUTLINETo cover the imaging region of the wide dynamic range in the IVR system, it is necessary to create a different CM concentration. Recent C-arm CBCT technology in the IVR has obtained to an image of high resolution up to the region of the wholebody including the head and neck area.Therefore, it is very effective to use Dual-type Injector which can convert variety of contrast concentration with dilution of saline. Setting appropriate contrast concentration and also using the device of generation tube, which called spiral flow tubing heighten an effect dilution. The benefit of diluted injection is reduction of the CM in the Artifact C-arm CBCT, and also it can react for various scanning patterns.

VI134-ED-X

Myth and Mystery in Imaging and Endovascular Management of May-Thurner Syndrome

All Day Location: VI Community, Learning Center

Participants
Vivek Gowdra Halappa, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
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Aaron Brandis, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Oleg Teytelboym, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Salmi Simmons, MD, Darby, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

May-Thurner syndrome (MTS) describes left iliac deep venous thrombosis (DVT) due to an anatomical variant predisposing the left common iliac vein to compression between the right common iliac artery and the lumbar spine.MTS is underdiagnosed in clinical practice and there are reports that ~56 % of left-sided DVT seem to be due to this variant and should be considered in all patients presenting with left iliac and femoral DVT.It is important to recognize MTS early as it has been hypothesized to elevate ambulatory venous pressures and produce lower-extremity symptoms, increase the risk of initial and recurrent DVT. MTS requires aggressive therapy in addition to anticoagulation. Otherwise MTS has increased risk of recurrence and post-thrombotic syndrome.

TABLE OF CONTENTS/OUTLINE

Anatomy and pathophysiology: Illustrate vascular anatomy variants and pathophysiology predisposing to MTS related DVT.Clinical Findings:Describe spectrum of MTS presentations using case based approach.Diagnostic Imaging: Illustrate multimodality imaging features of MTS including ultrasound, CTA, MRA and venography.Management, outcomes and complications:Endovascular treatment options for acute and chronic May - Thurner Syndrome including thrombectomy, endovascular stenting, catheter directed thrombolysis.Complications of untreated and untreated MTS.

VI135-ED-X

Percutaneous Transhepatic Cholangioscopy: Pearls and Pitfalls

All Day Location: VI Community, Learning Center

Awards
Cum Laude

Participants
Sameer . Ahmed, MD, Baltimore, MD (*Presenter*) Nothing to Disclose
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Kelvin K. Hong, MD, Baltimore, MD (*Abstract Co-Author*) Scientific Advisory Board, Boston Scientific Corporation;

TEACHING POINTS

1. Describe patient selection and pre-procedural workup, including indications, contraindications, and role of diagnostic imaging.2. Discuss techniques for intra-procedural success in a variety of cases.3. Discuss longitudinal care following the procedure, including expected outcomes, indications for rescoping, and management of potential complications.

TABLE OF CONTENTS/OUTLINE

1. Clinical evaluation of the patient: Indications Contraindications Role of diagnostic imaging2. Technique: New generation of percutaneous cholangioscopes Endoscopic instruments, including laser for lithotripsy Procedural steps Overcoming technical challenges and intra-procedural descriptions for success 3. Post-procedural followup: Longitudinal care in clinic Tests to follow Expected ourcomes, including a survey of the literature Management of complications Indications for rescoping

VI136-ED-X

The Heart of the Matter: Cardiac Arrythmia Diagnosis and Management Quiz for the Interventional Radiologist

All Day Location: VI Community, Learning Center

Participants
Siavash Behbahani, MD, Mineola, NY (*Presenter*) Nothing to Disclose
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Andrew Lee, BS, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
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TEACHING POINTS

1. Given the complexity and variety of medical conditions treated by interventional radiologists, an awareness of cardiac arrythmias is critical for efficient diagnosis and effective management.2. Interventional Radiologists should be familiar with causes and management of asystole, bradycardia, ventricular tacchycardia, supraventricular arrythmias, and other cardiac arrythmias so that they can be treated appropriately in the IR suite.

TABLE OF CONTENTS/OUTLINE

Utilize a quiz format to:Detail the importance of accurate and efficient diagnosis of cardiac arrythmias in the IR suite.Review pertinent literature relating to cardiac arrythmias and management algorithms.Provide examples of cardiac arrythmias that can be encountered in the IR suite, utilizing cased-based scenarios and EKG interpretations.Cases covered will include (but are not limited to):-Cardiac arrest (with review of reversible causes of cardiac arrest)-Ventricular tachycardia and fibrillation-Pulseless Electrical Activity/Asystole-Supraventricular Tachycardia-Atrial Fibrillation-Atrial Flutter-Heart Block-BradycardiaWhere appropriate, common causes of such arrythmias will also be discussed, with particular attention to causes that can be related to IR procedures.Review treatment algorithms for such arrythmias.

VI137-ED-X

Quality Improvement: Gated Thoraco-Abdominal Aortic CTA Utilizing State-of-the-Art Dual-Source Technology

All Day Location: VI Community, Learning Center

Participants
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Richard D. White, MD, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Reduce the radiation dose on gated thoraco-abdominal aortic CTA (GTAA) while increasing the overall quality through reduced respiratory motion and increased Hounsfield Unit (HU) measurements.

METHODS

Our standard method for performing the GTAA exam has been to perform a gated thoracic CTA followed by a high-pitch spiral CTA of the Abdomen and Pelvis. This approach leads to long scan times, higher radiation doses, and diminished contrast enhancement within the abdominal aorta.We collected and compared data from two different systems located in separate Emergency Departments (ED). The standard method was performed on a single-source 128-slice (Siemens Definition AS+) while the single-acquisition protocol was performed on a state-of-the-art dual-source 192-slice (Siemens Force).With the new dual-source CT scanner, we are able to perform a Gated TAA exam with table speeds up to 737 mm/s and pitch of 3.2. High pitches are possible on this system because the two sources are 90o from each other, thus increasing rotational coverage to enable faster translational table speeds without sacrificing sampling or image quality. As a result, the entire thoraco-abdominal aorta can be scanned in 1 to 1.5 seconds in a single gated acquisition with no breath hold required.

RESULTS

The results from 10 studies on each system are reported below. The high speed gated TAA protocol resulted in 64.7% dose reduction and 38.6% increase in HU, measured in the abdominal aorta at the origin of the superior mesenteric artery.System Scan Time (sec) Average HU Average DLP (mGy) Average Eff Dose (mSv)Single-Source 128 20.7 215.7 1199 16.8Dual-Source 192 1.3 298.4 423 5.9

CONCLUSION

Significant quality improvements in gated studies can be achieved using a state-of-the-art dual-source CT. The technology advancements enable faster scanning that allow free breathing examinations without motion artifact. This is particularly useful in an ED setting where non-compliant patients can be frequent. Additional quality improvements are achieved with increased HU for improved bolus timing. The increased speed also permits a reduction in the amount of iodine used. Safety is not sacrificed through these quality improvement changes and is enhanced with a 64.7% radiation dose reduction.

FIGURE (OPTIONAL)

http://abstract.rsna.org/uploads/2015/15007749/15007749_l46l.jpg

VI138-ED-X

All about the Selective Arterial Calcium Injection Test for Pancreatic Neuroendocrine Tumors

All Day Location: VI Community, Learning Center

Participants
Kenji Kajiwara, Hiroshima, Japan (*Presenter*) Nothing to Disclose
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Wataru Fukumoto, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Takuji Yamagami, MD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
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Kazuo Awai, MD, Hiroshima, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation; Research Grant, Hitachi, Ltd; Research Grant, Bayer AG; Reseach Grant, DAIICHI SANKYO Group; Medical Advisor, DAIICHI SANKYO Group; Research Grant, Eisai Co, Ltd; Research Grant, Nemoto-Kyourindo; ; ; ; ;

TEACHING POINTS

Pancreatic neuroendocrine tumors such as insulinomas and gastrinomas are relatively rare pathology. It is sometimes difficult to localize pancreatic neuroendocrine tumors by conventional imaging techniques. To perform a curative resection of neuroendocrine tumors, accurate localization of them is indispensable. Selective arterial calcium injection (SACI) test is a highly sensitive investigation for the localization of them. Its major advantage over other investigations is that the venous sampling provides functional data by which the identified abnormality can be confirmed as a functioning tumor. Although reports of SACI test are limited due to its rarity, the technique is extremely useful in patients with the pancreatic neuroendocrine tumors. Therefore, interventional radiologists should master the technique.Here we describe physiological background, imaging anatomy, typical technical procedure, tips and potential pitfalls for successful examination based on our clinical experience. Furthermore, as there are sometimes false positive cases, we will discuss optimal cutoff value for localizing insulinomas with SACI test.

TABLE OF CONTENTS/OUTLINE

1. Physiological background of SACI test2. Technical procedures of the SACI test3. Tips and pitfalls for successful venous sampling4. Optimal cutoff value of hormone level of sampled blood for insulinoma

VI139-ED-X

Segmental Arterial Mediolysis: Clinical, Imaging and Therapeutic Options in Asymptomatic Patients

All Day Location: VI Community, Learning Center

Participants
Paula Garcia Barquin, MD, Pamplona, Spain (*Presenter*) Nothing to Disclose
Maite Millor, MEd, Pamplona, Spain (*Abstract Co-Author*) Nothing to Disclose
Almudena Quilez Larragan, DO, Pamplona, Spain (*Abstract Co-Author*) Nothing to Disclose
David Cano, MD, Pamplona, Spain (*Abstract Co-Author*) Nothing to Disclose
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Isabel Vivas Perez, MD, Pamplona, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The objective of this work are: To assess the CT findings of segmental arterial mediolysis in abdominal visceral involvement, making emphasis in points that help the differential diagnosis from other vasculities. To review the follow-up protocols depending on the initial presentation: arterial dilatation, single aneurysm, multiple aneurysms, dissection, arterial stenosis, or arterial occlusion. To study the therapy options (medical/surgical reconstruction/catheter embolization/stent-graft repair)

TABLE OF CONTENTS/OUTLINE

A. Pathophysiology. Segmental arterial mediolysis is a rare entity defined by nonatherosclerotic, nonhereditary, noninflammatory arteriopathy characterized by lysis of the outer media of the arterial wall which results in disection that might cause massive hemorrhages. B. Diagnostic Imaging (CT). Although the histologic diagnosis would be the gold standard, it is usually unavailable because those patients are not surgically treated. That is why is crucial the radiological point of view to diferentiate this entity from fibromuscular dysplasia or other vasculitis.C. Differential DiagnosisD. TreatmentE. Follow-up: Over time, the SAM manifestations, become smaller, or resolve, but asymptomatic dissections with delayed onset may occur and follow up is necessary.

VI140-ED-X

Doppler Ultrasound for Haemodialysis Fistulas: PreSurgical Assessment Techinique, Development Assesment and Common Complications

All Day Location: VI Community, Learning Center

Awards
RSNA Country Presents Travel Award

Participants
Victor M. Garcia-Gallegos, MD, PhD, Guadalajara, Mexico (*Presenter*) Nothing to Disclose
Roberto Chavez Perez, MD, Guadalajara, Mexico (*Abstract Co-Author*) Nothing to Disclose
Alfonso Valenzuela SR, MD, Etzatlan, Mexico (*Abstract Co-Author*) Nothing to Disclose
Roberto Chavez-Appendini, MD, Guadalajara, Mexico (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review in a detailed manner the technique and criteria used to define the type of fistula and location prior to surgery. To review the criteria to assess the appropiate development of the fistula. To depict the most common complications associated with haemodialysis fistulas.

TABLE OF CONTENTS/OUTLINE

Types of Vascular Accesses for Haemodialysis. Native Arteriovenous Fistula Artificial grafts Permanent CathetersImportant Anatomic Aspects To Consider Prior to Surgery Venous anatomy of the Arm and Forearm Arterial Anatomy of the Arm and Forearm Critical points to assess when considering the establishment of an Arteriovenous fistulaAssessment of Adequate Maturation of an Arteriovenous fistula Citeria of adequate arterial supply to the fistula. Criteria of adequate venous outflow from the fistulaMain Complications Associated with Arteriovenous Fistula Estenosis of the fistula Estenosis of the venous outflow tract Steal syndrome Vein thrombosis Pseudoaneurism and Hematomas

VI142-ED-X

The Road Less Traveled: A Review of Celiac Axis Arterial Variation and Its Clinical Implications in the Treatment of Hepatocellular Carcinoma

All Day Location: VI Community, Learning Center

Participants
Ryan Braun, MD, New York, NY (*Presenter*) Nothing to Disclose
Travis E. Meyer, MD, Brooklyn, NY (*Abstract Co-Author*) Nothing to Disclose
William Kwon, MD, New York City, NY (*Abstract Co-Author*) Nothing to Disclose
James P. Walsh, MD, Brooklyn, NY (*Abstract Co-Author*) Nothing to Disclose
Robert F. Leonardo, MD, Brooklyn, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Standard celiac axis arterial anatomy historically occurs in approximately 50% of evaluated patients following cadaveric dissection or angiography. Once thought to be clinically insignificant, the rising incidence of hepatocellular carcinoma and the concomitant advances in organ transplantation and the development of targeted endovascular interventions have necessitated increased awareness of these vascular variations. Failure to appreciate these variants preoperatively can result in increased patient morbidity and mortality. This presentation will provide a review of many of the anatomic arterial variations encountered within the celiac axis with discussion of their clinical implications with regard to the treatment of hepatocellular carcinoma - surgical transplant, targeted chemoembolization and intra-arterial brachytherapy.

TABLE OF CONTENTS/OUTLINE

Multiple celiac axis arterial variations are presented on angiography, CT and/or MRI. Aberrant vessels to be presented include: (1) replaced left and right hepatic arteries, (2) accessory left and right hepatic arteries, (3) replaced common hepatic arteries and (4) non-hepatic arteries arising from the hepatic arterial system. A discussion of the clinical implications of each aberrant artery with respect to potential surgical and/or targeted endovascular therapies will accompany each case.

VI143-ED-X

Dual Energy Computed Tomography in Post-(T)EVAR Patients: Advantages of the Virtual Non-contrast CT and the Iodine Overlay Measurements

All Day Location: VI Community, Learning Center

Participants
Lydia Maaskant, Rotterdam, Netherlands (*Presenter*) Nothing to Disclose
Jasper Florie, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Marcel L. Dijkshoorn, RT, Rotterdam, Netherlands (*Abstract Co-Author*) Consultant, Siemens AG
Ronald Booij, RT, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Gabriel P. Krestin, MD, PhD, Rotterdam, Netherlands (*Abstract Co-Author*) Consultant, General Electric Company; Research Grant, General Electric Company; Research Grant, Bayer AG; Research Grant, Siemens AG; Speakers Bureau, Siemens AG
Mohamed Ouhlous, MD, PhD, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

to understand how Dual Energy CT works to assess the quality of the virtual non-contrast CT obtained with Dual energy CT scanning compared to single energy CT to assess and quantify the iodine overlay technique in post-(T)EVAR patients with or without endoleak to assess the radiation dose in Dual Energy CT scans

TABLE OF CONTENTS/OUTLINE

Explain how Dual energy technique works 40 Dual Energy CT's in post-(T)EVAR patients were analysed Assess image quality calculation of virtual non-contrast CT, comparison with true non-contrast CT Assessement of endoleak How to perform measurements on the Iodine overlay technique Radiation dose

VI144-ED-X

Tunneled Dialysis Catheters (TDCs): " The Good, the Bad and the Ugly. "

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Nanda Venkatanarasimha, MRCP, FRCR, Singapore, Singapore (*Presenter*) Nothing to Disclose
Karthikeyan Damodharan, MRCP, FRCR, Liverpool, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Trisha Upadhyaya, MBChB, Singapore, Singapore (*Abstract Co-Author*) Nothing to Disclose
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Apoorva Gogna, MBBS, Singapore, Singapore (*Abstract Co-Author*) Nothing to Disclose
Ankur Patel, BMedSc, MBChB, Singapore, Singapore (*Abstract Co-Author*) Nothing to Disclose
Richard H. Lo, MBBS, Singapore, Singapore (*Abstract Co-Author*) Nothing to Disclose
Bien Soo Tan, Singapore, Singapore (*Abstract Co-Author*) Institutional research collaboration, Koninklijke Philips Electronics NV Institutional research collaboration, Siemens AG Institutional research collaboration, Toshiba Corporation
Kiang Hiong Tay, FRCR, Simgapore, Singapore (*Abstract Co-Author*) Nothing to Disclose
Farah G. Irani, MD, Singapore, Singapore (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

• TDCs contribute to significant morbidity and mortality. Despite K/DOQI guidelines on limiting the use of cuffed catheters for hemodialysis there has been an increasing number who are dependent on TDCs as an interim lifeline while waiting for a permanent solution• Identify the wide-spectrum of TDC-related complications and familiarize with interventional radiology management of both vascular and non-vascular complications• Intensive root cause analysis of complications and valuable lessons learnt for prevention and treatment

TABLE OF CONTENTS/OUTLINE

1. Overview of Good TDCs (including venous anatomy and technical considerations for placement)2. Systematic review of the wide spectrum of complications (including management) and factors contributing to these complications 3. Valuable lessons learnt from quality assurance of miss and near miss complications (including tips to prevent)4. Difficult venous access and unconventional venous anatomy5. Highlight K/DOQI guidelines and value of patient education

VI145-ED-X

Ultrasound-guided High Intensity Focused Ultrasound for the Treatment of Advanced Pancreatic and Liver Cancer

All Day Location: VI Community, Learning Center

Participants
Maximilian Rauch, Bonn, Germany (*Presenter*) Nothing to Disclose
Milka Marinova, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Asadeh Lakghomi, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Hans H. Schild, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Holger M. Strunk, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

• Ultrasound-guided high intensity focused ultrasound (USgHIFU) is introduced as a promising non-invasive tumor ablation technique for the treatment of advanced pancreatic and liver cancer.• Technical aspects and practical fundamentals of USgHIFU are presented.• Advantages of USgHIFU over conventionally applied local ablative methods are discussed.• A step-by-step guide for patient selection, patient preparation, USgHIFU therapy, patient aftercare and follow-up is given.• We give an overview on current literature concerning treatment of unresectable pancreatic and liver cancer.• We discuss limitations, contraindications and complications of USgHIFU.

TABLE OF CONTENTS/OUTLINE

• Fundamentals and technical aspects of USgHIFU• Advantages of USgHIFU• Patient selection and simulation• Patient preparation• USgHIFU-treatment• Patient after-care and follow-up• Overview on current literature concerning o Pancreatic cancer o Hepatocellular carcinoma, liver metastasis• Limitations and contraindications of USgHIFU• Complications of USgHIFU• Conclusion and perspectives

VI146-ED-X

High Flow Arteriovenous Malformations: Lessons Learned From Problem Cases

All Day Location: VI Community, Learning Center

Participants
Carolina Ospina Moreno, MD, Zaragoza, Spain (*Presenter*) Nothing to Disclose
Maria Lourdes Diaz-Dorronsoro, Zaragoza, Spain (*Abstract Co-Author*) Nothing to Disclose
Fermin Urtasun, MD, PhD, Pamplona, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

High flow arteriovenous malformations are rare and complex lesions that may involve any part of the body. They often represent a therapeutic challenge because of their complex anatomy and behavior. The type of embolic agent and access may be determined by the anatomy of the lesion, localization, size, operator´s experience, etc. The purpose of this poster is to share some of our experience in the management of high flow AVM based on problem cases.

TABLE OF CONTENTS/OUTLINE

Anatomy and pathophysiology of the high flow AVM. Management of high flow AVM based on problem cases: Direct alcohol injection into the nidus of a foot AVM. Use of the Amplatzer closure device in a large renal AV fistula. Histoacryl and lipiodol embolization of a uterine AVM. Coil embolization of a post-traumatic AV fistula. Each case shows how each AVM poses a therapeutic challenge. It is important to be familiar with the different embolic agents, their indications and routes of administration.

VI147-ED-X

Embolization of a Type II Endoleak Using Onyx

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Sumeet Bahl, MD, New York, NY (*Presenter*) Nothing to Disclose
Adie Friedman, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Joseph N. Shams, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Steven Steer, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Post-endovascular aneurysm repair (EVAR) imaging surveillance should occur at regular intervals. Triple-phase CT angiography is often the modality of choice. The most common complication after EVAR is an endoleak, of which type II is the most common, resulting in continued expansion of the aneurysm sac. The lumbar arteries, inferior mesenteric artery, and median sacral artery are the usual culprit feeding vessels contributing to a type II endoleak. Multiple methods exist to treat type II endoleaks, all with the risk of non-target embolization. We present our successful experience and technique using the liquid embolic agent, Onyx, to embolize the feeding vessels of a 91-year-old patient with a type II endoleak.

TABLE OF CONTENTS/OUTLINE

A. Types of aortic aneurysms B. Open vs. endovascular aneurysm repair (EVAR) C. Post-EVAR imaging timeline D. Complications of EVAR: Endoleak E. 5 types of endoleak: type II is most common F. Treatments for type II endoleak G. Onyx mechanism of action H. Our patient: clinical history and diagnostic imaging I. Our technique: CT-guided aortic catheterization and fluoro-guided Onyx embolization of feeding vessels J. Clinical and imaging follow-up

VI148-ED-X

Examination in the Depiction Ability Improvement of the Hepatic Artery 3D Image by Cone Beam CT

All Day Location: VI Community, Learning Center

Participants
Mitsuyoshi Yasuda, PhD, Koto-Ku, Japan (*Presenter*) Nothing to Disclose
Takaho Hirano, RT, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Koki Yoshikawa, MD, Kanagawa, Japan (*Abstract Co-Author*) Nothing to Disclose
Toshiyuki Takahashi, Tokyo-To, Japan (*Abstract Co-Author*) Nothing to Disclose
Kyoichi Kato, Yokohama, Japan (*Abstract Co-Author*) Nothing to Disclose
Syougo Sai, Kanagawa, Japan (*Abstract Co-Author*) Nothing to Disclose
Morio Shimada, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasuo Nakazawa, PhD,RT, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1.Changes in the capability of visualizing differences due to the tumor and peripheral blood vessels of the concentration of injected contrast agent. 2.Changes in peripheral vascular depiction performance due to the difference in the digital processing of cone-beam CT image.

TABLE OF CONTENTS/OUTLINE

Table of Contents:Examination in phantom- Differences in the capability of visualizing simulated blood vessel and simulated tumors by contrast agent concentration change.-Differences in the capability of visualizing simulated blood vessel and simulated tumors by reconstruction process change of cone-beam CT data.Examination in clinical image.-Visual assessment of simulated blood vessel and simulated tumors by reconstruction process change of cone-beam CT data.The major teaching points of this exhibit are:1. In the high iodine content (300mgI/mL), masses will be reduced depiction performance by the beam hardening artifact, depiction performance of peripheral blood vessels to improve.2. In 3D reconstruction, the reconstruction function and edge enhancement, reconstruction matrix of 512 × 512, by the appearance and Maximum intensity projection (MIP), tumor representation of mass feeding artery becomes very clear, easily vessel selection by catheter to become.

VI150-ED-X

Advanced Interventional Procedures for Revision of Occluded Transjugular Intrahepatic Portosystemic Shunts (TIPS)

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Andrew S. Niekamp, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Bill S. Majdalany, MD, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To present traditional monitoring modalities for TIPS and findings that are suggestive of stent occlusion and stenosis. Subsequently, a variety of advanced interventional procedures designed for recanalization and revision of stenosed or occluded transjugular intrahepatic portosystemic shunts will be demonstrated.

TABLE OF CONTENTS/OUTLINE

A. TIPS Background / IndicationsB. Present Traditional Ultrasound Monitoring Modalities for TIPSC. Ultrasound Monitoring Findings that are Suggestive of TIPS Occlusion and Stenosis.D. Present a Traditional TIPS RevisionE. Present Example of TIPS not Ameniable to Traditional RevisionF. Present a Combined Transhepatic - Transjugular 'Pull-Through' TechniqueG. Present Colapinto Needle Access RevisionH. Present Transsplenic Access RevisionI. Present Trans-variceal Access RevisionJ. Discussion Regarding Parallel TIPS FormationK. Conclusion

VI151-ED-X

Image-guided Percutaneous Diagnostic Peritoneal Lavage in Oncology Patients: Indications, Technique, and Outcomes

All Day Location: VI Community, Learning Center

Participants
Sishir Rao, MD, Boston, MA (*Presenter*) Nothing to Disclose
Anand M. Prabhakar, MD, Somerville, MA (*Abstract Co-Author*) Nothing to Disclose
Michael S. Gee, MD, PhD, Jamaica Plain, MA (*Abstract Co-Author*) Nothing to Disclose
Peter R. Mueller, MD, Boston, MA (*Abstract Co-Author*) Consultant, Cook Group Incorporated
Ashraf Thabet, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Image guided diagnostic peritoneal lavage (DPL) may be indicated in patients with ovarian or endometrial cancer with suspected but without definite clinical or imaging evidence of peritoneal involvement.2. Determination of peritoneal involvement is important as positive peritoneal cytology is associated with lymph node metastases and may make the patient eligible for intraperitoneal chemotherapy or whole abdominal radiation.3. Technical considerations for image guided DPL include review of pertinent imaging for the presence or absence of ascites and loculation, utilization of ultrasound or "loss of resistance" technique for peritoneal access, and determination of the volume of normal saline to infuse into and aspirate from the peritoneum.4. Measures of success include technical success (peritoneal access) and clinical success (diagnostic cytology results). Complications are assessed through the Society of Interventional Radiology classification.

TABLE OF CONTENTS/OUTLINE

1. Review of indications for image guided DPL. 2. Discuss technical considerations of image guided DPL among ovarian and endometrial cancer patients. 3. Review technical and clinical measures of image guided DPL success and complications based on the SIR criteria.

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

VI152-ED-X

Spectrum of MDCT Findings Affecting Pulmonary Artery Diameter

All Day Location: VI Community, Learning Center

Participants
Josung Jung, Cheonan, Korea, Republic Of (*Presenter*) Nothing to Disclose
Yeri Yoon, MD, Cheonan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young Tong Kim, Cheonan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung Shick Jou, Cheonan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. We will review about pulmonary disorders changing diameter of pulmonary artery.2. We have classified these disorders in two broad categories : Increase in pulmonary artery diameter and diminish in pulmonary artery diameter 3. It is important to recognize the CT signs of these conditions because their presence has implications for the prognosis.

TABLE OF CONTENTS/OUTLINE

Increased Diameter of Pulmonary ArteryCongenital Pulmonary artery Aneurysm Acquired Pulmonary hypertension Pulmonary artery Aneurysm Acute Pulmonary thromboembolism (complete filling defect) Diminished Diameter of Pulmonary Artery Congenital Unilateral proximal interruption, hypoplasia of arteries Acquired Bronchial carcinoma Anthracofibrosis. Chronic Pulmonary thromboembolism Swyer-James Syndrome Chronic pericarditis

VI153-ED-X

Cerebral Disease: Optimal Imaging Method for Preoperative 3DCT - Arteriovenous Separation Scanning Method

All Day Location: VI Community, Learning Center

Awards
Magna Cum Laude

Participants
Kota Mitsui, Saga-Shi, Japan (*Presenter*) Nothing to Disclose
Makoto Kishikawa, Saga-Shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Shinji Kakimoto, Saga-shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Rinsaku Kawano, Saga-Shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Hitoshi Aibe, MD, Kitakyushu, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

·The necessity for preoperative 3DCT simulation·The optimum imaging conditions·Advantages and limitation of the method·Optimal acquisition timing

TABLE OF CONTENTS/OUTLINE

-TABLE OF CONTENTS-Necessity for 3DCT:Presentation of information required for preoperative simulation. Separation of the cerebral arteriovenous, blood vessels (arteries / veins) of the respective tumor.The optimal scan timing for the arteriovenous separation including the split bolus injection optimal volume of contrast medium and the Noise Reduction for the iterative reconstruction.Visualization improvement of tumor, arteries and vein. Scan timing in consideration of the brain hemodynamics(4D).-OUTLINE-The evaluation of brain tumors using preoperative 3DCT is known, but improvement in image details is sought. In particular, with respect to superficial brain tumors, the difficulty in determining optimal acquisition timing for arteriovenous separation is determined. We utilize a split bolus injection to isolate the cerebral arteries from the 4D analysis data. Using this technique, a precise vascular depiction (arteriovenous separation) is possible. Our preoperative simulation technique provides a predictable surgical view with detailed vascular information, and tumor visualization enabling the selection of the optimal surgical technique.

VI154-ED-X

Usefulness of Dual Energy CT for Endoleaks after Endovascular Aortic Repair

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Eijun Sueyoshi, MD, Nagasaki, Japan (*Presenter*) Nothing to Disclose
Hiroki Nagayama, Shimabara, Japan (*Abstract Co-Author*) Nothing to Disclose
Hirofumi Koike, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Ichiro Sakamoto, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Masataka Uetani, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

2. Teaching Points: The purpose of this exhibit is:1. To know the various dual energy CT findings of endoleaks after endovascular aortic repair.2. To know the clinical significances of dual energy CT findings of endoleaks after endovascular aortic repair3. To know the clinical significances of dual energy CT findings after management for endoleaks

TABLE OF CONTENTS/OUTLINE

1. 1. Explanation of dual energy CT findings and clinical significances of endoleaks after endovascular aortic repair1.2. Explanation of dual energy CT findings and clinical significances after management for endoleaks 2. Illustrative cases- Presentation of various dual energy CT findings of endoleaks after endovascular aortic repair- Presentation of dual energy CT findings after management for endoleaks3. Discussion4. Directions and summary The major teaching points of this exhibit are:1. Dual energy CT is an useful tool to detect endoleaks.2. Dual energy CT can detect small endoleaks.3. The therapeutic strategies are different based on dual energy CT imaging findings.

VI155-ED-X

Usefulness of Carbon Dioxide Digital Subtraction Angiography at Endovascular Abdominal Aortic Aneurysm Repairs

All Day Location: VI Community, Learning Center

Participants
Eijun Sueyoshi, MD, Nagasaki, Japan (*Presenter*) Nothing to Disclose
Hiroki Nagayama, Shimabara, Japan (*Abstract Co-Author*) Nothing to Disclose
Ichiro Sakamoto, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Masataka Uetani, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:1. To explain the methods of carbon dioxide digital subtraction angiography (CO2-DSA).2. To explain the safety and potential complications of CO2-DSA.3. To show imaging findings of CO2-DSA at endovascular abdominal aortic aneurysm repairs (EVAR) procedure4. To discuss the role of CO2-DSA at EVAR procedure5. To understand how to reduce the total volume of contrast media at EVAR procedure

TABLE OF CONTENTS/OUTLINE

1. Methods of CO2-DSA2. Safety and potential complications of CO2-DSA3. Illustrative cases- Review of imaging findings of abdominal aortic aneurysm by CO2-DSA at EVAR procedure- Review of imaging findings of endoleaks by CO2-DSA at EVAR procedure- Review of mimics of CO2-DSA at EVAR procedure4. Discussion5. Directions and summary The major teaching points of this exhibit are:1. CO2-DSA is easy and safe at EVAR procedure..2. CO2-DSA can reduce the total volume of contrast media at EVAR procedure.

VI156-ED-X

Percutaneous Cryoablation of the Celiac Plexus

All Day Location: VI Community, Learning Center

Participants
Constance de Margerie-Mellon, Paris, France (*Abstract Co-Author*) Travel support, Guerbet SA
Alexandre Coffin, PhD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Cedric M. De Bazelaire, MD, PhD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Eric De Kerviler, MD, Paris, France (*Presenter*) Research Consultant, Galil Medical Ltd; Speaker, Guerbet SA

TEACHING POINTS

Patients with pain from pancreatic or gastric carcinoma are often treated by a combination of opioids and neuroablative procedures (mainly alcohol) In patients with locally advanced cancer, alcohol diffusion is unpredictable, making celiac block difficult and/or ineffective Cryoablation combines antitumor, antiangiogenic and neurolytic properties and represent a valuable alternative in these patients Our technique involves bilateral posterior approach with one or two 17-G cryoneedles on each side placed under CT guidance After one or two 10 minutes freezing cycles, the pain usually decreases by 4 to 5 points on the visual analog scale

TABLE OF CONTENTS/OUTLINE

Review of the celiac plexus anatomy Current indications of celiac plexus block Cryobiology and rationale for cryoablation of the celiac plexus Anesthetic properties of cryoablation Antiangiogenic effects Antitumor effects How to perform cryoablation of the celiac plexus Needle trajectory and placement Freezing protocol Results Risks and complications of the procedure Take home messages and tips for success

VI157-ED-X

Beyond Stenosis: Assessment of Arterial Functional Status - A Multimodality Approach in Imaging Arterial Disease

All Day Location: VI Community, Learning Center

Participants
Jonathan Weir-McCall, MBBCh, FRCR, Dundee, United Kingdom (*Presenter*) Nothing to Disclose
Phey M. Yeap, MBChB, FRCR, Dundee, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Deirdre Cassidy, Dundee, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Richard D. White, MBChB, FRCR, Cardiff, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Thiru A. Sudarshan, DMRD, FRCR, Dundee, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Ian A. Zealley, MD, Dundee, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Graeme Houston, MD, FRCR, Dundee, United Kingdom (*Abstract Co-Author*) Director, Vascular Flow Technologies Ltd Shareholder, Vascular Flow Technologies Ltd Grant, Guerbet SA
Matthew J. Budak, MD, FRCR, Edmonton, AB (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Modern imaging techniques enable a more detailed assessment of arterial functional status than traditional angiography2. Arterial stiffness is associated with cardiovascular disease (CVD) risk and can be measured using US, CT and MRI3. Vascular endothelial dyfunction is a risk factor for future atherosclerosis and CVD. Assessment of the endothelium requires utilisation of both endothelial-dependent and -independent techniques4. Flow quantification assesses pressure gradients, collateral flow and shunt volumes, providing haemodynamic evaluation of congenital conditions and stenosis

TABLE OF CONTENTS/OUTLINE

Arterial anatomy and normal blood flowReview-Importance of arterial stiffness in CVDDiscussion-Measuring arterial stiffnessa. Arterial capacitance and distensibilityb. PWV:• Tonometry: Carotid-femoral; augmentation index• US: PWV, arterial waveform analysis• MRI: Transit time/Flow-Area/Cross-correlationc. Pulmonary arterial stiffness and pulmonary hypertensionReview-Endothelial function and its role in atherosclerosisDiscussion-Endothelial assessmenta. Flow mediated dilationb. Cold pressor testc. Reactive hyperaemiad. Induced hyperaemia: Adenosine/acetylcholineFlow assessmenta. Stenosis and regurgitationb. Pressure gradientsc. Shunt quantification

VI158-ED-X

Pressures, Waveforms and Plethysmography. Oh My!: A Guide to Physiologic Studies to Screen for Peripheral Arterial Disease

All Day Location: VI Community, Learning Center

Participants
Carson Sibley, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Jarrod MacFarlane, DO, Farmington Hills, MI (*Abstract Co-Author*) Nothing to Disclose
Stephen P. Reis, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Mark Reddick, MD, MS, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Sanjeeva P. Kalva, MD, Dallas, TX (*Abstract Co-Author*) Consultant, CeloNova BioSciences, Inc
Patrick D. Sutphin, MD, PhD, Dallas, TX (*Presenter*) Nothing to Disclose

TEACHING POINTS

1. Noninvasive physiologic studies are the primary screening exam for the detection of peripheral arterial disease.2. Interpretation of segmental pressures, Doppler waveforms and pulse-volume recordings requires an understanding of the principles of blood flow in the lower extremities. 3. Review commonly used criteria for the diagnosis of peripheral arterial disease. 4. Apply principles to the interpretation of noninvasive vascular studies in case-based review.

TABLE OF CONTENTS/OUTLINE

1. Review physiologic principles of blood flow in the lower extremities.2. Examine how arterial pressures, Doppler waveforms and plethysmography detect perturbations in normal arterial blood flow to suggest peripheral arterial disease. 3. Present commonly used parameters for the interpretation of noninvasive physiologic vascular studies. 4. Case-based presentation and application of principles learned to interpret noninvasive vascular studies with comparison to angiography.

VI159-ED-X

Super Tough PTC : Tips and Tricks

All Day Location: VI Community, Learning Center

Participants
Vartan Vartanians, MD, Burlington, MA (*Presenter*) Nothing to Disclose
Shams I. Iqbal, MD, Burlington, MA (*Abstract Co-Author*) Nothing to Disclose
Christopher P. Molgaard, MD, Lexington, MA (*Abstract Co-Author*) Nothing to Disclose
Heideh K. Ahari, MD, Burlington, MA (*Abstract Co-Author*) Nothing to Disclose
Brian D. Davison, MD, MSc, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Roger Jenkins, Burlington, MA (*Abstract Co-Author*) Nothing to Disclose
Sebastian Flacke, MD, Burlington, MA (*Abstract Co-Author*) Consultant, BTG International Ltd; Consultant, Surefire Medical, Inc; Consultant, Koninklijke Philips BV; Consultant, XACT Robotics

TEACHING POINTS

To illustrate with images, the presentation and challenges of the primary transhepatic cholangiography. To illustrate difficulties faced its management.

TABLE OF CONTENTS/OUTLINE

CONTENT ORGANIZATION: 1. Pathology of biliary obstruction. 2. Commonly used imaging including CT and MRI. 3. Various techniques in management of such complex cases. 4. Tips and Tricks to help when usual methods do not work. Percutaneous transhepatic cholangiogrpahy is a complex procedure. Patients with complex anatomy, especially in post surgical patients present challenges for the interventional radiologist. A sound understanding of the anatomy and techniques is helpful in successfully performing this procedure. Tips and Tricks help at times when routine methods do not work.

VI160-ED-X

Postoperative Complications and Management of Endovascular Aortic Aneurysm Repair

All Day Location: VI Community, Learning Center

Participants
Hironori Onizuka, MD, Nagasaki, Japan (*Presenter*) Nothing to Disclose
Eijun Sueyoshi, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Ichiro Sakamoto, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Masataka Uetani, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To know the various imaging findings of postoperative complications and management of endovascular aortic aneurysm repair 2. To know the clinical significances of imaging findings of postoperative complications of endovascular aortic aneurysm repair 3. To know the management for postoperative complications of endovascular aortic aneurysm repair

TABLE OF CONTENTS/OUTLINE

1. 1. Explanation of imaging findings and clinical significances of postoperative complications of endovascular aortic aneurysm repair1.2. Explanation of management for postoperative complications of endovascular aortic aneurysm repair 2. Illustrative cases- Presentation of various imaging findings of postoperative complications of endovascular aortic aneurysm repair- Presentation of management for postoperative complications of endovascular aortic aneurysm repair3. Discussion4. Directions and summary The major teaching points of this exhibit are:1. Various postoperative complications can oocur after endovascular aortic aneurysm repair.2. The serial changes of complication can be seen after endovascular aortic aneurysm repair.3. The therapeutic strategies are different based on imaging findings of postoperative complications after endovascular aortic aneurysm repair.

VI161-ED-X

Hemobilia of Different Iatrogenic Origins: Imaging Features of CT and Angiography and Management of Transcatheter Arterial Embolization?A Series of 30 Cases

All Day Location: VI Community, Learning Center

Participants
Feng Wen, Shen Yang, China (*Presenter*) Nothing to Disclose
Zaiming Lu, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Qiyong Guo, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The definition, different iatrogenic origins and clinical symptoms of hemobilia.The imaging fearturesof CT and angiography of hemobilia.The management:how to do transcatheter arterial embolization (TAE) and its efficacy

TABLE OF CONTENTS/OUTLINE

Hemobilia is a potentially life-threatening cause of upper gastrointestinal hemorrhage caused by hepatic trauma or iatrogenic injury. Different iatrogenic origins of hemobilia: transhepatic intervention(percutaneous transhepatic cholangial drainage, percutaneous transhepatic biopsy, and radiofrequency ablation)and surgical procedures in the hilar area(laparoscopic cholecystectomy and surgical resection of cholangiocarcinoma).Typical clinical triad of hemobilia , including melena, abdominal pain, hematemesis, and jaundice, was observed in most patients.Contrast-enhanced abdominal CT showed hematocele, pseudoaneurysm and extravasation of contrast material in patients with hemobilia. Pseudoaneurysm was the most common angiographic feature.Polyvinylalcohol particles, gelatin sponges, and coils were used for TAE based on the iatrogenic origin and bleeding location, and the embolization was technically successful in all patients.The reason for failed embolizations was initial incomplete arterial occlusion.

VI162-ED-X

Interventional Management of Hemoptysis: For Every Interventional Radiology Resident/Fellow

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Jitsuro Tsukada, Tokyo, Japan (*Presenter*) Nothing to Disclose
Seishi Nakatsuka, MD, Shinjuku-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Masashi Tamura, Shinjuku-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Yosuke Suyama, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Sota Oguro, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Masanori Inoue, MD, Shinjuku-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Nobutake Ito, MD, Yokohama, Japan (*Abstract Co-Author*) Nothing to Disclose
Hideki Yashiro, MD, Shinjuku-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Masahiro Jinzaki, MD, Tokyo, Japan (*Abstract Co-Author*) Support, Toshiba Corporation; Support, General Electric Company

TEACHING POINTS

Interventional procedures are considered to be an effective nonsurgical treatment and play an important role in the management of hemoptysis. This exhibit may produce the readers, 1. To understand pathophysiologic causes and diagnostic images of hemoptysis. 2. To understand indications and therapeutic strategy of hemoptysis. 3. Learn how to safely perform bronchial and nonbronchial systemic artery embolization using basic technique. 4. Get further techniques for hemoptysis secondary to pulmonary artery pseudoaneurysms.

TABLE OF CONTENTS/OUTLINE

To describe and illustrate a comprehensive review of diagnostic imaging, a therapeutic strategy and interventional techniques for management of hemoptysis.Table of Contents/Outline:1. Introduction2. Definition and Pathophysiologic Causes of Hemoptysis3. Diagnosis and Imaging of Hemoptysis4. Anatomy of Related Arteries a. Assessment of Bronchial arteries b. Assessment of Nonbronchial Systemic Arteries c. Assessment of Pulmonary Arteries (including Rasmussen's Aneurysms)5. Interventional Techniques for Hemoptysis a. The therapeutic strategy of hemoptysis b. Systemic Artery (Bronchial and Nonbronchial Systemic Arteries) Embolization c. Reported Outcomes and Complications of Systemic Artery Embolization d. Selective Pulmonary Artery Embolization combined with systemic artery embolization

VI163-ED-X

MRI Pulse Wave Velocity Measurement for Vascular Age/aortic Stiffness Assessment: Intra-, Interobserver and Inter-center Variability in a Multicenter Trial Setting

All Day Location: VI Community, Learning Center

Participants
Maja Hrabak Paar, MD, Basel, Switzerland (*Presenter*) Nothing to Disclose
Achim Kircher, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
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Sebastien Kopp, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Francesco Santini, PhD, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Jens Bremerich, MD, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Tobias Heye, MD, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Aortic pulse wave velocity (PWV) is an established marker of aortic stiffness. In this study we assessed intraobserver, interobserver and inter-center variability of PWV measurement using magnetic resonance imaging (MRI) in order to gauge the precision of the implemented method in a multicenter trial setting.

METHOD AND MATERIALS

This is an IRB approved, HIPAA compliant prospective study. A subset of 45 (15 patients per site) adult patients (31 male, age 58±12 yrs.) with newly diagnosed essential arterial hypertension were randomly included from a multicenter trial (3 sites, 140 patients total) on antihypertensive treatment. All patients underwent cardiovascular 3T MRI with a standardized imaging protocol. Axial phase-contrast scans (100 frames/RR-interval) were repeated three times per examination to assess transit time (Δt) between the ascending and descending aorta. The distance between ascending and descending aorta (Δx) was measured on prospectively ECG-gated parasagittal 2D GRE images of the aortic arch. Δt and Δx were measured using semi-automatic analysis software (Syngo.via Siemens Healthcare, Erlangen, Germany) three times per scan by five different readers, resulting in 2025 Δt and 675 Δx data points. PWV was calculated as Δx/Δt. Intraobserver, interobserver and inter-center variability was calculated as coefficient of variation (COV).

RESULTS

Median intraobserver COV equaled 0 for Δt; ranged from 0.4-1.2% (interquartile range 0.2-1.8%) for Δx, and 0.4-1.2% (0.2-2.0%) for PVW. Interobserver COV was 0 (0-0.3%) for Δt; 1.5% (1.2-1.8%) for Δx, and 1.5% (1.2-2.0%) for PWV.There was no significant inter-center difference in scan-rescan COV ($p>0.05$): 12.5% for Δt and 14.9% for PWV in center 1, 10.7% for Δt and 11.8% for PWV in center 2, and 12.1% for Δt and 12.8% for PWV in center 3.

CONCLUSION

MRI PWV measurement for assessment of aortic stiffness as a surrogate marker for vascular age is a method with low intra- and interobserver variability. Using a standardized protocol, low inter-center variability can be achieved in a multicenter trial setting.

CLINICAL RELEVANCE/APPLICATION

Establishing the measurement variability in multicenter trials is important to ensure that study results are representing biological changes and not predominantly the overall measurement error.

FIGURE (OPTIONAL)

http://abstract.rsna.org/uploads/2015/15012582/15012582_5tgb.jpg

VI164-ED-X

Interventional Radiology Management of Complications Related to Percutaneous Transhepatic Biliary Tract Interventions (PTBTI): A Comprehensive Review Based on Select Cases from Morbidity and Mortality Rounds of Over 10 Years

All Day Location: VI Community, Learning Center

Participants
Nanda Venkatanarasimha, MRCP, FRCR, Singapore, Singapore (*Presenter*) Nothing to Disclose
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Farah G. Irani, MD, Singapore, Singapore (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. The aim of this exhibit is to (a) describe (b) illustrate (c) prevent and (d) manage complications related to PTBTI based on the lessons learned from quality assurance rounds of over 10 years in a large tertiary referral center2. PTBTI induced complications are not uncommon and radiologists should be familiar with the diagnosis and management, especially of uncommon ones3. A combination of percutaneous techniques are needed for appropriate treatment in complex cases

TABLE OF CONTENTS/OUTLINE

Illustrate and discuss the:1. Broad spectrum of complications related to percutaneous transhepatic biliary tract interventions2. Classificationrelated on access, catheter, stent; vascular and non-vascular3. Pearls and pitfalls in the diagnosis4. Step-by-step interventional techniques with tips for successful treatment5. Discuss the principles and technical considerations in preventing complications based on lessons learned from Morbidity and Mortality rounds6. Highlight relevant variant biliary anatomy and value of additional imaging (eg cone beam CT) in select cases to avoid potential traps7. Short and long term follow-up

VI165-ED-X

Painful Pelvic Metastases-Minimally Invasive Managment: Essentials for the Interventional Radiologist

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Jack W. Jennings, MD, Saint Louis, MO (*Presenter*) Speakers Bureau, DFINE, Inc; Consultant, DFINE, Inc
Anderanik Tomasian, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
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Sarah E. Connolly, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Jeremiah R. Long, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Discuss the various techniques and interventional procedures for the treatment of painful metastatic pelvic lesions including radiofrequency ablation, cryoablation, cementoplasty and local steroid injections. Recognize example lesions/cases where there is a preferential modality for treatment. Recognize cases in which multiple modalities are used for local control and stabilization. Understand the common complications and relevant neural anatomy and often necessary thermal protection techniques utilized.

TABLE OF CONTENTS/OUTLINE

Review the most common painful pelvic metastatic lesions Overview of the percutaneous ablative, augmentation, and local injection techniques. Provide examples of representative cases of augmentation, ablation (radiofrequency and cryoablation), combined modalities, and local injections. Provide examples of complications and the use of thermoprotective techniques.

VI166-ED-X

Understanding and Identifying Common and Anomalous Female Pelvic Venous Anatomy and Varicosities on Multi-modality Imaging in the Setting of Pelvic Congestion Syndrome

All Day Location: VI Community, Learning Center

Participants
Monica A. Stanley, DO, Phoenixville, PA (*Presenter*) Nothing to Disclose
Wylie E. Gomez, MD, Bryn Mawr, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Provide multi-modality imaging examples of common female pelvic venous anatomy and varicosities in the setting of pelvic venous congestion syndrome for benefit of both the interventionist and diagnostic radiologist.Describe and provide imaging examples of anomolous pelvic venous anatomy contributing to pelvic venous congestion syndrome.

TABLE OF CONTENTS/OUTLINE

Background and pathophysiology of pelvic congestion syndrome Normal female pelvic venous anatomy on CT and MR CT, MR, and angiographic appearance of pelvic venous varicosities in the setting of pelvic congestion syndrome Venous anomalies in the setting of pelvic venous congestion - Nutcracker syndrome, May-Thurner syndrome, anomolous origin of the ovarian veins Summary and brief overview of interventional treatment approaches

VI167-ED-X

Role of Interventional Radiology in the Palliative Management of Spinal Metastases

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Adam N. Wallace, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Randy O. Chang, BS, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Jack W. Jennings, MD, Saint Louis, MO (*Abstract Co-Author*) Speakers Bureau, DFINE, Inc; Consultant, DFINE, Inc

TEACHING POINTS

The purpose of this exhibit is:1. To review the indications and comparative advantages of epidural injections, vertebral augmentation, and percutaneous radiofrequency and cryoablation in the palliative management of metastatic spine disease. 2. To review recent technical advances that facilitate the safety and efficacy of these procedures.

TABLE OF CONTENTS/OUTLINE

Epidural injections Injectate and mechanisms of pain relief Indications Pain secondary to neural mass effect Temporary pain relief prior to diagnostic studies or other interventions Vertebral Augmentation Mechanism of pain relief Indications Improving cement distribution and minimizing extravasation Navigational osteostomes High viscosity cement Injection cavity pressure monitoring Cavity creation with controlled ablation Radiofrequency Ablation Mechanisms of heat production and pain relief Improving safety and efficacy Real-time monitoring of the ablation volume Navigational ablation probe Thermal protection techniques Cryoablation Mechanisms of tumor cell death Unique advantages Visualization of the ablation volume Treatment of sclerotic metastases Techniques for increasing safety Motor evoked potential monitoring Peripheral motor nerve electrostimulation

VI168-ED-X

'Crazy Walk on the Curve Side ': Performing Difficult Biopsies with Curved Needles

All Day Location: VI Community, Learning Center

Participants
Philippe Brunner sr, MD, Monte Carlo, Monaco (*Presenter*) Nothing to Disclose
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Patrick Baque, Monaco, Monaco (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Propose an alternative way with curved needles to perform biopsies reputedly difficult in special anatomic conditions. Know the most frequent targets to apply these technique. Describe how to proceed step by step.

TABLE OF CONTENTS/OUTLINE

Biopsies are essential for diagnosing cancer and several others conditions in patient management. Nevertheless, some CT-guided biopsies are deemed difficult or technically challenging to perform in the case of deep lesions, narrow access ways and interposed sensitive structures. In usual procedures, straight needles are designed to be inserted directly with limited redirection inside the body. By contrast, curved needles allow to bypass obstacles thanks to the possibility to take different trajectories with variable curves, only by applying a stepwise rotation approach during the advancement of these needles : the curve effect. It is possible to major this curve effect by leaning on the bevel opening which is always located in the needle's convexity : the edge effect. In our institution, biopsies with curved needles are well-established for some years now. These modified needles allow a better targeting of hard-to reach lesions (mediastinal, intra or retroperitoneal localizations...).These technique can be widely used for different parts of the body with safe conditions and may be easily handle.

VI170-ED-X

Feeling Hormonal? An Interventionalist's Guide to Endocrine Consults

All Day Location: VI Community, Learning Center

Participants
Benjamin Carney, MS, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Eric J. Monroe, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Christopher R. Ingraham, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Guy E. Johnson, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Karim Valji, MD, Seattle, WA (*Abstract Co-Author*) Royalties, Reed Elsevier

TEACHING POINTS

The learner will review basic hormone signalling as well as common pathophysiologic disruptions of these pathways The learner will develop an understanding of the procedures that the interventional radiologist can offer to clarify and guide management of various endocrinologic diagnoses The learner will become familiar with the indications for endocrine stimulation and sampling procedures and be prepared for frequently asked questions from patients and referring endocrinologists The learner will be able to identify normal anatomy and variants pertinent to interventional stimulation and sampling procedures The learner will review patient preparation, stimulation and sampling techniques, specimen handling and results interpretation

TABLE OF CONTENTS/OUTLINE

The exhibit is divided anatomically into six sections: Pituitary Adrenal Kidney Parathyroid Pancreas Gonads Within each section, content is organized as follows: Pathways and Pathophysiology Role of Interventional Stimulation and Sampling Procedures Normal and Variant Anatomy Patient Preparation, Procedural Technique and Results Interpretation

VI171-ED-X

Efforts Against Effort Thrombosis of the Axillosubclavian Vein: A Review of the Endovascular Management of Paget-Schroetter Syndrome

All Day Location: VI Community, Learning Center

Participants
Jonathan R. Young, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Jocelyn A. Young, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Jonathan K. Park, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
John M. Moriarty, MD, Los Angeles, CA (*Abstract Co-Author*) Speaker, AngioDynamics, Inc; Consultant, AngioDynamics, Inc; Speaker, Sequent Medical, Inc ; Consultant, Sequent Medical, Inc; Speaker, Argon Medical Devices, Inc ; Consultant, Argon Medical Devices, Inc

TEACHING POINTS

1. The mechanism of Paget-Schroetter syndrome is compression of the subclavian vein as it courses through the anterior thoracic outlet at the junction of the first rib and clavicle, as well as between the subclavius and anterior scalene muscles. Intimal damage results in a thrombogenic surface, increasing the risk of deep vein thrombosis. 2. The treatment of Paget-Schroetter syndrome is somewhat controversial, as there have not been large prospective randomized controlled trials to compare various treatment strategies. Many advocate catheter-directed thrombolysis followed by decompressive surgery, venography with possible venoplasty, and anticoagulation. 3. Catheter-directed thrombolysis is most successful when performed within 10-14 days of thrombus formation.4. Angioplasty and stent placement prior to surgical decompression have been largely unsuccessful and are not recommended. Stent placement frequently results in stent fracture. Venoplasty can cause endothelium damage, increasing the risk of early re-thrombosis.

TABLE OF CONTENTS/OUTLINE

1. Epidemiology of Paget-Schroetter Syndrome 2. Mechanism of Paget-Schroetter Syndrome 3. Presentation and Diagnosis of Paget-Schroetter Syndrome 4. Management of Paget-Schroetter Syndrome a. Catheter-Directed Thrombolysis b. Surgical Decompression c. Venography with Possible Venoplasty d. Anticoagulation

VI173-ED-X

Pre and Intra Hospital Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA): A United Kingdom Level 1 Trauma Center Perspective

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Awards
Certificate of Merit

Participants
Rohit S. Malliwal, MBBS, London, United Kingdom (*Presenter*) Nothing to Disclose
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Samy Sadek, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Gareth Davies, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Timothy Fotheringham, MBBS, FRCR, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Susan Cross, MBChB, FRCR, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Ounali Jaffer, MBBS, FRCR, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Understand the indications, techniques and equipment required for the insertion of REBOA in the hemodynamicaly unstable trauma patientTo be familiar with the normal imaging appearances of a correctly placed REBOAUnderstand the potential pitfalls and complications associated with use of REBOA and their imaging features

TABLE OF CONTENTS/OUTLINE

REBOA is a resuscitative adjunct technique which can be a potential lifesaver in the setting of hemorrhagic shock. Its utilization within trauma centers is gaining increasing recognition, but not infrequently, complete cardiovascular collapse may have already occurred prior to hospital arrival. Our Level 1 trauma center is a pioneering REBOA site and is the first worldwide to undertake REBOA insertion at the roadside.Within our pictorial review, we will discuss the indications for REBOA insertion with description of equipment modification to ease placement in the pre-hospital setting. We will also demonstrate the correct and incorrect radiological appearances of REBOA on plain film and CT, and include case examples of the potential complications associated with REBOA insertion.

VI174-ED-X

Interventional Management of Pulmonary Nodules: See One, Stick One, Treat One

All Day Location: VI Community, Learning Center

Participants
Aliaksei Salei, MD, Darby, PA (*Presenter*) Nothing to Disclose
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Oleg Teytelboym, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Aaron Brandis, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Salmi Simmons, MD, Darby, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review and illustrate biopsy recommendations for lung nodules discovered incidentally or through lung cancer screening. Provide pictorial review of techniques and considerations important in percutaneous biopsy. Illustrate biopsy complications and predisposing factors. Provide practical tips for minimizing complication risks.Review percutaneous biopsy accuracy and management of patient with unsatisfactory biopsy specimen. Discuss and illustrate approaches to interventional treatment of pulmonary neoplasms.

TABLE OF CONTENTS/OUTLINE

Imaging features that warrant biopsy, including appearance, growth, persistence and elevated FDG uptake. Percutaneous biopsy: - CT guided biopsy; - US guided biopsy; - Technical considerations (nodule location, coaxial vs. non-coaxial needle, double needle technique); - Complications (predisposing factors, ways to avoid); - Approach to unsatisfactory biopsy specimen.Treatment: - Needle localization for wedge resection; - Fiducial markers placement; - RF ablation; - Cryoablation; - Microwave ablation; - Post therapy appearance and follow up.

VI175-ED-X

Organizing a Systematic Analysis to Detect and Manage Endovascular Aortic Aneurysm Repair and Complications by Ultrasound: A Comprehensive and Objective Review

All Day Location: VI Community, Learning Center

Participants
George C. Dantas, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
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Thiago D. Saraiva, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Daniel C. Luz, MD, Brazil, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is systematize an ultrasound examination after Endovascular Aortic Aneurysm Repair (EVAR), using Duplex Scan, CEUS and Image fusion techniques to detect and evaluate complications.- Duplex scan is performed to determine aneurysm size, morphology of the endoprosthesis and visualize and evaluate blood flow in and out of the prosthesis (leak).- CEUS increases the sensitivity of ultrasound surveillance, due its ability in detects low flow velocity and recognize endoleaks with delayed enhacement. Contrast image is viewed on a split image screen with the grayscale image adjacent.- We do it with 1mL of Sonovue® followed by 5mL of normal saline flush. Where an endoleak was found, a more focused examination could be conducted with a further 1mL bolus agent contrast.- In case of patients have a previous CTA, image fusion techniques combining CEUS and CTA can be performed in a split image screen using appropriate software.- Image fusion improves spatial orientation, facilitating the characterization of complications post-EVAR, especially endoleaks.

TABLE OF CONTENTS/OUTLINE

Introduction Complications after EVAR Ultrasound advantages and limitations Systematization of examination Conclusion

VI176-ED-X

Beyond Atherosclerosis: Lower Limb Ischaemia in the Younger Patient

All Day Location: VI Community, Learning Center

Participants
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Ian Williams, Cardiff, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Andrew C. Gordon, Cardiff, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Andrew Wood, MBBS, FRCR, Cardiff, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Thiru A. Sudarshan, DMRD, FRCR, Dundee, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Review imaging strategies and the wide range of differential diagnosis when evaluating lower limb ischaemia in young (<50 years) patients2. Illustrate the spectrum of pathologies on multimodality imaging (US, CT, MR, angiography) with clinical correlation and associated endovascular management where applicable, using cases from an extensive archive at two tertiary vascular centres

TABLE OF CONTENTS/OUTLINE

1. Optimal imaging strategies: who, how and when to image? 2. Pearls and pitfalls 3. Pathologies: a. Premature atherosclerosis b. Vasculitis. i. Categorisation c. Thromboembolic disease, including septic embolic disease d. Popliteal entrapment syndromes. i. Categorisation. ii. Specific imaging considerations e. Popliteal cystic adventitial disease f. Iliac endofibrosis g. Trauma. i. acute. ii. chronic sequelae h. Iatrogenic e.g. migrated vascular occlusion plugs, post-surgical complications i. Non-arterial e.g. May-Thurner syndrome

VI178-ED-X

Emergencies in the Pulmonary Arteries: Beyond Pulmonary Embolism

All Day Location: VI Community, Learning Center

Participants
Daniel Lamus, MD, San Antonio, TX (*Presenter*) Nothing to Disclose
Carlos S. Restrepo, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Daniel Ocazionez, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
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Santiago Martinez-Jimenez, MD, Kansas City, MO (*Abstract Co-Author*) Author, Reed Elsevier; Author, Oxford University Press
Horacio Murillo, MD, PhD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Describe and illustrate different conditions, other than pulmonary embolism affecting the pulmonary arteries that may manifest as medical emergencies.

TABLE OF CONTENTS/OUTLINE

Current MDCT technology allows precise evaluation of the pulmonary vasculature in numerous emergency situations. Even though the evaluation of the pulmonary arteries has commonly been focused on the diagnosis or exclusion of thromboembolic disease, the pulmonary arteries can be affected in several other conditions that may require emergency treatment.Prompt identification of these pathologic conditions and injuries, is critical for improving patient outcomes. Table of Contents:Aneurysms and pseudoaneurysms.Extension of wall hematoma from Type-A aortic dissection.Pulmonary artery dissection.Traumatic injury.Pulmonary artery occlusion / extrinsic compression.Severe stenosis.Foreign body embolization.

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Carlos S. Restrepo, MD - 2012 Honored Educator
Carlos S. Restrepo, MD - 2014 Honored Educator
Santiago Martinez-Jimenez, MD - 2014 Honored Educator
Santiago Martinez-Jimenez, MD - 2015 Honored Educator

VI179-ED-X

Play it Again SMA: Normal Anatomy,Variant Anatomy and Pathologies of the Superior Mesenteric Artery with Implications for Modern Endovascular Management

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Lyn Zimmo, MBBS, Cardiff, United Kingdom (*Presenter*) Nothing to Disclose
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Andrew Wood, MBBS, FRCR, Cardiff, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Andrew C. Gordon, Cardiff, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Review the embryology, normal anatomy and anatomical variants of the SMA (superior mesenteric artery) and its branches, with schematic diagrams and multimodality imaging (US, CT, MR, angiography) 2. Describe optimal imaging strategies for evaluating pathology related to the SMA 3. Illustrate the spectrum of pathologies involving the SMA and its branches on multimodality imaging emphasising clinical correlation and endovascular management where applicable, using cases from an extensive archive at two tertiary vascular centres

TABLE OF CONTENTS/OUTLINE

1. Embryological development 2. Normal and variant anatomy of the SMA 3. Imaging strategies and SMA appearances on multiple imaging modalities 4. Pathologies: a. Mesenteric ischaemia. i. acute (embolic, dissection) vs chronic (atherosclerotic). ii. non-atherosclerotic causes of stenosis/occlusion (vasculitis, extrinsic compression) b. SMA aneurysms c. Vascular malformations d. Hemorrhage e. SMA syndrome 5. Endovascular management: indications, tips and tricks

VI180-ED-X

Aortic Obstructive Syndromes (AOS): Revisiting Pathogenesis and Cross Sectional Imaging Findings

All Day Location: VI Community, Learning Center

Participants
Ameya J. Baxi, MBBS, DMRD, San Antonio, TX (*Presenter*) Nothing to Disclose
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Daniel Ocazionez, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Daniel Vargas, MD, Aurora, CO (*Abstract Co-Author*) Nothing to Disclose
Horacio Murillo, MD, PhD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To discuss taxonomy, etiopathogenesis and causes of AOS To review characteristic multimodality imaging findings

TABLE OF CONTENTS/OUTLINE

Aortic obstruction results in complete or partial loss of continuity of the aorta and may result in development of collaterals. The severity and extent of narrowing of aorta account for presence of symptoms and can have poor prognosis. Management may include aortoaortic bypass, vascular reconstruction, stenting or angioplasty.Cross sectional imaging provides accurate noninvasive assessment of anatomy, morphology, etiology, location, collaterals, severity and associated findings. Recognizing typical imaging manifestations with adequate clinical correlation is essential for timely and accurate diagnosis and for pretreatment evaluation. Imaging plays a critical role in the patient management.In this exhibit, we discuss etiopathogenesis and characteristic multimodality imaging findings of AOS. Increased awareness of such entities will contribute to optimized patient care.Aims/Objectives Introduction Taxonomy Etiopathologenesis and imaging Coarction and Pseudocoarction Aortic interruption Mid-aortic syndrome Leriche `s syndrome Inflammatory vasculitis: Takayasu arteritis, Neurofibromatosis 1,Retroperitoneal fibrosis, and Fibromuscular dysplasia Miscellaneous- Aortic sarcoma, Conclusion Teaching points

Honored Educators

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Carlos S. Restrepo, MD - 2012 Honored Educator
Carlos S. Restrepo, MD - 2014 Honored Educator

VI181-ED-X

Pulmonary Artery Dissections and Intramural Hematomas: Changing Concepts in Pathogenesis and Cross Sectional Imaging Findings

All Day Location: VI Community, Learning Center

Participants
Ameya J. Baxi, MBBS, DMRD, San Antonio, TX (*Presenter*) Nothing to Disclose
Carlos S. Restrepo, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Santiago Martinez-Jimenez, MD, Kansas City, MO (*Abstract Co-Author*) Author, Reed Elsevier; Author, Oxford University Press
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Daniel Vargas, MD, Aurora, CO (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To discuss taxonomy and etiopathogenesis of pulmonary artery dissections (PAD) :and intramural hematomas (PIH) To review characteristic multimodality imaging findings

TABLE OF CONTENTS/OUTLINE

Aortic dissection can penetrate the common aortic and pulmonary adventia, occasionally forming PAD and PIH. Limited radiology literature is available on PAD and PIH and only few case reports are published. Not much is known about natural history, etiopathogenesis, and radiological manifestations of PAD and PIH.: A more accurate and precise terminology of PAD is a need of time and is proposed.Cross sectional imaging provides accurate anatomy and morphology with information on etiology, location, mass effect and severity of PAD as well as PIH. Recognizing typical imaging manifestations with adequate clinical correlation is essential for timely and accurate diagnosis as well as guiding treatment. Imaging plays a critical role in the patient management.In this exhibit, we discuss the etiopathogenesis and characteristic multimodality imaging findings of PD. Increased awareness of such entities will contribute to optimized care of cancer patients.Aims/Objectives Introduction Taxonomy Etiopathologenesis Imaging of PAD and PIH Conclusion Teaching points

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/

Carlos S. Restrepo, MD - 2012 Honored Educator
Carlos S. Restrepo, MD - 2014 Honored Educator
Santiago Martinez-Jimenez, MD - 2014 Honored Educator
Santiago Martinez-Jimenez, MD - 2015 Honored Educator

VI182-ED-X

Root at Risk: Primer of Significant Aortic Root Imaging Findings for Non Cardiovascular Imagers

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Mukta D. Agrawal, MBBS, MD, Arlington, MA (*Presenter*) Nothing to Disclose
Sandeep S. Hedgire, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Beth A. Ripley, MD, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Ron Blankstein, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Michael L. Steigner, MD, Boston, MA (*Abstract Co-Author*) Speaker, Toshiba Corporation

TEACHING POINTS

1. Aortic root findings can impact patient outcome and management significantly. Detection of these findings on a non gated study can be challenging for a non cardiovascular imager. 2. High index of suspicion greatly aids detection of these findings. 3. Requesting a repeat gated acquisition often serves as a problem solving tool.

TABLE OF CONTENTS/OUTLINE

Review of imaging spectrum -CT angiography -PET/CT Sample cases that were missed on non gated study by non cardiovascular radiologist. Tips and tricks for avoiding pitfalls.

VI183-ED-X

Management of Massive and Submassive PE: A Primer for Radiologists

All Day Location: VI Community, Learning Center

Participants
Brian Trinh, Chicago, IL (*Presenter*) Nothing to Disclose
Jeremy D. Collins, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Daniel H. Schimmel, MD, Rch Palos Vrd, CA (*Abstract Co-Author*) Nothing to Disclose
Kush R. Desai, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Scott A. Resnick, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Robert L. Vogelzang, MD, Chicago, IL (*Abstract Co-Author*) Consultant, C. R. Bard, Inc
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

TEACHING POINTS

Patients with massive or submassive pulmonary embolism (PE) have extremely high mortality rates, especially when not treated expediently. Novel interventional radiological techniques including catheter-directed therapy (CDT) are constantly being refined to increase the effectiveness of non-invasive clot removal compared with intravenous thrombolysis alone. There are numerous ongoing trials studying the outcomes of CDT in patients with PE. This educational exhibit will summarize current guidelines and clinical trial results to provide a practical algorithm for the radiologist evaluating patients with suspected massive or submassive PE.

TABLE OF CONTENTS/OUTLINE

The exhibit will begin with a brief overview, covering the clinical presentation of PE, the definitions of functional grading systems useful for directing PE treatment, and a list of indications for treating a patient with CDT. It will then summarize the results from recent trials designed to study catheter-directed therapies, and discuss the risk and benefits involved with the contemporary cather-directed techniques. We will present our institution's PE response team management algorithm based on current research and clinical expertise. The exhibit will conclude by reviewing clinical cases from our institution illustrating the utility of catheter-directed thrombolysis and ancillary techniques in PE.

VI184-ED-X

Introduction to Dialysis Access Complications and Interventions

All Day Location: VI Community, Learning Center

Participants
Pratik A. Shukla, MD, New York, NY (*Presenter*) Nothing to Disclose
Marcin K. Kolber, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Jason Teitelbaum, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Abhishek Kumar, MD, Newark, NJ (*Abstract Co-Author*) Nothing to Disclose
James E. Silberzweig, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review complications associated with dialysis access (Central Venous Dialysis Catheters/Arteriovenous Fistula/Graft).To review treatment options for the dialysis access associated complications.

TABLE OF CONTENTS/OUTLINE

A.Permcath Related Complications a.Fibrin Sheath Formation i.Balloon angioplasty ii.Thrombolytic infusionB.Failure to mature a.Balloon assisted maturationC.Venous outflow stenosis a.Balloon angioplasty b.Stent placementD.Arterial inflow stenosis a.Balloon angioplasty b.Stent placementE.Access Thrombosis a.Mechanical catheter assisted thrombectomy b.Rheolytic thrombectomy c.ThrombolysisF.Collateral Vessel Steal a.Collateral Vessel EmoblizationG.Dialysis Associated Steal Syndrome a.Distal radial artery embolization b.MILLER (minimally invasive limited ligation endoluminal assisted revision) banding c.Ulnar Artery Recanalization

VI185-ED-X

Bronchial Artery Embolization for Treatment of Hemoptysis: Our Experience and Correlation with Bronchoscopy and MDCT Findings

All Day Location: VI Community, Learning Center

Participants
Ivan Babin, MD, Syracuse, NY (*Presenter*) Nothing to Disclose
Michael-Isaac Walshon, Syracuse, NY (*Abstract Co-Author*) Nothing to Disclose
Mitchell I. Karmel, MD, Syracuse, NY (*Abstract Co-Author*) Nothing to Disclose
Cole F. Mendenhall, MD, Long Branch, NJ (*Abstract Co-Author*) Nothing to Disclose
Dianbo Zhang, MD, Syracuse, NY (*Abstract Co-Author*) Nothing to Disclose
Katsuhiro Kobayashi, MD, Syracuse, NY (*Abstract Co-Author*) Nothing to Disclose
Mohammed Jawed, MD, Syracuse, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review the etiology, pathophysiology, and classification of hemoptysis.Define normal bronchial artery anatomy, variants, and other frequently involved vessels. Discuss the diagnostic options. While therapeutic bronchoscopy is an indispensible tool in massive hemoptysis, its use as a diagnostic-only tool to localize the site of hemoptysis is controversial. We will correlate angiography findings with bronchoscopy and pre-procedural CT findings and assess their sensitivity. Present diagnostic and management options of hemoptysis, including bronchoscopic, imaging, and surgical options. Describe our experiences with bronchial artery embolization techniques, device selection, and outcomes.

TABLE OF CONTENTS/OUTLINE

Etiology, pathophysiology, and classification of hemoptysis. Review of relevant anatomy. Diagnostic options: Discuss the diagnostic success rates for localization of bleeding via CT and bronchoscopy. Correlation to angiographic findings will be provided. Treatment options: Present data on surgical options, bronchoscopic options - including balloon tamponade, vasoconstrictor injection, laser photocoagulation, electrocautery, and stent placement. Data for long-term outcomes on these options, where available, will be compared to bronchial artery embolization. Bronchial artery embolization technique and device selection. Conclusion.

VI186-ED-X

MDCT of Acute Nonatherosclerotic / Noninflammatory Pathology of the Splachnic Arteries: A Practical Imaging Approach to Aid in Diagnosis and Management

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Daniel Alvarez, MD, Santiago, Chile (*Presenter*) Nothing to Disclose
Jose Gutierrez Chacoff, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Francisca Leiter, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Jorge Ortiz Vega, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Ignacio Maldonado, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Cristian Varela, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Young patient with complaint of abdominal pain and/or gastrointestinal hemorrhage2. Hematoma - Dissection complex (HDC) and focal arterial dilatation (aneurysm/pseudoaneurysm) should be looked for in the acute setting. Luminal irregularity, narrowing and focal dilatation are late manifestations. MDCT frequently shows intestinal or splenic infarction.3. The pathophysiology underlying acute nonatherosclerotic / noninflammatory processes of the splachnic arteries is not completely understood.4. In most cases, pathological correlation is not possible. However, segmental arterial mediolysis and fibromuscular dysplasia should be considered5. Early follow-up imaging (5-7 days after diagnosis) is recommended to look for complications such as focal dilatation or increasing HDC

TABLE OF CONTENTS/OUTLINE

1. Introduction and objectives2. Normal anatomy and histology3. MDCT protocol and signs: Hematoma - Dissection complex (HDC), focal dilatation, luminal irregularity and narrowing4. Pathologic conditions: segmental arterial mediolysis (SAM), fibromuscular displasia (FMD)5. Presentation per artery:a) Celiac trunck: splenic, hepatic and left gastric arteriesb) Superior mesenteric arteryc) Inferior mesenteric artery6. Keys to good reporting7. Management8. MDCT keys for differentiation from systemic inflammatory diseases

VI187-ED-X

Endovascular Management of Persistent Pulmonary Arteriovenous Malformations

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Ahmed K. Abdel Aal, MD, PhD, Birmingham, AL (*Presenter*) Consultant, St. Jude Medical, Inc Consultant, Baxter International Inc Consultant, C. R. Bard, Inc
Amr S. Moustafa, MBBCh, MSc, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Maysoon F. Hamed, MD, MSc, Hoover, AL (*Abstract Co-Author*) Nothing to Disclose
Hesham Attaya, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Souheil Saddekni, MD, Birmingham, AL (*Abstract Co-Author*) Consultant, St. Jude Medical, Inc

TEACHING POINTS

Teaching points: 1- Review the complications of pulmonary arteriovenous malformations. 2- Describe the signs and symptoms of persistent pulmonary arteriovenous malformations. 3- Outline the mechanisms for persistence of pulmonary arteriovenous malformations. 4- Demonstrate different imaging modalities used for the diagnosis of persistent pulmonary arteriovenous malformations. 5- Highlight the technique and embolic agents used for percutaneous transcatheter embolotherapy of persistent pulmonary arteriovenous malformations. 6- Outline the outcomes of percutaneous embolotherapy of pulmonary arteriovenous malformations.

TABLE OF CONTENTS/OUTLINE

Outline: 1- Introduction. 2- Signs and symptoms of persistent pulmonary arteriovenous malformations. 3- Causes of persistence of pulmonary arteriovenous malformations. 4- Diagnosis of persistent pulmonary arteriovenous malformations by different imaging modalities. 5- Endovascular management of persistent pulmonary arteriovenous malformations. 6- Outcomes. 7- Summary and conclusion.

VI188-ED-X

Lymphangiography: What is it Good For? A Pictorial Review Depicting Lymphangiography Techniques and Interventions

All Day Location: VI Community, Learning Center

Participants
Joseph C. DeMarco, DO, Valhalla, NY (*Presenter*) Nothing to Disclose
Joanna Kee-Sampson, MD, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose
Jonathan Schiavi, 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

TEACHING POINTS

Understand the indications for performing a lymphangiogram. Understand the various lymphangiography techniques. Be able to identify normal and variant thoracic duct anatomy for successful treatment.

TABLE OF CONTENTS/OUTLINE

Lymphangiography was first described in the 1950s using a transpedal approach, which was technically difficult and time consuming. Our Educational Exhibit will provide a pictorial review of various older and newer approaches, including tips for successful lymphatic catheterization and thoracic duct embolization.Indications for lymphangiography: Chylothorax due to iatrogenic injury or traumatic injury to the thoracic duct Chylopericardium Postoperative chylous wound leaks Chylous ascites Chyloptysis Chyluria Diagnosing lymphoma/melanomaChoosing method of approach:1. Injection approach: Traditional pedal access Intranodal access2. Cisterna access: Transabdominal approach Retroperitoneal approach Transvenous approach via left subclavian veinIdentifying thoracic duct anatomy: Variants: Based on outflow location, predominantly left-sided, right-sided, or bilateral (duplicated thoracic duct), and plexiform.Lymphatic Interventions: Indications and Contraindications Medical management versus surgical versus IR options Lymphatic disruption versus embolization

VI189-ED-X

Imaging in the Evaluation of Thoracic Outlet Syndrome with Vascular Complication

All Day Location: VI Community, Learning Center

Participants
George C. Dantas, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Ana Graziela S. Anton, MD, Brasilia, Brazil (*Abstract Co-Author*) Nothing to Disclose
Marcelo R. Natal, MD, Brasilia, Brazil (*Abstract Co-Author*) Nothing to Disclose
Rafael L. Nascif, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is explain the role of the different imaging methods in diagnostic and evaluation of Thoracic Outlet Syndrome with vascular complication, providing tools to radiologist conduct these cases.- Thoracic Outlet Syndrome is a compression injury or irritation of neurovascular structures (subclavian artery, subclavian vein and brachial plexus) in cervical and upper thoracic region, which can be done by bone, ligament or muscle anatomical anomalies in the neck and chest higher.- There are three more likely places to compression: interscalene triangle, costoclavicular space, and retropectoralis minor space. - The radiology methods are important to determine the local of compression, the compressed structure and the cause of this.- The radiologist must be able to conduct the exam protocols and know the findings that may be found.

TABLE OF CONTENTS/OUTLINE

1. Review of the anatomy involving the thoracic outlet.2. The use of various imaging techniques (CR, US, MRI and CT) to Identify the normal and abnormal anatomy of the thoracic outlet syndrome.3. Radiological findings in the most common causes of Thoracic Outlet Syndrome with vascular complications.

VI190-ED-X

A How to Guide to Embolization and Sclerosis of Ovarian Varices to Treat Pelvic Congestion Syndrome

All Day Location: VI Community, Learning Center

Participants
Earljay O. Landrito, MD, Houston, TX (*Presenter*) Nothing to Disclose
David M. Wynne, MD, Pearland, TX (*Abstract Co-Author*) Nothing to Disclose
Ketan Y. Shah, MD, BS, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) Define pelvic congestion syndrome2) Review the indications, contraindications, diagnostic imaging, interventional methods, outcomes and potential complications of ovarian vein embolization

TABLE OF CONTENTS/OUTLINE

A. AnatomyB. Pathophysiology of pelvic congestion syndromeC. Clinical Findings: prevalence, symptoms, risk factorsD. Diagnostic Imaging: pelvic and transvaginal ultrasound, CT, and MRI findingsE. Differential Diagnosis: other causes of pelvic congestion and pelvic painF. Indications/contraindications to ovarian vein embolizationG. Procedure: coiling and sclerotherapyH. Outcomes and complicationsI. Follow-up

VI191-ED-X

Challenges in Ultrasound Imaging of Carotid Artery Stenosis

All Day Location: VI Community, Learning Center

Participants
Faezeh Razjouyan, MS, Washington, DC (*Presenter*) Nothing to Disclose
Osvaldo Mercado, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
Bonnie C. Davis, MD, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
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Brittany Bryant, BS, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
Weonpo Yarl, MS, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
Sanchez J. Colo, MBA, Pharm D, Lanham, MD (*Abstract Co-Author*) Nothing to Disclose
Isaac Dodd, Cheverly, MD (*Abstract Co-Author*) Nothing to Disclose
Jonathan Nakata, BS, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
Motahar Basam, BA, Silver Spring, MD (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

At the end of this presentation, participants will be able to: Apply new insights from a summary of the world literature on the use of ultrasound in evaluating normal carotid anatomy with gray-scale, color and duplex Doppler techniques. Describe the potential for human errors and technical artifacts and/or mistakes when acquiring or interpreting carotid ultrasound examinations. Recognize technical limitations that can result in errors in interpretation. Recognize the need for further research in the flow hemodynamics of the carotid artery. Discuss the importance of quality assessment in the accuracy of diagnosing carotid stenosis.

TABLE OF CONTENTS/OUTLINE

Review and summarize the world literature on various imaging modalities used for carotid imaging. Illustrate specific human errors and technical artifacts such as: satisfaction of search, machine tracing of Doppler velocity flow patterns and others. Assess the need for more research and understanding of how to apply hemodynamic principles validated in the carotid bifurcation to other portions of the carotid anatomy. Review limitations of carotid imaging due to color Doppler artifacts. Review recommendations to obtain consistency in reporting carotid sonograms for both structure and content.

VI192-ED-X

Ultrasound Assessment of Chronic Mesenteric Ischemia

All Day Location: VI Community, Learning Center

Awards
Cum Laude

Participants
Abbas Momin, MD, New Haven, CT (*Presenter*) Nothing to Disclose
John S. Pellerito, MD, Manhasset, NY (*Abstract Co-Author*) Nothing to Disclose
Margarita V. Revzin, MD, Wilton, CT (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To familiarize the radiologist with application of ultrasound in assessment of chronic mesenteric ischemia (CMI). This will aid in improving radiologists ability to correctly diagnose this disease and minimize the rate of misdiagnosis and misinterpretation.

TABLE OF CONTENTS/OUTLINE

1. The natural history of CMI, and factors that differentiate it from acute mesenteric ischemia.2. Review of the anatomy and physiology of splanchnic vessels and their collateral circulation.3. Review ultrasound protocols for evaluation of splanchnic arteries with emphasis on utilization of different approaches and modes, and optimization of parameters to improve mesenteric artery assessment.4. Diagnostic criteria for CMI will be summarized with detailed discussion of secondary signs of stenosis. Different examples of two and three vessel stenoses and chronic superior mesenteric artery occlusion with retrograde reconstitution will be provided. 5. Pitfalls in evaluation will be discussed including median arcuate ligament syndrome, nutcracker syndrome, low and high output states, arrhythmia, acute superior mesenteric artery thrombosis, celiac axis dissection and pseudoaneurysm formation, and spontaneous superior mesenteric artery dissection.6. Current management of CMI will be discussed.7. A discussion of follow-up assessment after arterial stenting.

VI193-ED-X

AngioVac: This Thing Sucks. Interventionalist's Guide to Novel Endovascular Thrombectomy Device

All Day Location: VI Community, Learning Center

Participants
Charles H. Li, BS, Los Angeles, CA (*Presenter*) Nothing to Disclose
Jonathan K. Park, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
John M. Moriarty, MD, Los Angeles, CA (*Abstract Co-Author*) Speaker, AngioDynamics, Inc; Consultant, AngioDynamics, Inc; Speaker, Sequent Medical, Inc ; Consultant, Sequent Medical, Inc; Speaker, Argon Medical Devices, Inc ; Consultant, Argon Medical Devices, Inc

TEACHING POINTS

1. The AngioVac thrombectomy device is an exciting and novel tool designed for high-volume aspiration of undesired endovascular material.2. To review the indications and rationale for utilizing the AngioVac venovenous bypass system.3. To guide the reader through the pre-procedural diagnostic imaging, interventional methods, benefits, and potential complications of AngioVac. 4. Real-world case examples will be presented to highlight the technique.

TABLE OF CONTENTS/OUTLINE

A. Overview of the AngioVac device and how it works.B. Review and rationale for patient selection. C. Graphic and radiographic guide to the AngioVac technique. D. Multiple case examples to highlight the variety of indications for AngioVac (including but not limited to caval thrombosis and atrial masses)E. Visual overview of outcomes and complications.

VI194-ED-X

Endovascular Treatment of Cerebral Aneurysms with Flow-Diverter Devices: An Effective Alternative When Surgery, Coils and Conventional Stent Are Not an Option

All Day Location: VI Community, Learning Center

Participants
Roberto Correa Soto, Salamanca, Spain (*Presenter*) Nothing to Disclose
Jose Antonio de las Heras Garcia, Salamanca, Spain (*Abstract Co-Author*) Nothing to Disclose
Francisco Menor, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Roberto Llorens Salvador, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Karin Daniela Muller Campos, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Diego S. Palominos Pose, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

In the endovascular treatment of cerebral aneurysms, in recent years, the Flow-Diverter Devices are positioned as a lasting curative option.The purpose of esta exhibit is:1.- To review the pathophysiology and clinical presentation of cerebral aneurysms.2.- To explain the diagnostic images of cerebral aneurysms.3.- To explain and to review the indications, contraindications, interventional method, images, outcomes, complications and timing of controls, of the Flow-Diverter Devices.

TABLE OF CONTENTS/OUTLINE

A. IntroductionB. AnatomyC. Cerebral Aneurysms - Pathophysiology - Types - Clinical presentation - Diagnostic ImagesD. Treatment OptionsE. Flow-Diverter Devices - Anatomy, mechanics, physiology and biology to achieve aneurysmal occlusion - Indications - Contraindications - Interventional Method - Outcomes - Complications - ControlsF. Representative clinical casesG. Key Points

VI195-ED-X

Computational Fluid Dynamics (CFD) in Aortic Applications - What You Need and What You Get

All Day Location: VI Community, Learning Center

Participants
Martina Roxane Correa Londono, DSc, Bern, Switzerland (*Presenter*) Nothing to Disclose
Sasan Partovi, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Christof Karmonik, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Matthias Muller-Eschner, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Hoegen, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose
Katerina Spranger, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Philipp Erhart, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose
Duanduan Chen, Bejiing, China (*Abstract Co-Author*) Nothing to Disclose
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Paul Morris, Sheffield, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Fernando M. Gomez, MD, PhD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Fabian Rengier, MD, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose
Hendrik Von Tengg-Kobligk, MD, Bern, Switzerland (*Abstract Co-Author*) Research Grant, W. L. Gore & Associates, Inc

TEACHING POINTS

To describe a typical workflow and how to perform computational fluid dynamics (CFD). To review cases in the field of cardiovascular medicine with special focus on thoracic and abdominal aorta. To highlight how to interpret the hemodynamic results of CFD simulations. To summarize the potential of CFD for personalized medicine in daily use.

TABLE OF CONTENTS/OUTLINE

1. Toolbox for computational fluid dynamics (CFD). A. Segmentation and discretization by a 3D mesh. B. Simulation and post processing. C. The relevance of boundary conditions to the model as well as major limitations of boundary conditions and CFD models. D. Interpretation of hemodynamic results.2. Application to the main aortic pathologies. A. Aortic dissection. B. Aneurysms of the thoracic and/or abdominal aorta.3. Conclusion.

VI196-ED-X

Track Plugging after Percutaneous Imaging-guided Core Needle Biopsy of Solid Tumors: Reducing Bleeding Risk in Cancer Patients

All Day Location: VI Community, Learning Center

Awards

RSNA Country Presents Travel Award

Participants

Eunice A. Lara Garcia, MD, Mexico City, Mexico (*Presenter*) Nothing to Disclose
Carlos E. Rojas Marin, MD, Mexico, Mexico (*Abstract Co-Author*) Nothing to Disclose
Ricardo Becerra Ulloa, MD, Mexico City, Mexico (*Abstract Co-Author*) Nothing to Disclose
Arturo Garcia Martinez, Mexico City, Mexico (*Abstract Co-Author*) Nothing to Disclose
Edwin G. Belalcazar Bolanos, MD, Mexico City, Mexico (*Abstract Co-Author*) Nothing to Disclose
Fabian A. Cabrera-Florez, MD, Mexico City, Mexico (*Abstract Co-Author*) Nothing to Disclose
Beatriz E. Retamoza, MD, Mexico City, Mexico (*Abstract Co-Author*) Nothing to Disclose
Jose Vazquez Flores, MD, Morelia, Mexico (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Describe the biopsy technique regarding localization of the tumor taking into account relevant anatomical considerations Illustrate the embolization technique: all about the embolic agent and how to use it.

TABLE OF CONTENTS/OUTLINE

1.Introduction2.Patient preparation and lesion localization: general considerations3.Main anatomical considerations and how to perform percutaneous core needle biopsy for solid neoplasms in: Thorax: lung, mediastinum, pleura Abdomen: liver, spleen and peritoneum Retroperitoneal: pancreas, adrenal, spleen and other retroperitoneal lesions Pelvic cavity: Ovarian, para rectal, pre sacral Musculoskeletal4.Embolization: how to prepare the embolic agent, how much to use and what to expect5.Conclusions

VI198-ED-X

Ultrasound-Guided Intervention Enhanced: How to Improve Success Rate and Avoid Complication with the Use of Ultrasound Contrast Agent

All Day Location: VI Community, Learning Center

FDA Discussions may include off-label uses.

Awards
Cum Laude

Participants
Dean Y. Huang, FRCR, London, United Kingdom (*Presenter*) Nothing to Disclose
Mohammad Daneshi, MBBS, FRCR, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Gibran Yusuf, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Raymond Ramnarine, MBBS, FRCR, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Maria E. Sellars, MD, FRCR, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Paul S. Sidhu, MRCP, FRCR, London, United Kingdom (*Abstract Co-Author*) Speaker, Bracco Group; Speaker, General Electric Company

TEACHING POINTS

Ultrasonography is a proven technology in intervention. Ultrasound contrast agent (UCA) improves its imaging to the level of other enhanced modalities. However, to justify its use in interventional procedures, it is useful to attain clarity about where its use could potentially improve outcome. The aim of the exhibit is to familiarise learners with the evolving application of UCA in US-guided procedures, and to illustrate how use of UCA could improve success rate and reduce complications.

TABLE OF CONTENTS/OUTLINE

To provide illustration of a spectrum of routinely performed US-guided procedures where use of UCA could be rewarding: A. Drainage: For targeting septated intra-hepatic, pelvic and sub-capsular renal abscess. B.'US tubograms' for precise information on drain position and extent of collection. C. Biopsy: For visualization of vascular tissue within necrotic lesions, and avascular scar in native and transplant renal biopsy. D. Nephrostomy: For calyceal and needle visualization. E. 'US nephrostograms': for drain position and imaging of ureteric stricture, urinoma or rare ureteroenteric fistula. F. Tumor ablation: For tumor visualization and response monitoring. G. Macro-vascular imaging: For detection and management of complications such as extravasation and pseudo-aneurysm at puncture site and in dialysis fistula intervention.

VI199-ED-X

A CT-based Step-by-Step Approach for Vasculitis and Vasculitis Mimics on the Basis of the 2012 Revised International Chapel Hill Consensus Conference Nomenclature

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
Jee Hye Hur, MD, Gyeonggi-Do, Korea, Republic Of (*Presenter*) Nothing to Disclose
Yeo Koon Kim, Seongnam-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sang Il Choi, MD, Seongnam-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Ju Chun, MD, PhD, Seongnam-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyon Joo Kwag, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To introduce the 2012 revised International Chapel Hill Consensus Conference (CHCC) nomenclature of vascultides (Vts) 2. Besides the clinical and lab-findings, CT is useful to diagnose Vts, because it can evaluate not only the lumen but the vessel wall and perivascular structure 3. On the CT-based step-by-step approach, we can diagnose Vts 4. Vts mimics need to be differentiated from vasculitis, because of the different treatment

TABLE OF CONTENTS/OUTLINE

1. Overview of the 2012 CHCC nomenclature of Vts2. Clinical and lab-based approach for patients with suggestive Vts3. Imaging-based approach Step 1] Approach to the involved vessel size, location and extent - Large vessel Vts; Takayasu arteritis - Medium vessel Vts; Kawasaki disease, Polyarteritis nodosa - ANCA-associated small vessel Vts: Wegener granulomatosis, Churg-Strauss syndrome - Variable vessel Vts: Behcet disease, Cogan syndrome - Frequent location for specific Vts Step 2] Key findings of the specific Vts Step 3] Presence of the associated systemic disease: IgG-related disease, rheumatoid, etc. Step 4] To exclude the Vts mimics: fibromuscular dysplasia, segmental arterial mediolysis, Marfan syndrome, Loeys-Dietz syndrome, etc.4. Potential role of CT for Vts as compared to other imaging modalities5. Summary table

VI200-ED-X

Adrenal Vein Sampling: How to Success in Difficult Cases. How to Solve the Problems.

All Day Location: VI Community, Learning Center

Awards
Certificate of Merit

Participants
Sota Oguro, Tokyo, Japan (*Presenter*) Nothing to Disclose
Seishi Nakatsuka, MD, Shinjuku-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Masanori Inoue, MD, Shinjuku-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Hideki Yashiro, MD, Shinjuku-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Jitsuro Tsukada, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Masashi Tamura, Shinjuku-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Yosuke Suyama, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Nobutake Ito, MD, Yokohama, Japan (*Abstract Co-Author*) Nothing to Disclose
Masahiro Jinzaki, MD, Tokyo, Japan (*Abstract Co-Author*) Support, Toshiba Corporation; Support, General Electric Company

TEACHING POINTS

1. To understand how to perform the pre-procedural dynamic CT to find the right adrenal vein, and how to prepare the procedure using pre-procedural dynamic CT image. 2. To learn which pre-shaped catheter should be used for various location and angle of the right adrenal vein from review on 450 successful procedures. 3. Learn how to find the location of the right adrenal vein when it was not catheterized after search using several different pre-shaped catheter. 4. How to perform and interpretate CT during arteriography. 5. To learn pit falls and solutions of catheterization of left adrenal vein.

TABLE OF CONTENTS/OUTLINE

To describe and illustrate a comprehensive review of adrenal vein sampling.Table of Contents/Outline: Introduction Diagnosis and Imaging of primary aldosteronism Anatomy of right adrenal vein on pre-procedural dynamic CT How to perform CT during arteriography from the right inferior phrenic artery, the right middle adrenal artery and the right inferior right adrenal artery Assessment of the right adrenal vein on CT during arteriography How to choose a pre-shaped catheter using the information of CT images based on 450 successful procedures. How to deal with the cases which can hardly be drawn the blood sample from the catheter. Pit falls of catheterization of left adrenal vein and solutions.

VI201-ED-X

Spectrum Analysis and Qualitative Evaluation of Takayasu Arteritis (TA) Using 256-Slice Dual Source Multi Detector CT Angiography (MDCTA): A Pictorial Essay

All Day Location: VI Community, Learning Center

Participants
Richa Tiwari, MD, New Delhi, India (*Presenter*) Nothing to Disclose
Amit K. Verma SR, MBBS, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Ruchi Gupta, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Sonali Sethi, MBBS, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Meenakshi Prakash, MD, MBBS, Ranchi, India (*Abstract Co-Author*) Nothing to Disclose
Poonam Narang, MBBS, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

MDCTA with low dose imaging protocols is good enough to evaluate the involvement of systemic, pulmonary and coronary arteries. The spectrum of vascular involvement and mural changes correlate with clinical status and disease activity that predict the possible outcome. The important features of disease a vascular surgeon looks for in a CTA report should be emphasized

TABLE OF CONTENTS/OUTLINE

Introduction and pathological basis of the disease. Clinical presentation of the disease. MDCTA: low dose optimum imaging protocol role in evaluation of Takayasu arteritis Diagnostic criterion and spectrum of vascular involvement Other imaging modalities with pros and cons CTA report: points to be included

VI202-ED-X

Peripheral Pseudoaneurysm: Imaging Perspective with Focus on Multidetector CT Angiography (MDCTA)

All Day Location: VI Community, Learning Center

Participants
Ruchi Gupta, MD, New Delhi, India (*Presenter*) Nothing to Disclose
Amit K. Verma SR, MBBS, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Richa Tiwari, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Sonali Sethi, MBBS, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Meenakshi Prakash, MD, MBBS, Ranchi, India (*Abstract Co-Author*) Nothing to Disclose
Dipali Shah, MD, Ahmedabad, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Peripheral arterial psuedoaneurysms although uncommon but constitute important spectrum of peripheral vascular abnormality with significant morbidity. The purpose of exhibit is:To elucidate the role of MDCT in evaluation of peripheral pseudoaneurysm.To delineate spectrum of disease with special emphasis on the imaging findings in surgeon's perspective.

TABLE OF CONTENTS/OUTLINE

Introduction, prevalance and etiology. Pathophysiology and clinical spectrum of presentation. MDCTA- Optimum imaging protocol with minimal radiation dose. Role in evaluation of peripheral pseudoaneuryms. Comparative description of other imaging modalities. Highlight using case based approach, imaging findings and spectrum of the disease. Reporting format.

VI203-ED-X

Median Arcuate Ligament Syndrome: Role of CTA in Diagnosis and Management

All Day Location: VI Community, Learning Center

Participants
Xiao-Mei Zhong, Guangzhou, China (*Presenter*) Nothing to Disclose
Hui Liu, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Sachin S. Saboo, MD, FRCR, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Hai-Ying Luo, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Sachin S. Pathak, MD, MBBS, Kalyan, India (*Abstract Co-Author*) Nothing to Disclose
Jiajun Xie, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yu-Hsiang Juan, MD, Taoyuan, Taiwan (*Abstract Co-Author*) Nothing to Disclose
Chang Hong Liang, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Median arcuate ligament syndrome(MALS) is rare but with characteristic imaging findings. CT angiography is preferred method for its diagnosis with the end expiratory abdominal CT angiographic study being more useful test.

TABLE OF CONTENTS/OUTLINE

Anatomy, pathogenesis and clinical presentation of MALS. Discuss the role of different imaging techniques like conventional angiography, Doppler ultrasound, CT Angiography and MR Angiography with major emphasis on CTA for its initial evaluation and post-treatment follow up. Describe imaging findings of MALS on CT Angiography with its 3D imaging. Managementof MALS.

VI205-ED-X

Focal Therapy for a Focal Disease. Treatment of Locally Non-advanced Prostate Cancer with 3T Magnetic Resonance Guided High Intensity

All Day Location: VI Community, Learning Center

Participants
Maurizio Del Monte, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Alessandro Napoli, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Gaia Cartocci, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Fabrizio Boni, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carola Palla, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1.To evaluate feasibility and safety of MRgFUS treatment of low risk organ-confined prostate cancer in patients indicated to Radical Prostatectomy. 2.To discuss the role of MR imaging findings after treatment, correlating them with clinical and histologic findings.

TABLE OF CONTENTS/OUTLINE

1. State of the art in focal therapy of organ-confined prostate cancer2. Patient selection3. MRgFUS system anatomy, physiology and overview of current application. 4. MRI pre-treatment planning to evaluate size, accessibility and viability of prostate lesion5. Post-treatment MRI and pathological correlation 6. Analysis of surgical morbidity associated with previous MRgFUS treatment

VI206-ED-X

Extreme TIPS: Survival Guide and Pictorial Gallery

All Day Location: VI Community, Learning Center

Participants
Jason C. Ni, MS, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Jonathan K. Park, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Win Phyu, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Justin P. McWilliams, MD, Santa Monica, CA (*Abstract Co-Author*) Nothing to Disclose
Stephen T. Kee, MD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Edward W. Lee, MD, PhD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Transjugular portosystemic intrahepatic shunts (TIPS) are commonly performed for portal hypertension, however can be complicated when faced with scenarios such as portal venous thrombosis. Furthermore, TIPS commonly require modification for complications such as hepatic encephalopathy. The aims of this exhibit are as follows.2. To review various techniques of performing the complicated TIPS. Techniques include but are not limited to transsplenic, transhepatic, and transvariceal access to facilitate portal venous reconstruction and TIPS.3. To guide the reader through novel interventional techniques in performing TIPS reductions and modifications.4. Real-world case examples will be presented to highlight the various techniques.

TABLE OF CONTENTS/OUTLINE

A. Overview of the extreme TIPS indications and techniques with graphic and radiographic guide. B. Multiple case examples to highlight the variety of techniques C. Visual overview of outcomes and complications.

VI207-ED-X

Planning for Transcatheter Aortic Valve Replacement: What Should Radiologists Know for CT Reporting

All Day Location: VI Community, Learning Center

Participants
Daisuke Utsunomiya, MD, Kumamoto, Japan (*Presenter*) Nothing to Disclose
Seitaro Oda, MD, 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
Yoshinori Funama, PhD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Takeshi Nakaura, MD, Amakusa, 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

TEACHING POINTS

The purpose of this exhibit is:1. To review the clinical indication and influence of transcatheter aortic valve replacement (TAVI) as an important therapeutic strategy for aortic stenosis (AS) in high-risk patients 2. To explain the appropriate planning by using cardiac CT for safe and effective TAVI procedure 3. To demonstrate the essential CT findings and pitfalls for TAVI planning

TABLE OF CONTENTS/OUTLINE

Clinical indication of TAVI -Symptomatic old patients with severe AS -Normal tricuspid valveCT scan and contrast injection protocol -Variable-pitch technique -Dual regions-of-interest technique for target attenuation -Low-dose contrast doseAppropriate 3D reconstruction image -Oblique multiplanar reformation and 4D volume rendering (VR) images -VR and maximum intensity projection of aorta -Curved planar reformation of access routeCT evaluation for TAVI planning -Evaluation of valve shape: tricuspid- vs bicuspid valve -Basal ring measurement: oval-shape "virtual annulus" -Valsalva sinus: deep vs shallow -Degree and distribution of calcification -Simulated C-arm angle -Access route evaluation: calcification, diameter, tortuousityComplications -Malposition, migration -Leak -Annulus rupture (flank- and contained rupture) -Myocardial ischemia due to obstructed coronary ostium

VI208-ED-X

Advanced Imaging Techniques in Improving Image Quality of CT Angiography

All Day Location: VI 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
Theodore Lau, Melbourne, Australia (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

CT angiography (CTA) has been established as the first line imaging modality for evaluation of vascular anatomy and pathology, including stenosis, occlusion, thrombo-embolism, aneurysm, dissection, endoleak and bleed. CT image quality is described in terms of contrast, spatial resolution, image noise, and artifacts. Vessel wall calcification may cause beam-hardening artifact obscuring the vessel lumen. The aim of this exhibit is to assess several latest imaging techniques that can improve the diagnostic utility of CTA.

TABLE OF CONTENTS/OUTLINE

Lowering kVp for better luminal contrast visualization and ECG-gating to remove pulsation artifact have been established techniques for CTA improvement. Latest techniques include: a) model-based iterative reconstruction to reduce image noise and calcium blooming artifact, b) utilization of fine-focal spot in x-ray tube to improve vessel wall clarity and reduce calcium artifact by minimizing the penumbra effect of x-ray, c) dual energy to optimize contrast opacification by lowering keV and to remove calcium and metal artefacts, and d) single photon metal artifact reduction technique to remove metal artifact from coils, clips and adjacent prosthesis. These latest imaging techniques are shown to improve the diagnostic quality of CTA, and therefore, enhance the accuracy of vascular pathology assessment.

VI209-ED-X

256 Slice Dual Source CT Angiography of Acute and Chronic Aortic Syndrome - What A Surgeon Wants to Know???

All Day Location: VI Community, Learning Center

Participants
Sonali Sethi, MBBS, MD, New Delhi, India (*Presenter*) Nothing to Disclose
Sunil Kumar Puri, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Amit K. Verma SR, MBBS, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Richa Tiwari, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Ruchi Gupta, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Meenakshi Prakash, MD, MBBS, Ranchi, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

MDCT is the gold standard technique for pre and post operative assessment of aortic pathologies. The exhibit aims to highlight the role of MDCT in a setting of acute and chronic aortic syndromes for the detection, classification and the pre and post surgical assessment of the same.

TABLE OF CONTENTS/OUTLINE

Embryology, anatomy of aorta and its branches. Optimal CT angiography technique: low dose protocols, including role of ECG gating and post processing techniques. Classification of acute and chronic aortic syndromes (aortic aneurysms, acute aortic dissection, intramural hematoma and penetrating atherosclerotic ulcers) Definition, etiological, morphological and anatomical classification of aortic aneurysms. Aneurysms vs pseudoaneurysms. Features of rupture, impending rupture and related complications. Indications for repair. Reporting checklist from a surgeon's perspective. Post -operative imaging-grave signs not to be missed. Identification of the mimics and pitfalls in imaging- ductus diverticulus and aortic spindle.

VI210-ED-X

Paravertebral Block: A Primer for Interventional Radiologist

All Day Location: VI Community, Learning Center

Participants
Mehran Midia, MD, Burlington, ON (*Presenter*) Nothing to Disclose
Dyda Dao, Hamilton, ON (*Abstract Co-Author*) Nothing to Disclose
Juan Jose Cimapi Dopazo, MD, Toledo, Spain (*Abstract Co-Author*) Nothing to Disclose
Ramin Midia, MD, Topeka, KS (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Teaching Point:1- To review paravertebral neural anatomy 2- To review technique, indications and complications of paraverterbal block

TABLE OF CONTENTS/OUTLINE

This eduction exhibit reviews;1- Relevant anatomy and physiology and sensory innervation in chest and abdomen 2- Historical perspective of paravertebral block 2- Indication and contraindications for PVB3- PVB techniques 4- Efficacy of PVB5- PVB complications and their management

VI211-ED-X

Tumor Microenviroment and Strategies to Improve Drug Delivery in Interventional Radiology

All Day Location: VI Community, Learning Center

Participants
Mehran Midia, MD, Burlington, ON (*Presenter*) Nothing to Disclose
Hakan Akbulut, MD, PhD, Ankara, Turkey (*Abstract Co-Author*) Nothing to Disclose
Hamidreza Faraji, MD, FRCPC, Hamilton, NU (*Abstract Co-Author*) Nothing to Disclose
Dyda Dao, Hamilton, ON (*Abstract Co-Author*) Nothing to Disclose
Ramin Midia, MD, Topeka, KS (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1- Review tumor microenviroment 2- Review the implication of tumor microenviroemnt on efficacy of interventional oncology ((IO) treatment3- Review of strategies to improve drug delivery in IO

TABLE OF CONTENTS/OUTLINE

This educational Exhibit Reviews:1- Tumor microenviromenta- Hypoxiab-Acidosis2- Barriers to drug deliverya- Abnormal tumor vascular systemb- Deregulated composition of the extracellular matrixc- Interstitial hypertension (elevated interstitial fluid pressure)3- Strategies for more effective Drug Delivery in IOa- Vascular normalizationb- Solid state alleviationc- Tumor penetrating peptides4- Future direction and summary

VI256-ED-X

Ultrasound Immersion Week: An Innovative Approach of Instruction for Medical Students in Ultrasound

All Day Location: VI Community, Learning Center

Participants
Varun Rachakonda, MD, Houston, TX (*Presenter*) Nothing to Disclose
Roshon Amin, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Manickam Kumaravel, MD, FRCR, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

At the end of this exhibit, the readers would learn: A method of creating an intensive ultrasound curriculum by designing a program 'Ultrasound Immersion Week' aimed specifically at medical students A method for measuring effectiveness of the program Application of this methodology for various audiences in different institutions

TABLE OF CONTENTS/OUTLINE

Overview of ultrasound training for medical students. Current status and gaps in instruction. Presention of our curriculum for 2nd year medical students curriculum in ultrasound at our institution including instrumentation, anatomy, and ultrasound guided interventional procedures using phantoms Program overview of Ultrasound Immersion Week including teaching methodology, curriculum, pre- and post- Immersion Week assessments of skills and knowledge Medical student ultrasound competition Medical student and resident satisfaction surveys Discussion of how to replicate this experience at other institutions Training radiology resident volunteers to teach medical students basic ultrasound techniques/principles Ultrasound machines, human models, and phantom models Creation of low-cost homemade phantom models to demonstrate ultrasound guided interventional procedures

SPSP01

Diagnóstico Precoz por Imagen en la Población el CIR: Sesión del Colegio Interamericano de Radiología (CIR) en Español/Population based Preventive Imaging from CIR: Session of the Interamerican College of Radiology (CIR) in Spanish

Saturday, Nov. 28 1:00PM - 5:00PM Location: E451A

BR CH GI NR VA HP

AMA PRA Category 1 Credits ™: 3.75
ARRT Category A+ Credits: 4.00

Participants
Pablo R. Ros, MD, PhD, Cleveland, OH (*Moderator*) Medical Advisory Board, Koninklijke Philips NV; Medical Advisory Board, KLAS Enterprises LLC; Medical Advisory Committee, Oakstone Publishing; Departmental Research Grant, Siemens AG; Departmental Research Grant, Koninklijke Philips NV; Departmental Research Grant, Sectra AB; Departmental Research Grant, Toshiba Corporation
Miguel E. Stoopen, MD, Mexico City, Mexico (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the state-of-the-art of population based preventive imaging 2) To discuss preventive imaging approaches in all major organ systems and key pathologies, ranging from dementia, cardiovascular disease, colon, liver, lung and breast cancer 3) To illustrate the use of different imaging technologies in preventive imaging such as CT, MRI and ultrasound

Sub-Events

SPSP01A Introducción/Introduction

Participants
Dante R. Casale Menier, MD, Ciudad Juarez, Mexico (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSP01B Parte 1/Part 1

Participants

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSP01C Presentación de Ponentes/Panel Introduction

Participants
Pablo R. Ros, MD, PhD, Cleveland, OH (*Presenter*) Medical Advisory Board, Koninklijke Philips NV; Medical Advisory Board, KLAS Enterprises LLC; Medical Advisory Committee, Oakstone Publishing; Departmental Research Grant, Siemens AG; Departmental Research Grant, Koninklijke Philips NV; Departmental Research Grant, Sectra AB; Departmental Research Grant, Toshiba Corporation

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSP01D Colon: La Colonografía Virtual: ¿Un Método de Escrutinio en la Poblacion?/Colon: Virtual Colonography: A Population Screening Tool?

Participants
Jorge A. Soto, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under 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/

Jorge A. Soto, MD - 2013 Honored Educator
Jorge A. Soto, MD - 2014 Honored Educator
Jorge A. Soto, MD - 2015 Honored Educator

SPSP01E Cardiovascular: Cribaje de Enfermedad Cardiovascular por Imagen Medica/Cardiovascular: Diagnostic Imaging in Cardiovascular Screening

Participants

Carlos S. Restrepo, MD, San Antonio, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under 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/

Carlos S. Restrepo, MD - 2012 Honored Educator
Carlos S. Restrepo, MD - 2014 Honored Educator

SPSP01F Neurología: Diagnóstico Temprano de Demencias: ¿Dónde Estamos?/Neurology: Dementia Early Diagnosis: Where Are We?

Participants
Carlos Zamora, MD,PhD, Chapel Hill, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Objetivos: 1) Comprender conceptos clínicos básicos para el diagnóstico de los síndromes principales de demencia. 2) Reconocer características anatómicas y metabólicas fundamentales de neuroimagen en los síndromes principales de demencia, con especial atención a enfermedad de Alzheimer. 3) Explorar direcciones futuras y desafíos para el diagnóstico temprano. Learning objectives: 1) Understand basic clinical concepts for the diagnosis of major dementia syndromes. 2) Recognize fundamental anatomic and metabolic neuroimaging features of major dementia syndromes, with special focus on Alzheimer's disease. 3) Explore future directions and challenges for early diagnosis.

SPSP01G Parte II/Part II

Participants

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSP01H Presentación de Ponetes/Panel Introduction

Participants
Miguel E. Stoopen, MD, Mexico City, Mexico (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSP01I Mama: Rol de la RM en el Cáncer de Mama en Mujeres de Alto Riesgo/Breast: Role of MR in High Risk Breast Cancer Patients

Participants
Linei A. Urban, Curitiba, Brazil (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSP01J Pulmón: TC de Cribaje en Cancer de Pulmon: ¿Debe Hacerse en Fumadores y Exfumadores?/Lung: Lung Cancer CT Screening: Should It Be Performed in Smokers and Former Smokers?

Participants
Claudio S. Silva Fuente-Alba, MD, MSc, Santiago, Chile, (csilvafa@alemana.cl) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSP01K Hígado: Cribaje del Hepatocarcinoma en Pacientes de Riesgo: ¿Cómo Hacerlo y a Quién Incluir?/Liver: Hepatocellular Carcinoma Screening in High Risk Patients: How and Whom?

Participants
Carmen Ayuso, MD,PhD, Barcelona, Spain, (cayuso@clinic.ub.es) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Definir la población en riesgo de desarrollar un carcinoma hepatocelular que debe ser incluida en un programa de cribado. 2) Analizar la mejor estrategia para llevar a cabo el cribado del hepatocarcinoma en la población en riesgo de padecerlo. 3) Discutir la conducta a seguir una vez que se detecta un nódulo hepático en pacientes incluidos en un programa de cribado.1) To define the population at risk of hepatocellular carcinoma to be included in a surveillance program. 2) To analyze the best strategy for

surveillance in patients at risk of hepatocellular carcinoma. 3) To discuss how to proceed when a liver ndule is detected in patients on surveillance

SPSP01L Comentarios Finales y Clausura/Closing Remarks

Participants
Dante R. Casale Menier, MD, Ciudad Juarez, Mexico (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

SSA17

Neuroradiology/Head and Neck (Vascular Disease of the Head and Neck)

Sunday, Nov. 29 10:45AM - 12:15PM Location: N227

HN NR VA MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Mahmud Mossa-Basha, MD, Seattle, WA (*Moderator*) Research support, General Electric Company

Sub-Events

SSA17-01 The CTA Rim Sign: Calcification Pattern Predicts Carotid Intraplaque Hemorrhage

Sunday, Nov. 29 10:45AM - 10:55AM Location: N227

Participants
Laura B. Eisenmenger, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose
Joseph S. McNally, MD, PhD, Salt Lake City, UT (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Carotid intraplaque hemorrhage (IPH) is associated with a high risk of future stroke. The gold standard for IPH detection is MRI with heavily T1-weighted sequences. This study was undertaken to determine essential CTA imaging predictors of carotid IPH.

METHOD AND MATERIALS

In this IRB-approved retrospective cross sectional study, 172 patients (244 carotid arteries) were studied having undergone carotid disease workup with both MRA and CTA from 2009-present. IPH was detected with the Magnetization Prepared Rapid Acquisition Gradient-recalled Echo (MPRAGE) sequence. CTA predictors included the presence or absence of calcification, type of calcification (rim, adventitial or bulky), percent diameter stenosis, mm stenosis, maximum plaque thickness, ulceration, and intraluminal thrombus. Clinical covariates included age, male sex, diabetes, hypertension, hyperlipidemia and body mass index. Cardiovascular medication confounders included antihypertension, antiplatelet, anticoagulation and statin medication classes. A mixed effects multivariable Poisson regression model was used accounting for 2 vessels per patient. A backwards-elimination method was used to determine the final model, in which prevalence ratios were reported and all remaining predictors had a p<.10. ROC analysis was used to determine discriminatory power measured by area under the curve (AUC).

RESULTS

The final model for carotid IPH prediction included the rim sign (prevalence ratio, PR=8.6, p<.001, 95%CI: 4.0,18.5) and maximum plaque thickness (PR=1.2, p=.001, 95%CI: 1.1,1.4). In the final model, no other imaging criteria were significant predictors of IPH. The discriminatory value of the final model was extremely high (AUC=93.9%), significantly higher than the rim sign alone (86.1%, p<.001), thickness alone (85.2%, p<.001), NASCET stenosis (78.4%, p<.001), mm stenosis (77.7%, p<.001) or ulceration (71.0%, p<.001).

CONCLUSION

The carotid CTA rim sign is highly predictive of carotid IPH.

CLINICAL RELEVANCE/APPLICATION

Because most patients undergoing acute stroke workup receive lumen imaging with CTA, MRI is often not performed and IPH is ignored. The CTA rim sign and maximum plaque thickness allow high discrimination of carotid IPH. Future prospective studies may be envisioned to determine if the rim sign indicates a higher future stroke risk.

SSA17-02 Clinical Risk Prediction Models for the Identification of Patients with High-Risk Carotid Plaque

Sunday, Nov. 29 10:55AM - 11:05AM Location: N227

Participants
Navneet Singh, MD, Toronto, ON (*Presenter*) Nothing to Disclose
Alan R. Moody, MD, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Kush Kapur, PhD,MENG, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

High-risk carotid plaque containing intraplaque hemorrhage predicts stroke, however, it is not yet routinely screened for in practice. We aimed to develop cross-validated clinical models to identify patients at risk of high-risk carotid plaque.

METHOD AND MATERIALS

Between 2003 and 2014, 1862 suspected neurovascular disease patients had MRI. High-risk carotid plaque was defined by presence of intraplaque hemorrhage on 3D T1w GRE black-blood MRI, a sequence routinely included in our institutional neurovascular MRI protocol. Using derivation and validation cohorts with 931 patients each, two risk-prediction logistic regression models considering 11 risk factors, with and without inclusion of stenosis grade, were developed. Receiver-operator characteristic curves were used to compare discriminatory ability of these two models.

RESULTS

The overall prevalence of high-risk carotid plaque was 19.3% (359/1862). Patients with high-risk carotid plaque could be identified

using age, sex, hypercholesterolemia, and peripheral vascular disease (AUC 0.781, 95% CI 0.747 to 0.815). Optimal threshold sensitivity and specificity was 81.8% and 62.4%, respectively. The addition of carotid stenosis grade improved discrimination of patients (AUC 0.826, 95% CI 0.795 to 0.856), and improved optimal threshold specificity to 72.8% without a significant change in sensitivity.

CONCLUSION

Patients prone to high-risk carotid plaque, containing intraplaque hemorrhage, may be identified using a simple clinical risk prediction model of cardiovasacular risk-factors and carotid stenosis grade.

CLINICAL RELEVANCE/APPLICATION

The model provides an opportunity for targeted carotid MRI screening in patients not already undergoing neurovascular MRI, but external validation studies are required.

SSA17-03 Identification of the Vulnerable Carotid Plaque Using Dynamic Contrast Enhanced Ultrasound

Sunday, Nov. 29 11:05AM - 11:15AM Location: N227

Participants
Brahman Dharmarajah, MBBS, MRCS, London, United Kingdom (*Presenter*) Nothing to Disclose
Michalakis A. Averkiou, PhD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Damianos Christofides, MSc, Nicosia, Cyprus (*Abstract Co-Author*) Nothing to Disclose
Ankur Thapar, MBBS, MRCS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Alun Davies, FRCR, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Edward Leen, MD, FRCR, London, United Kingdom (*Abstract Co-Author*) Equipment support, Koninklijke Philips NV Equipment support, General Electric Company Equipment support, SuperSonic Imagine Research Consultant, General Electric Company Speakers Bureau, Bracco Group Speakers Bureau, Koninklijke Philips NV Speakers Bureau, AngioDynamics, Inc Speakers Bureau, General Electric Company

PURPOSE

Carotid atherosclerosis is implicated in 15-20% of all strokes. Dynamic contrast enhanced ultrasound (DCEUS) is a simple adjunct to color Doppler ultrasound for the assessment of carotid atherosclerosis. It has been identified that DCEUS can demonstrate perfusion within carotid plaques of greater than 50% stenosis with some differentiation observed between symptomatic and asymptomatic patients. In this study the perfusion of carotid plaques is evaluated both qualitatively and quantitatively to evaluate carotid perfusion of symptomatic and asymptomatic patients.

METHOD AND MATERIALS

After ethical approval, the carotid arteries of 24 patients were imaged using the L9-3 probe of the Philips iU22 ultrasound platform. Patients were injected with a bolus of 2ml of Sonovue with subsequent dynamic phase imaging acquisitionOffline blinded analysis was performed using DICOM data transferred to QLAB commercial analysis software. Qualitative perfusion assessment used binary grading: 0 represented less than 50% of carotid plaque area contained moving microbubbles and 1 represented more than 50% of carotid plaque area contained moving microbubbles. Static refelectors were not considered as valid microbubble signal.For quantitative DCEUS analysis, a region-of-interest (ROI) was drawn around the plaque. Plaques were delineated from the lumen signal to remove potentially large amplitude differences between the plaque and lumen signal intensity. A time intentisity curve (TIC) was derived from the dynamic phase ROI signal with mean plaque intensity signal calculated from the TIC.

RESULTS

The qualitative analysis results showed that 75% (9/12) of asymptomatic patients had >50% carotid plaque perfusion in comparison to only 33% (4/12) of symptomatic patients. After quantitative image analysis, the mean DCEUS intensity signal from the TIC of the carotid plaques was again significantly higher for asymptomatic patients than symptomatic patients ($P<0.05$).

CONCLUSION

Contrary to previous studies, this study suggests that patients with greater carotid plaque perfusion are more likely to have an asymptomatic carotid symptom status where as those with reduced perfusion are more likely to be symptomatic from their carotid disease.

CLINICAL RELEVANCE/APPLICATION

In patients with greater than 50% carotid stenosis, reduced plaque perfusion on DCEUS may represent vulnerable, symptomatic carotid atherosclerosis.

SSA17-05 Advanced Atherosclerotic Disease with Intraplaque Hemorrhage is Present in Non-Stenotic Carotid Arteries of Diabetic Patients

Sunday, Nov. 29 11:25AM - 11:35AM Location: N227

Participants
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PURPOSE

Diabetic patients have an increased risk of ischemic cerebrovascular events with worse outcomes than the non-diabetic population. Carotid artery stenosis currently stratifies patient risk but, even without significant stenosis, intraplaque hemorrhage (IPH) may predict cerebrovascular events. We report the prevalence of IPH in an asymptomatic diabetic population without carotid artery stenosis, using 3-dimensional (3D) magnetic resonance imaging (MRI) and investigate its association with carotid artery wall

volume.

METHOD AND MATERIALS

Patients were recruited from a prospective dietary trial between 2010 and 2013, with a carotid intima-media thickness (IMT) > 1.2mm and non-stenotic carotid arteries on ultrasound. All were asymptomatic type 2 diabetic patients who underwent baseline 3D T1-weighted black blood imaging for visualization of intraplaque hemorrhage (3D-MRIPH) and 3D- time of flight imaging. Carotid artery vessel wall (VW) volumes and IPH volumes were determined bilaterally for a standard 32 mm segment centered at each carotid bifurcation, using a validated approach with the software, VesselMASS (Medis, Netherlands). Descriptive statistics as well as repeated measures linear regression analyses were performed.

RESULTS

159 patients were included with mean age 63.1 + 7.9 years, 62.3% male, 17.9% with a smoking history and 69.2% on hypertensive medication. The prevalence of IPH was 23.3% (n=37) with five patients exhibiting IPH in both carotid arteries. VW volume of the IPH positive carotid arteries was found to be significantly different from IPH negative arteries (β=0.15mm3 SE=0.03, p<0.01) and independent from other factors that affected VW volume - age (β=0.01yrs SE=0.002, p<0.01), sex (β=0.21 SE=0.04, p<0.01), BMI (β=0.22 SE=0.10, p=0.03) - when adjusted (none significant) for disease duration, smoking, blood pressure, and medications (statins, anti-hypertensive, anti-platelet).

CONCLUSION

IPH can be found in the absence of carotid artery stenosis in asymptomatic diabetic patients and is associated with an increased carotid artery wall volume as measured by 3D-MRI. It represents a biomarker of advanced atherosclerotic disease and may identify individuals at higher risk of cardiovascular disease.

CLINICAL RELEVANCE/APPLICATION

3D MRI can identify high risk cardiovascular biomarkers, such as intraplaque hemorrhage, in diabetic patients before onset of stenosis.

SSA17-06 Feasibility of High-resolution MR Imaging for the Diagnosis of Posterior Inferior Cerebellar Artery Dissection

Sunday, Nov. 29 11:35AM - 11:45AM Location: N227

Participants
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Yoolim Baek, MD, Suwon, Korea, Republic Of (*Presenter*) Nothing to Disclose

PURPOSE

To evaluate the feasibility of HR-MR imaging diagnosing posterior inferior cerebellar artery (PICA) dissection and to find most useful imaging findings suggesting dissection

METHOD AND MATERIALS

We retrospectively reviewed 104 patients suspected of having arterial dissection involving posterior cerebral circulation and underwent HR-MR imaging between March 2012 and March 2015. 66 patients were diagnosed with arterial dissection involving posterior cerebral circulation and 16 patients among them (24.2%) were diagnosed with isolated PICA dissection by the consensus among neuroradiologists, neurointerventionist and neurologist after reviewing all clinical and paraclinical investigations available at hospital discharge (initial CT, MR, DSA images and etiologic work-ups) and follow up. Two neuroradiologists independently reviewed the HR-MR images of patients finally diagnosed as PICA dissection and looked for evidence of dissection (mural hematoma, dissection flap, outer diameter enlargement on T2WI) on each sequence of HR-MRI (PDWI, T2WI, T1WI and CE-T1WI). Inter- and intraobserver agreement for detecting evidence of dissection was estimated using the Cohen's kappa coefficient.

RESULTS

Dissection flaps were seen in all cases on T2WI (100%) and secondly detected on CE-T1WI (81.3%). Outer-diameter enlargement of the steno-occlusive lesions on angiography was detected in most of cases (81.3%). A mural hematoma was best detected on CE-T1WI (50.0%). The two reviewers showed substantial to almost perfect agreement for detecting dissection signs on every sequence (Cohen's kappa coefficient: 0.63 ~0.94)

CONCLUSION

HR-MR imaging could be a useful and non-invasive diagnostic tool for PICA dissection and dissection flap with outer wall enlargement on T2WI is most confident sign for suggesting dissection.

CLINICAL RELEVANCE/APPLICATION

HR-MR imaging can demonstrate direct findings of dissection and be non-invasive useful diagnostic tool for the diagnosis of posterior inferior cerebellar artery dissection

SSA17-07 Corrrelation of Carotid Plaque Features with Acute Cerebral Infarction in Type 2 Diabetic Patients - A Magnetic Resonance Imaging Study

Sunday, Nov. 29 11:45AM - 11:55AM Location: N227

Participants
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Ye Cao, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

Jianrong Xu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of this study was to investigate the association between carotid atherosclerotic plaque characteristics and the severity of acute cerebral infarct (ACI) in symptomatic patients with T2DM.

METHOD AND MATERIALS

We studied 204 arteries in 102 stoke patients by carotid and brain MRI. ACI volume was determined from symptomatic internal carotid artery territory on diffusion-weighted imaging (DWI).The symptomatic carotid plaque burden and compositional characteristics between stroke patients with T2DM and without T2DM were compared by using independents sample t-test and nonparametric Wilcoxon signed rank test after analyzed with MR vessel imaging. Pearson correlation test was applied to determine the correlations between volume of ACIs and carotid features in T2DM patients, then univatiate and multivariate linear regressions were applied to assess the independent associations of carotid characteristics with severity of ACIs.

RESULTS

Out of 104 enrolled stroke patients, 44(42%) had T2DM. They were distinguished as atherosclerotic plaque based on carotid artery with presence of any plaque component on MRI, such as calcification, LRNC, or IPH. The occurrence rate of carotid artery plaque was higher in diabetics vs non-diabetics (76.1% vs 52.6%, p=0.001). Compared with patients without T2DM, the T2DM subjects showed significantly higher prevalence of LRNC (70.5% vs 48.3%, P=0.038) as well as a larger volume of LRNC (76.82±114.31 mm3 vs 35.91±73.79mm3, P=0.042). Among these stroke patients, ACIs size of T2DM subjects in internal carotid artery (ICA) territory (7.75±11.49mm3 vs 3.77±6.33mm3, P=0.042) are greater than that of non-T2DM subjects. In addition, The LRNC volume had superior correlation (r=0.77, p<0.001) with the infarction volume of ipsilateral ICA territory, outperforming the other parameters in T2DM patients. Univariate and multivariate linear regression analysis showed close correlation of LRNC volume and MWT with the severity of ACI (B= 0.15, P<0.01 and B=4.99, P<0.05, respectively).

CONCLUSION

LRNC prevalence and volume of carotid plaques are significantly different between stroke patients with T2DM and without T2DM. In addition, LRNC volume and MWT are independently associated with cerebral infarction as measured by DWI.

CLINICAL RELEVANCE/APPLICATION

Our findings indicate that characterizing atherosclerotic plaque by MR vessel wall imaging might be useful for stratification of plaque risk and infarction severity in T2DM patients.

SSA17-08 Early Atherosclerotic Disease Detected by MRI and CT in the Carotid and Coronary Arteries in Low-moderate Risk Individuals

Sunday, Nov. 29 11:55AM - 12:05PM Location: N227

Participants
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David A. Bluemke, MD, PhD, Bethesda, MD (*Presenter*) Research support, Siemens AG

PURPOSE

We examined the relationship between positive remodeling in the carotid and coronary arteries and investigated determinants of remodeling in a population with low-moderate risk of cardiovascular disease.

METHOD AND MATERIALS

Study subjects >55 years old with history of hypercholesterolemia underwent high resolution black blood carotid MRI using dedicated surface coils at 3T. In addition, CT angiography was performed using 320 slice scanning. Arterial wall area (outer vessel area-lumen) and the remodelling index (RI) (wall area/outer vessel area) were measured by observers blinded to clinical status. Data were analyzed using Spearman's correlation coefficient and multivariate linear regression analysis adjusted for sex, age, height and weight.

RESULTS

In 201 individuals (mean age 65.3±6.5, 64% men) with a low-moderate risk (Framingham Risk Score 7.8±7.6%), we found a strong association between wall area and outer vessel area in both the carotid (r=0.80;p<0.001, adjusted beta 1.67 [95%CI 1.43-1.92]) as well as the coronary arteries (r=0.82;p<0.001, adjusted beta 1.48 [95%CI 1.24-1.72]). This association was stronger when we compared the third tertile of lumen area to the first tertile, indicating more outward remodeling. The RI of the right and left carotid artery in a study subject was strongly correlated (r=0.75, p<0.001), whereas intra-individual RI between carotid and coronary disease was weak (r=0.20, p<0.001). In multivariate analysis, hypercholesterolemia, height and CAC score were associated with the RI of the coronary arteries.

CONCLUSION

This study is the first to combine MRI and CT imaging to investigate positive remodeling in the carotid and coronary arteries of low-moderate risk individuals from the general population. Early atherosclerosis was associated with positive remodeling with larger diameter in the coronary and carotid arteries. Positive remodeling was not the same for different vascular beds.

CLINICAL RELEVANCE/APPLICATION

Detection of positive remodeling and understanding its role in early atherosclerotic disease could improve prevention strategies and management of stroke and coronary heart disease.

SSA17-09 Characterization of Restenosis after Carotid Endarterectomy Using Contrast-Enhanced Black Blood MRI

Sunday, Nov. 29 12:05PM - 12:15PM Location: N227

Participants
Huan Yang, Baltimore, MD (*Presenter*) Nothing to Disclose
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Gunes Orman, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
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Hugh Trout III, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Bruce A. Wasserman, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To characterize restenosis after carotid endarterectomy (CEA) using high-resolution contrast-enhanced black blood MRI (CEMRI) and compare with primary atherosclerotic lesions.

METHOD AND MATERIALS

17 consecutive patients (10 male; mean age 73.4±11.9 years) with carotid restenosis (13 unilateral; 4 bilateral) after CEA underwent CEMRI at 3T. The median interval between surgery and CEMRI was 16.5 months (IQR, 9.3-95.5 months). Patients were matched with 20 asymptomatic patients with primary carotid atherosclerosis (19 unilateral; 1 bilateral) by age and luminal stenosis. All MRI images were de-identified and interpreted by two readers who were blinded to the history of CEA. The presence of plaque and plaque components was recorded for each lesion based on previous criteria on CEMRI. The lesions were classified as plaques or intimal hyperplasia based on the presence/absence of plaque features on CEMRI. The MRI morphological measurements included wall thickness (WT), area, normalized wall index and eccentricity (maximum WT- minimum WT)/maximum WT), and the signal measurements included heterogeneity (defined by coefficient of variation of signal intensity) and contrast-enhancement (%CE, the percent change in signal intensity from the pre- to post-contrast images).

RESULTS

A total of 42 carotid lesions from 37 patients were analyzed, and classified as primary plaques (n=21), recurrent plaques (n=13) and intimal hyperplasia lesions (n=8). Compared with plaques (both primary and recurrent), lesions with intimal hyperplasia exhibited smaller eccentricity (0.48 vs. 0.74, $p<0.001$), lower signal heterogeneity (20.0% vs. 27.2%, $p=0.004$) and higher % CE (88.4% vs 43.9%, $p=0.002$). Recurrent plaques had similar MRI characteristics when compared with primary plaques. However, recurrent lesions demonstrated higher CE (57.5% vs 35.4%, $p=0.046$) and more frequently involved in the medial wall of the internal carotid artery, an uncommon location for a plaque formation (recurrent vs. primary; 38.5% vs 4.8%, $p<0.001$).

CONCLUSION

Carotid restenosis from intimal hyperplasia demonstrated distinct imaging characteristics on CEMRI compared with atherosclerotic lesions.

CLINICAL RELEVANCE/APPLICATION

The phenotype of the restenotic lesions after CEA imposes different stroke risks. CEMRI imaging allows for the differentiation of these lesions and may provide insight into the treatment of restenosis.

SSA23

Vascular/Interventional (Venous Interventions)

Sunday, Nov. 29 10:45AM - 12:15PM Location: E350

VA IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Gretchen M. Foltz, MD, Saint Louis, MO (*Moderator*) Nothing to Disclose
Thomas-Evangelos G. Vrachliotis, MD, PhD, Athens, Greece (*Moderator*) Nothing to Disclose

Sub-Events

SSA23-01 Prophylactic Antibiotics during Totally Implantable Venous Access Device Placement Does Not Decrease the Rate of Infection

Sunday, Nov. 29 10:45AM - 10:55AM Location: E350

Participants
Jonathan Jo, MD, New York, NY (*Presenter*) Nothing to Disclose
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PURPOSE

Controversy still exists regarding antibiotic use in totally implantable venous access device (TIVAD) placement. A recent study showed a <1% risk of catheter related bloodstream infection (CLABSI) without the use of antibiotic prophylaxis. The current study seeks to delineate the efficacy of prophylactic antibiotics in TIVAD placement and to identify parameters associated with infection risk in an institution where antibiotic prophylaxis was used in the majority of cases.

METHOD AND MATERIALS

Following IRB approval, retrospective review of consecutive patients receiving TIVADs from January 2008 - December 2012 were analyzed for port infections. Post-procedural infection was defined as port removal within 30 days of placement with clinical signs of infection. Demographic information, comorbidities, hospital admission status, port characteristics, as well as prophylactic and supplemental antibiotic use were documented. Preoperative laboratory results were reviewed for white blood cell count (WBC), platelet count, and coagulation studies. Chi-square tests were used to determine associations between patient characteristics and procedural infection.

RESULTS

Of 1438 patients, 1158 (80.5%) received antibiotics and 280 (19.5%) did not. Of the patients given antibiotics, 143 (12.3%) also received supplemental antibiotics within 30 days of port placement and were excluded from analysis. Among the remaining 1295 patients, 7 post-procedural infections were identified (0.5%), all occurring in the antibiotic group ($p<0.0001$). Post-procedural infection was also significantly associated with inpatient status versus outpatient (3.8% vs. 0.1%, $p<0.0001$) and double lumen ports versus single lumen (1.9% vs. 0.2%, $p=0.002$).

CONCLUSION

Prophylactic antibiotic therapy does not reduce the post-procedure infection rate. Infection rates are higher with inpatients and those receiving double lumen ports.

CLINICAL RELEVANCE/APPLICATION

With level 8 evidence in existence, the Society of Interventional Radiology guidelines suggests that prophylactic antibiotics are unnecessary for tunneled central lines. No consensus exists for totally implantable venous access devices. Despite mounting evidence of the limited utility of antibiotics, many interventional radiologists and the majority of fellows of the American College of Surgeons still use antibiotics. The study seeks to add to the evidence that prophylactic antibiotics may not add benefit in this setting.

SSA23-02 Developing a Method for Testing Mechanical Properties for Implantable Catheter Lines

Sunday, Nov. 29 10:55AM - 11:05AM Location: E350

Participants
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Kay Sellenschloh, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Gerd Huber, Hamburg, Germany (*Abstract Co-Author*) Speakers Bureau, Ulrich GmbH & Co KG;
Gerhard B. Adam, MD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Harald Ittrich, MD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To develop a reproducible and sensitive method for the quantification of parameters of mechanical properties of catheter lines as well as to investigate the influences of artificial aging.

METHOD AND MATERIALS

Constructing an experimental setup and performing uniaxial tensile tests with 5F-silicone- and 6F-polyurethane catheter lines. Subgroups were each with unattended (n=6), chemically aged (n=7), and mechanically aged samples. Material behavior was analyzed by optical strain measurement (EOS 700D, Canon, Tokio/ Japan) and force measuring system (Xforce P, Zwick Roell AG, Ulm/ Germany). Maximum force (N), stress at break (Pa), strain at break (%), and Young's elastic modulus (Pa) were evaluated.

RESULTS

In the 5F-silicon catheter trial series ANOVA shows significant differences in subgroups with Young's elastic module ($p<0.001$); in the 6F-polyurethan catheters with Young's elastic module ($p<0.001$) maximum force ($p<0.001$), stress at break ($p<0.001$), as well as strain at break ($p=0.001$).

CONCLUSION

We successfully developed an experimental setup to quantify mechanical properties of various catheter lines and proofed reliability and sensitivity to determine artificial aging induced modification. The low range of variance promises to detect even minor deviations in material features.

CLINICAL RELEVANCE/APPLICATION

According to recurrent failures with catheter lines among the patient cohort with totally implanted port systems within our medical center it is necessary to gain knowledge about influences of long-term usage and to quantify aberrations to avoid risk owing to material fatigue or potentially faulty batches.

SSA23-03 Adrenal Venous Sampling in Primary Aldosteronism: Value of a Multinomial Regression Model to Detect Aldosterone Hypersecretion Lateralization When the Right Adrenal Vein Sampling is Missing

Sunday, Nov. 29 11:05AM - 11:15AM Location: E350

Participants
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Gilles P. Soulez, MD, Montreal, QC (*Abstract Co-Author*) 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
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Marie-France Giroux, MD, Montreal, QC (*Abstract Co-Author*) Research Grant, Johnson & Johnson Research Grant, BIOTRONIK GmbH & Co KG Stockholder, Abbott Laboratories
Andre Lacroix, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Eric Therasse, MD, Montreal, QC (*Abstract Co-Author*) Research support, Johnson & Johnson; Consultant, Cook Group Incorporated

PURPOSE

To assess the value of a multinomial regression model to detect aldosterone hypersecretion lateralization (AHL) with adrenal venous sampling (AVS) when the right adrenal vein sampling is missing.

METHOD AND MATERIALS

All consecutive AVS from November 1990 to December 2014 were included. Non selective AVS, repeated AVS and AVS with missing data were excluded. Cortisol and aldosterone levels were measured simultaneously from the adrenal veins and left iliac vein before (basal) and after intravenous cosyntropin injection. Reference standard for AHL was a basal adrenal vein aldosterone /cortisol ratio (A/C) >4 the opposite side. Two multinomials regressions models were built to predict AHL (right, left or no lateralization) using only the left adrenal and iliac veins hormone concentration, 1) before and 2) after cosyntropin injection. AHL detection accuracy was assessed with receiver operating characteristic (ROC) curves.

RESULTS

AVS of 171/186 (91.9%) patients (60 women; 126 men, mean age 53.5 years) met the inclusion/exclusion criteria. AHL was found in 106 (62%) patients. Areas under the ROC curves for AHL detection with the basal and the post-cosyntropin models were respectively 0.907 (95%CI; 0.862-0.952) and 0.928 (95%CI; 0.892-0.965) for the right side ($p=0.11$) and 0.915 (95%CI; 0.872-0.958) and 0.917 (95%CI; 0.875-0.959) for the left side ($p=0.84$). Sensitivities to detect AHL with a specificity of 95% with the basal and the post-cosyntropin models were respectively 52.7% (95%CI; 38.9%-66.1%) and 56.4% (95%CI; 42.4%-69.4%) for the right side and 52.9% (95%CI; 38.6%-66.8%) and 59.2% (95%CI; 44.2%-72.7%) for the left side. There were no contralateral AHL among false positives in both models.

CONCLUSION

Multinomial regression models of AVS can determine AHL in the majority of patients even when the right adrenal vein sampling is missing. Basal and post cosyntropin multinomial regression models had similar accuracy to detect AHL.

CLINICAL RELEVANCE/APPLICATION

Adrenal venous sampling is essential to assess aldosterone hypersecretion lateralization before adrenalectomy but is limited by a high right adrenal vein cannulation failure rate.

SSA23-04 Selective Arterial Calcium Stimulation (SACST) with Hepatic Venous Sampling Differentiates Occult Insulinoma from Nesidioblastosis in Patients with Endogenous Hyperinsulinemic Hypoglycemia and Negative or Inconclusive Noninvasive Imaging

Sunday, Nov. 29 11:15AM - 11:25AM Location: E350

Participants
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PURPOSE

To determine the diagnostic role of selective arterial calcium stimulation (SACST) with hepatic venous sampling in differentiating occult insulinoma from nesidioblastosis in patients with hyperinsulinemic hypoglycemia and negative or inconclusive noninvasive imaging.

METHOD AND MATERIALS

An IRB-approved retrospective review was undertaken of 116 patients with biochemical evidence of endogenous hyperinsulinemic hypoglycemia, negative or inconclusive noninvasive imaging and surgically and pathologically confirmed occult insulinoma (N=42) or nesidioblastosis (N=74) who underwent SACST with hepatic venous sampling from 1/1996 to 3/2014. Clinical, laboratory, radiologic and pathology data were reviewed. The maximum hepatic venous insulin concentration (mHVI; µIU/ml) and relative-fold increase in hepatic venous insulin concentration over baseline (rHVI) following calcium injection from the dominant artery were compared between insulinoma and nesidioblastosis groups. ROC curves were generated to determine the specificity of mHVI and rHVI in differentiating insulinoma from nesidioblastosis.

RESULTS

The biochemical results of SACST were positive (>2.0-fold) in two or more arterial distributions in 26.2% of patients in the insulinoma group and 73.0% of patients in the nesidioblastosis group ($p<0.0001$). The mean (±SEM) mHVI post calcium injection was significantly higher in the insulinoma group compared to the nesidioblastosis group (778.6 ± 189.6 µIU/ml v. 36.2 ± 4.1 µIU/ml, respectively; $p<0.001$). The mean (±SEM) rHVI from baseline was significantly higher in the insulinoma compared to the nesidioblastosis group (25.1 ± 4.4 v. 6.4 ± 0.5, respectively; $p<0.001$). The area under the receiver operator curve (AUC) for mHVI and rHVI was excellent (0.94; $p<0.0001$) and good (0.83; $p<0.0001$), respectively. mHVI cutoffs of >91.5µIU/ml and >263.5µIU/ml were 95% and 100% specific for insulinoma, respectively. A 19.0-fold increase in rHVI over baseline was 99% specific for insulinoma.

CONCLUSION

These data suggest that the biochemical results of SACST can differentiate occult insulinoma from nesidioblastosis with high specificity in patients with hyperinsulinemic hypoglycemia and negative noninvasive imaging.

CLINICAL RELEVANCE/APPLICATION

SACST should be considered in patients with hyperinsulinemic hypoglycemia and negative noninvasive imaging to differentiate occult insulinoma from nesidioblastosis, thereby avoiding blind pancreatic exploration.

SSA23-05 Comparison of Inferior Vena Cava Filter Placement by Two Different Vascular Physician Specialties

Sunday, Nov. 29 11:25AM - 11:35AM Location: E350

Participants
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Amy R. Deipolyi, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare inferior vena cava filter (IVCF) placement procedures performed by vascular-interventional radiology (VIR) to those by vascular surgery (VS) with respect to radiation exposure, procedure time, anesthesia, and filter position.

METHOD AND MATERIALS

All IVCF placements using contrast venography by VIR or VS in 2014 in a single tertiary hospital center were identified by a PACS database search. The operator, filter type, angulation and distance from the lowest renal vein, radiation dose, fluoroscopy time, and anesthesia type were noted. Angulation was measured as the angle between the midline of the IVC and centerline of the filter.

RESULTS

Of 176 IVCF placements performed in VIR in 2014, carbon dioxide venography was used in 15 cases which were excluded. One case was a combined retrieval and placement and was also excluded, resulting in 160 cases for analysis. A total of 21 filters were placed by VS in 2014; 5 were placed as a part of another fluoroscopic procedure and were excluded from dose and fluoroscopy time analysis. Among the 160 cases performed by VIR, 152 were performed with topical access site anesthesia only; 2 with nursing-administered intravenous sedation; and 6 with anesthesia. By comparison, all 21 cases by VS were performed with anesthesia. Comparing cases performed by VS and VIR, mean radiation dose was higher (180 vs. 66 mGy; $p=0.001$), fluoroscopy time longer (4.6 vs. 2.5 minutes; $p=0.0009$), and filter angulation greater (3.8 vs. 2.5 degrees; $p=0.006$), respectively. There was no statiscally significant difference in distance of the filter tip from the most inferior renal vein (1.7 vs. 1.1 cm; $p=0.19$).

CONCLUSION

IVCF placement by VIR, compared to VS, entails less radiation exposure, less procedure time as indicated by lower fluoroscopy times, less need for anesthesia consultation, and more precise placement centered in the IVC.

CLINICAL RELEVANCE/APPLICATION

Demonstrating superior technique and lower procedure cost is essential in promoting VIR practice development. IVC filter placement performed by interventional radiologists is faster, involves less radiation exposure, and reduces need for anesthesiology consultation, compared to filter placement by vascular surgery.

SSA23-06 Up to 96% Dose Reduction in Pediatric and Young Adult Venous Interventions: Too Good to Be True?

Sunday, Nov. 29 11:35AM - 11:45AM Location: E350

Participants
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John M. Racadio, MD, Cincinnati, OH (*Abstract Co-Author*) Research Consultant, Koninklijke Philips NV; Travel support, Koninklijke Philips NV
Manish N. Patel, DO, Cincinnati, OH (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study is to evaluate dose reductions achieved during venous interventions such as IVC filter placement/retrieval and thrombolysis performed on an enhanced low-dose interventional radiology system.

METHOD AND MATERIALS

An IRB approved retrospective review of patients who underwent a relatively low-dose venous procedure (IVC filter placement/retrieval) or a relatively high-dose venous intervention (lower extremity thrombolysis) was performed. Radiation doses for cases performed on an enhanced low-dose interventional system (AlluraClarity, Philips Healthcare, Best, The Netherlands) were compared with cases from our former system used as a reference (AlluraXper, Philips Healthcare, Best, The Netherlands). Nineteen IVC filter placements or retrievals (5 male/7 female, 9-35 years, 37-84 kg) were performed on the low-dose system and were compared with 21 cases (4 male/10 female, 13-31 years, 49-112 kg) on the reference system. Twelve thrombolysis cases (3 male/4 female, 15-18 years, 51-77 kg) performed on the low-dose system were compared with 12 cases (0 male/5 female, 14-18 years, 53-146 kg) on the reference system.

RESULTS

Overall radiation doses were substantially reduced using the low-dose system compared to the reference system (the following doses are reported as low-dose vs reference system). For IVC filter placement/retrieval, median cumulative procedure dose-area product (DAP) was 3.5 vs 30.9 Gy.cm2 (89% dose reduction), fluoroscopy dose/minute was 1.06 vs 3.21 Gy.cm2/min (67% dose reduction), and the digital subtraction angiography (DSA) dose/frame was 0.03 vs 0.72 Gy.cm2/frame (96% dose reduction). For thrombolysis, median cumulative procedure DAP was 25 vs 409 Gy.cm2 (94% dose reduction), fluoroscopy dose/minute was 1.4 vs 5.2 Gy.cm2/min (73% dose reduction), and the DSA dose/frame was 0.06 vs 1.6 Gy.cm2/frame (96% dose reduction).

CONCLUSION

Significant radiation dose reduction is possible in pediatric and young adult patients undergoing venous interventions by using an enhanced low-dose interventional radiology system.

CLINICAL RELEVANCE/APPLICATION

Use of an enhanced low-dose interventional radiology system for venous interventions results in substantial dose reduction of up to 96% for pediatric and young adult patients.

SSA23-07 Balloon Pulmonary Angioplasty: Applicability of Fluoroscopy-based Registration of a Pre Acquired C-Arm CT for Procedure Guidance

Sunday, Nov. 29 11:45AM - 11:55AM Location: E350

Participants
Jan Hinrichs, 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
Marius Hoeper, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose
Julius Renne, MD, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose
Karen Olsson, 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
Bernhard C. Meyer, Hannover, Germany (*Abstract Co-Author*) Research Consultant, Pro Medicus Limited

PURPOSE

To investigate the use of a fluoroscopy-based registration of a pre acquired C-Arm CT (CACT) for procedure guidance in patients suffering from chronic thromboembolic pulmonary hypertension (CTEPH) undergoing balloon pulmonary angioplasty (BPA).

METHOD AND MATERIALS

42 BPA procedures performed in 27 CTEPH patients (9m, 70±14y) were included in this study. Twenty-two BPAs were guided by selective CACT (syngo DynaCT, Artis Q®, Siemens Healthcare, Forchheim, Germany) acquired immediately before BPA (G3D). In another twenty BPAs (G2D), two orthogonal fluoroscopy images of the chest where acquired semi-automatically matched with a superimposed volume rendering (VRT) of a pre-acquired CACT (2D/3D registration, syngo Fusion®, Siemens), registration was computed and applied. In both cases CACT was post-processed to generate a volume rendering based graphic representation (VRT guidance) indicating the origin and course of the segmental pulmonary arteries (SPA). During the intervention, zoom level and orientation of VRT and C-Arm were linked online using intrinsic (G3D) or computed (G2D) registration. Based on VRT guidance, the interventional radiologist planned an apt working projection (WP-P). If necessary, the used WP (WP-U) was adapted. Agreement of WP-P and WP-U, duration of the procedure and radiation exposure data was documented and compared between the two groups (Wilcoxon-test).

RESULTS

Overall, 143 SPA were intended to undergo BPA. Agreement of WP-P and WP-U was obtained in G3D 82% and G2D 86%. The guide wire was successfully placed in G3D 93% and G2D 94% and subsequent BPA was successfully performed in G3D 91% and G2D 94%. CACT post-processing took a mean of 8min G3D and 7min G2D. Overall intervention time was 126min G3D and 117min G2D. No severe reperfusion edema occurred and no patient needed mechanical/assisted ventilation.Dose-area product (DAP) was significantly higher for G3D (G3D 9289±4221 vs. G2D 5448±2629 µGym2, p=0.002).

CONCLUSION

The use of fluoroscopy based 2D3D registration of CACT images for BPA guidance is feasible and accurate. 2D3D registration can be used to save radiation exposure if a pre-acquired CACT for guidance is available.

CLINICAL RELEVANCE/APPLICATION

CACT of the pulmonary arteries bares the opportunity to increase patient's safety during BPA, when used as guidance method. Additionally, 2D3D fusion of pre-acquired CACTs safes radiation dose in repeated BPAs.

SSA23-08 Added Value of Fluoroscopy/Venography during Endovenous Laser Therapy for Symptomatic Varicose Veins

Sunday, Nov. 29 11:55AM - 12:05PM Location: E350

Participants
Ricardo Yamada, MD, Charleston, SC (*Presenter*) Nothing to Disclose
J. Bayne Selby JR, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Marcelo Guimaraes, Charleston, SC (*Abstract Co-Author*) Consultant, Cook Group Incorporated ; Consultant, Baylis Medical Company; Consultant, Terumo Corporation; Patent holder, Cook Group Incorporated
John Selby III, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
James P. Gregg, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Procedural difficulties or unexpected findings may occur during endovenous laser therapy of varicose veins using ultrasound alone. Fluoroscopy/venography can be a useful adjunctive modality.

METHOD AND MATERIALS

After IRB approval, EVLT performed in the last 10 years were reviewed. Fluoroscopy/venography and ultrasound were used in all cases. Images, procedure report and patient's clinical condition were reviewed. Three graders evaluated whether this imaging method changed the treatment plan, aided completion of the procedure, displayed unexpected findings or clarified previous treatments results.

RESULTS

A total of 169 treatments were identified, in 142 patients. Fluoroscopy/venography had impact in 67 procedures (39%). In 25 cases it clarified multiple complex collateral veins. In 23 cases it helped navigate the guide-wire. In 16 cases it identified duplicated/accessory veins. In 3 cases it identified the need for second access. 23 patients had prior surgical ligation/stripping, sclerotherapy or endovenous thermal ablation. Among them fluoroscopy/venography contributed to procedure completion in 18 patients(78%).

CONCLUSION

Fluoroscopy/venography were helpful in patients previously treated, in whom passage of the guide wire was difficult and in those with bifurcated/accessory veins. Of these, patients with prior treatment benefited the most from fluoroscopy/venography.

CLINICAL RELEVANCE/APPLICATION

Fluoroscopy/venography during EVLT is particular helpful in patients with recurrent varicose veins after prior treatment. This additional imaging modality may be considered in all patients undergoing repeated treatment.

SSA23-09 Large Primary Varicose Veins: Combined Ultrasound Guided Endo-venous Laser Therapy and Selective Surgical Ligation at Sephano-Femoral Junction-A Mean 7 Years Follow-up with Review of Literature

Sunday, Nov. 29 12:05PM - 12:15PM Location: E350

Participants
Kiran C. Patil JR, MD, Jalgaon, India (*Presenter*) Nothing to Disclose
Anurag Singh, MBBS,MD, Sharjah, United Arab Emirates (*Abstract Co-Author*) Nothing to Disclose
Rajesh D. Jawale, MBBS, MD, Nasik, India (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

1) To evaluate our experience and curative effect of the combination of ultrasound guided endovenous Laser therapy (EVLT) and surgical detail separate ligation of each tributaries at S-F junction. 2) To review our experience with mean 7 years followup. 3) To compare our resultswith reviewed literature.

METHOD AND MATERIALS

Over the period from Jan 2005 to Dec 2013, 118 patients with 135 limbs were identified to have symptomatic primary large varicose veins (Criteria was SF junction diameter > 10 mm and saphenous vein > 8mm) were treated with this combined approach. Separate surgical ligation of each tributary at SF junction followed by ultrasound guided EVLT of rests of the lower limb large tributaries, duplicated veins and short saphenous vein (SSV) done by using 980-nm pulse wave Laser. Superficial subcutaneous tumescent injection of saline toprevent skin complications was used. Principal outcome measures were abolition of reflux, cosmetic improvement and improvement in Aberdeen Varicose Veins Symptome Score (AVVSS) . Future followup on duplex ultrasound at week 1 , months 1, 3, 6 then yearly for mean of 7 years.

RESULTS

The procedure was technically successful in all cases. Spot skin burns in 2, short term peri ankle parasthesia in 25, recurrent minor tributaries and spider veins in 12, 4 patients developed new parallel GSV. 2patient developed significant recurrence. All results were much better than only laser or only surgical or other combined methods reviewed in literature.

CONCLUSION

This combination therapy of intervention radiology and local surgery in treatment of large primary varicose veins appears to be very

This combination therapy of intervention radiology and local surgery in treatment of large primary varicose veins appears to be safe, effective and safe approach. The long term results are fairly better and more comparable. Its long term outcome is more superior and well accepted by patients than the other traditional methods compared from literature.

CLINICAL RELEVANCE/APPLICATION

Combined surgical and endovenous approach appears promising in good outcome in large primary varicose veins treatments. Large primary varicose veins of both lower limbs are aften associated with Sephano-femoral (S-F) junction diameter and saphenous vein diameter larger than 10 mm with multiple large varicose tributaries. These are notorious for recurrence even after intervention or surgical treatment. Hence combined intervention radiological and surgical approach was selected to obtain the best long term results.

VIS-SUA

Vascular Interventional Sunday Poster Discussions

Sunday, Nov. 29 12:30PM - 1:00PM Location: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
Hyeon Yu, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose

Sub-Events

VI213-SD-SUA1 Use of Indwelling Pulmonary artery Catheter to Significantly Reduce Iodinated Contrast Volume in Elderly Patients with Chronic Renal Dysfunction Undergoing Pre-operative Assessment for Transcatheter Aortic Valve Implantation (TAVI)

Station #1

Participants
Ferdia Bolster, FFR(RCSI), Baltimore, MD (*Presenter*) Nothing to Disclose
Anuj Gupta, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jean Jeudy JR, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Seth J. Kligerman, MD, Denver, CO (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the quality of contrast enhancement in patients undergoing low contrast volume CTA via an indwelling pulmonary artery catheter (PAC) compared to standard volume CTA administered via peripheral IV as part of pre-TAVI workup

METHOD AND MATERIALS

IRB/HIPAA compliant.7 patients with chronic renal dysfunction underwent low-contrast volume CTA via PAC, which was placed by a cardiologist during cardiac cath as part of pre-TAVI work up. Immediately following, patients were transferred to radiology for CTA. Patients received between 30-40mL of Omnipaque 350 (GE Healthcare) mixed with saline (50/50 mix) based on BMI. 7 control (CL) patients with pre-TAVI CTA using standard contrast volume (110-120mL) administered via peripheral IV were selected for comparison. All patients underwent 256-slice CTA (Brilliance- iCT, Philips) with retrospective gating. PAC group were scanned at 100 kVp (BMI >30) or 80kVp (BMI <30). CL group had gated-helical CTA of thorax at 100kVp and helical CTA of abdomen at 120 kVp. Intra-vessel CT attenuation (HU) and noise were measured using a model-based iterative reconstruction algorithm (IMR, Philips) at the level of the aortic annulus (AA) and right external iliac artery (EIC) for both groups. Subjective vascular enhancement was assessed with a 4-point Likert scale by 2 board-certified radiologists. Unpaired t-tests and Mann-Whitney U tests were used for parametric and nonparametric data, respectively. Statistical significance was set at $p<0.05$.

RESULTS

Average age of study and CL groups was 84 yrs (range 73-89) and 72.6 yrs (range, 58-81), respectively (p=0.03). Significantly less contrast was used in the PAC group (33.9mls ±4.8) vs. CL group (117.1 ±11.9) (p=0.001). There was no significant difference in HU at the level of AA for PAC (389.9±129) vs CL (292.16±103.7; p=0.1442) and EIC for PAC (374.2±121.2) vs. CL (269.9±69.7; p=0.0718). There was no difference in noise at AA (p=0.203) or EIC (p=0.265) between groups. All scans were graded as diagnostic. Median subjective score for both groups was 4 (ideal) (p=0.897).

CONCLUSION

Low contrast CTA via PAC can significantly decrease the amount of contrast required in pre-TAVI CTA while providing excellent vascular enhancement

CLINICAL RELEVANCE/APPLICATION

Patients referred for TAVI often have multiple co-morbidities including renal insufficiency. Contrast injection via PAC can result in significant decrease in contrast volume with overall ideal vascular enhancement.

VI214-SD-SUA2 Lower Extremity CT Angiography Using 70 kVp with Optimized Low Injection Rate of Low-iodine-concentrated Contrast Medium Protocol: A Feasibility Study

Station #2

Participants
Ying Zhan, Tianjin, China (*Presenter*) Nothing to Disclose
Xinwei Lei, MD, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Jin Qu, MS, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Hui X. Li, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Jinmeng Liu, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess image quality, radiation dose and total contrast medium(CM) dose of an optimized lower extremity CT angiography (CTA) protocol using 70 kVp with low contrast medium dose

METHOD AND MATERIALS

60 patients were included in this prospective study and randomly divided into two groups for lower extremity CTA examinations. 30 patients were evaluated with a standard protocol: 120 kVp, high-iodine-concentrated CM (370mgI/mL) with a normal injection rate of 3.5 mg/mL, while the other 30 underwent CTA with an optimized protocol: 70 kVp, low-iodine-concentrated CM (350 mgI/mL)

with a low injection rate of 2.5 mg/mL. The signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) abdominal aorta, common iliac artery, femoral artery, popliteal artery, peroneal artery, and arteria dorsalis pedis of both sides were calculated. Two radiologists subjectively assessed the image quality. And radiation dose in CTDIvol and DLP was recorded and compared between the two groups.

RESULTS

No significant difference of SNR or CNR was achieved in all measured sites for both protocols (p value for SNR and CNR comparison: 0.256 and 0.331 for abdominal aorta; for 0.777 and 0.947 for common iliac artery; 0.613 and 0.800 for femoral artery; 0.927 and 0.959 for popliteal artery, 0.194 and 0.269 for peroneal artery, and 0.783 and 0.763 for arteria dorsalis pedis). And there is no significant difference of the subjective score between the two protocols. :Radiation dose in optimized protocol was significantly lower than standard protocol (DLP: 192.67± 38.71 vs 473.38±123.18; CTDIvol: 1.49±0.27 vs 3.44±0.76). The total CM volume was 28.6% lower while the iodine dose was 32.4% lower in the optimized protocol.

CONCLUSION

An optimized protocol using 70 kVp may provide a diagnostic performance, comparable with the standard protocol, decreasing radiation dose, CM injection rate, total CM volume, and iodine dose.

CLINICAL RELEVANCE/APPLICATION

An optimized protocol using70KVp can dramatically decrease radiation and contrast agent doses with adequate imaging quality.

VI248-SD-SUA4 Characteristic Imaging Findings of Small Cystic Renal Tumors after Radiofrequency Ablation: Initial Experiences

Station #4

Participants
Masataka Kashima, MD, Tsu, Japan (*Presenter*) Nothing to Disclose
Koichiro Yamakado, MD, PhD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Atsuhiro Nakatsuka, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Haruyuki Takaki, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Takashi Yamanaka, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
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Junji Uraki, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Hajime Sakuma, MD, Tsu, Japan (*Abstract Co-Author*) Departmental Research Grant, Siemens AG; Departmental Research Grant, Koninklijke Philips NV; Departmental Research Grant, Bayer AG; Departmental Research Grant, Guerbet SA; Departmental Research Grant, DAIICHI SANKYO Group; Departmental Research Grant, FUJIFILM Holdings Corporation; Departmental Research Grant, Nihon Medi-Physics Co, Ltd
Yuichi Sugino, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
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Naritaka Matsushita, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Shinichi Ito, MD, Ichinomiya, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate imaging findings after percutaneous radiofrequency ablation (RFA) of small cystic renal tumors.

METHOD AND MATERIALS

RFA was performed under real-time CT fluoroscopic guidance for 20 cystic renal tumors in 20 consecutive patients. All were Bosniak category IV. Characteristic imaging findings were evaluated.

RESULTS

The mean maximum tumor diameter decreased to 18.4+/-7.6 mm (range 6.0-31.0 mm) immediately after RFA from 27.2+/-8.6 mm (range 10.0-40.0 mm) before RFA ($p<0.01$). The mean CT attenuation of the cystic component increased to 49.0+/-16.8 HU (range 18.1-81.1 HU) immediately after RFA from 28.1+/-12.5 HU (range 9.8-52.9 HU) before RFA ($p<0.0001$). Alteration of the cystic component was the pattern of signal intensity like both T1 and T2 shortening in 17 (89%). Simultaneously, the signal intensity of the whole tumor appeared as that of a single sort derived from the cystic component such that it showed a lack of the solid component in 18 (95%), and a characteristic pericystic halo that was visible at the tumor's limb, suggesting cyst wall necrosis, was found in 7 (37%) of 19 patients who underwent follow-up MR studies.

CONCLUSION

Characteristic imaging findings after RFA of small cystic renal tumors suggest rapid tumor shrinkage, and a single sort of signal intensity of the whole tumor in a manner that it remains unmixed with the solid component, which is derived from the cystic one, along with both T1 and T2 shortening and the pericystic halo sign.

CLINICAL RELEVANCE/APPLICATION

(dealing with characteristic imaging findings after RFA of small cystic renal tumors) this preliminary study presents certain characteristic imaging features that have never been reported, representing a small step for the progress of additional studies.

VI100-ED-SUA5 An Update on Oral Anticoagulants for Interventional Radiologists: Getting to Know the Newest Kids on the Block

Station #5

Awards
Certificate of Merit

Participants
Simon Onderi, MD, Mineola, NY (*Presenter*) Nothing to Disclose

Amanjit S. Baadh, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Ahmed Fadl, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Andrew Lee, BS, 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

TEACHING POINTS

1. Multiple new oral anticoagulants have been developed and are being used to overcome the limitations of the more traditionally used anticoagulants (warfarin, heparin, and analogues). These may be used in patients to prevent and/or treat thromboembolic disease and reduce the risk of stroke in atrial fibrillation. 2. There are key differences between warfarin, heparin (and analogues), and the newer oral anticoagulants.3. Knowledge of the mechanism of action and half-lives of these agents, along with what medicine may potentially reverse their effects, is crucial for the proceduralist to adequately manage these patients.

TABLE OF CONTENTS/OUTLINE

Review the mechanism of action and other key differences between warfarin, heparin (and analogues), and the newer oral anticoagulants (Dabigatran, Rivaroxaban, Apixaban, and Edoxaban).Describe why these newer oral anticoagulants are being used with increased frequency.Detail how to manage patients on these newer oral anticoagulant medications who also need an image-guided procedure.Propose guidelines for these newer oral anticoagulants, in the context of the current Society of Interventional Radiology guidelines which currently do not address all of these medications.Conclusions

VI001-EB-SUA Popliteal Artery Entrapment Syndrome: Clinical Presentation, Diagnosis with CTA and MR, and Treatment with Anticoagualation and Thromboytic Infusion and Surgery

Hardcopy Backboard

Participants
Soraya Ong, MD, Evanston, IL (*Presenter*) Nothing to Disclose
Michael H. Hamblin, MD, Evanston, IL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Popliteal artery entrapment syndrome (PAES) is a rare cause of peripheral vascular compromise, predominantly occurring in young, healthy males. It results from anomalous relations between the musculotendinous tructures of the popliteal fossa and the popliteal artery, of which six different types are identified. CTA and MR have been shown to be accurate in characterizing and classifying theh different types of PAES. Thrombolysis is only a temporizing measure for treatment of popliteal artery entrapment syndrome. The definitive treatment, as with any vascular compresion syndrome, is surgical release of the entrapping structure(s).

TABLE OF CONTENTS/OUTLINE

- Introduction- Case report of a patient with bilateral popliteal artery entrapment syndrome- Popliteal artery entrapment syndrome (PAES): - definition - epidemiology - clinical presentation - classifications of PAES - imaging diagnosis and characterization of PAES - therapeutic options for PAES: - medical - endovascular - surgical

VIS-SUB

Vascular Interventional Sunday Poster Discussions

Sunday, Nov. 29 1:00PM - 1:30PM Location: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
Hyeon Yu, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose

Sub-Events

VI216-SD-SUB1 An Experimental Study of TR-fluid as a New Embolic Material

Station #1

Participants
Shobu Watanabe, MD, Otsu, Japan (*Presenter*) Nothing to Disclose
Norihisa Nitta, MD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Shinichi Ota, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuki Tomozawa, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Akinaga Sonoda, MD, PhD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Kiyoshi Murata, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Shigeru Yao, Fukuoka, Japan (*Abstract Co-Author*) Colleague, the creator of the TR fluid, a provider.

PURPOSE

Thermal Rheological (TR)-fluid developed by Prof. Yao is low viscosity at low temperature (viscosity increases with temperature). In this study, we used TR-fluid as an embolic material for TAE and evaluated the embolic effect, anti-tumor effect, and pathology of embolized arteries in a rabbit model.

METHOD AND MATERIALS

Experiment 1:12 rabbits were divided into 2 groups and the renal artery was embolized using TR-fluid. Complete embolization of the lobular arteries and filling of the distal parts of the lobar arteries was considered as the end point of embolization. 6 rabbits in each group were sacrificed at 7, and 28 days later and kidneys were extracted. Pathological specimens were constructed in 3-mm intervals by coronal section and changes in arterial walls (wall distension, inflammatory change, and fibrosis) were evaluated.Experiment 2:We divided 6 rabbits with transplanted VX2 liver tumors into 2 groups. They were infused via the proper hepatic artery with cisplatin-TR-fluid suspension or saline as a control and the tumor growth rate was determined on MR images acquired before and 7 days after treatment.

RESULTS

Experiment 1:TR fluid pushed out of the catheter could be confirmed under fluoroscopy without combining with contrast agents. Embolization effect of the renal artery by TR-fluid after 28 days was observed to be the same as that of 7 days later. In microscopic specimens, TR-fluid observed in mold form within the blood vessel and vascular wall, resulting in distension and inflammation. Fibrosis was observed in all cases. Experiment 2:Compared to controls, the tumor growth rate was significantly reduced in the group treated with cisplatin-TR fluid suspension.

CONCLUSION

From this study, TR fluid was estimated to exhibit good embolic effects and anti-tumor effects.

CLINICAL RELEVANCE/APPLICATION

Gelatin sponge or beads are currently used in IVR because embolic area cannot be confirmed only in the distribution of the contrast agent used in the suspension, therefore the embolic effect may become insufficient.Also, it is possible that TR fluid itself is visible under fluoroscopy by using a contrast agent in the manufacturing process.Further studies are necessary, but with the characteristic that viscosity changes by temperature, TR-fluid may become a new material of embolic material.

VI218-SD-SUB3 Chest Port-related Infection According to Medical History: Are There Any High Risk Groups?

Station #3

Participants
Katsuhiro Kobayashi, MD, Syracuse, NY (*Presenter*) Nothing to Disclose
Jayminkumar Patel, Syracuse, NY (*Abstract Co-Author*) Nothing to Disclose
Masoud Faridnia, BS, Syracuse, NY (*Abstract Co-Author*) Nothing to Disclose
Mohammed Jawed, MD, Syracuse, NY (*Abstract Co-Author*) Nothing to Disclose
Mitchell I. Karmel, MD, Syracuse, NY (*Abstract Co-Author*) Nothing to Disclose
Dianbo Zhang, MD, Syracuse, NY (*Abstract Co-Author*) Nothing to Disclose
Cole F. Mendenhall, MD, Long Branch, NJ (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To retrospectively investigate the incidence of chest port-related infection according to medical history and to determine high risk gourps

METHOD AND MATERIALS

Between July, 2012 and May, 2014, a total of 924 chest ports were placed in 897 patients. Of these, 53 ports were placed in 48

between July, 2012 and May, 2014, a total of 871 chest ports were placed in 849 patients. Of these, 52 ports were placed in 49 patients with chronic medical disease (CMD) (Male/Female: 21/27, mean age: 37). 5 patients had a port placed twice because of complications. 871 ports were placed in 849 patients with cancer (Male/Female: 437/412, mean age: 57). 22 patients had a port placed twice because of tumor recurrence or complications. Chronic medical disease included sickle cell disease (SCD) (n=13 ports), cystic fibrosis (n=12), and others 27. Cancer type included Gastrointestinal (GI) (n=193), lung (n=154), breast (n=134), and hematology (n=133), Head and Neck (HandN) (n=97), and others (n=160) Retrospective review of the medical records of all the patients was conducted to identify chest port-related infection (local and systemic) requiring port removal. The incidence of infection according to medical history was calculated and compared to that of each comparison group.

RESULTS

The infection rate of patients with CMD was 22.6% (12/52) or 2.2 infections/1000 catheter-days, which was significanly higher than that of patiens with cancer (5.7% (50/871), 0.24/1000 catheter days) ($p<0.05$). Among patients with CMD, patients with SCD were at a higher risk for infection (38.5%, 1.11 infections/1000 catheter days). Among patients with cancer, patients with hematologic cancer had a highest chest port-related infection rate (9.02%, 0,40/1000 catheter-days), followed by lung cancer (7.79%, 0.396/1000 catheter-days) and HandN cancer (6.19%, 0.258/1000 catheter days). However, the infection rates were not statistically higher than those with the comparison groups (non-hematologic, non-lung and non-HandN, P=0.11, 0.26, 0.88, respectively).

CONCLUSION

Incidence of chest port-related infection in patients with CMD was significantly higher than that in patients with cancer. Patients with SCD were at a higher risk and patients with hematologic cancer were at marginally higher risk for infection.

CLINICAL RELEVANCE/APPLICATION

Proper handing with strict aseptic techniques and close monitoring of a chest port are mondatory in patients with CMD especially those with SCD because of the high incidence of chest port-related infection.

VI249-SD-SUB4 CT-Guided Percutaneous Renal Cryoablation: A Large Series with Long-Term Follow-Up and Low Morbidity

Station #4

Participants
Hussein D. Aoun, MD, Dearborn, MI (*Presenter*) Nothing to Disclose
Peter J. Littrup, MD, Providence, RI (*Abstract Co-Author*) Founder, CryoMedix, LLC; Research Grant, Galil Medical Ltd; Research Grant, Endo Health Solutions Inc; Consultant, Delphinus Medical Technologies, Inc
Barbara A. Adam, MSN, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Evan N. Fletcher, MS, BA, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Matthew Prus, BS, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess technical feasibility, efficacy and complication rates of CT guided percutaneous renal mass cryoablation in a large series on long term follow up.

METHOD AND MATERIALS

CT and/or CT-US fluoroscopic-guided percutaneous cryoablations were performed in 328 procedures on 344 tumors (277 RCC, 49 metastasis, 16 oncocytomas and 2 angiomylolipma) in 281 patients noting tumor size and location. Thirty-nine patients had multiple renal tumors ablated. Follow-up CT or MRI was utilized to assess efficacy and evaluate for local recurrences or new multicentric tumors. Hydrodissection with normal saline/ contrast (60:1) solution was performed to protect adjacent vital structures such as bowel, ureter or pancreas. Complications followed the grading system of the National Institutes of Health, Common Terminology of Complications and Adverse Events (CTCAE 4.0).

RESULTS

All the procedures were performed under conscious sedation and were virtually painless during and after the procedure. Average tumor and ablation size was 2.9cm and 5.0cm, respectively, with the largest 10.3cm. Hydrodissection was performed in 138 procedures. Major complication (only grade 3) rate attributable to the procedure was 2.4% (8/328). Of the major complications, 3 (3/8) were related to hemorrhage requiring transfusion (Grade 3). A ureteral stricture prior to ureteral stent placement for central tumors and bowel injury prior to protective hydrodissection techniques were observed early on in our experience. Mean follow-up was 2.1 years with 83 tumors having > 3 year follow-up, 36 tumors having > 5 year follow-up and 14 tumors having > 7 year follow-up. Local recurrence rate was 2.0% (7/344), with 5 technical failures and 2 tract recurrences. Of the local recurrences, 5 were re-ablated (2 tract and 3 technical) without residual disease on follow-up for a secondary efficacy of 99%.

CONCLUSION

Renal cryoablation has established low complication and local recurrence rates which do not appear to be significantly affected by tumor size or central location. CT guided percutaneous cryotherapy is a low cost and low morbidity alternative for patients with complex renal tumors.

CLINICAL RELEVANCE/APPLICATION

The rising cost of health care mandates consideration of renal cryoablation as a cost effective treatment option, justified by comparable low recurrence and complication rates for any renal location.

VI115-ED-SUB5 What You Would Like to Know about Imaging Thoracic Aorta Pre and Post Endovascular / Hybrid Repair

Station #5

Participants
Manav Bhalla, MBBS, Milwaukee, WI (*Presenter*) Nothing to Disclose
Mark D. Hohenwalter, MD, Milwaukee, WI (*Abstract Co-Author*) Nothing to Disclose
W. Dennis Foley, MD, Milwaukee, WI (*Abstract Co-Author*) Research Consultant, General Electric Company

TEACHING POINTS

1. To review CT imaging technique and interpretation of thoracic aorta, pre and post endovascular or hybrid repair.2. To discuss imaging findings which impact management of individual conditions, particularly endovascular repair.3. To discuss information required from imaging pre and post stent graft repair.

TABLE OF CONTENTS/OUTLINE

1. CT Angiogram of thoracic aorta: Imaging technique2. Thoracic aorta measurements : technique, recommended locations, normal limits of diameter.3. Thoracic aortic pathologies : Imaging keypoints for diagnosis, imaging considerations impacting endovascular or hybrid repair.4. Pre stent graft imaging : What information is needed ?5. Post aortic repair imaging : Indications, timing follow up studies, expected imaging findings, complications.6. Familiarities with various stent grafts and surgical procedures.

VI004-EB-SUB Vascular Complications Following Liver Transplant: Diagnosis and Intervention

Hardcopy Backboard

Awards
Certificate of Merit

Participants
Ankaj Khosla, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
David T. Fetzer, MD, Dallas, TX (*Presenter*) Nothing to Disclose
Stephen P. Reis, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Patrick D. Sutphin, MD, PhD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Clayton K. Trimmer, DO, Irving, TX (*Abstract Co-Author*) Nothing to Disclose
Sanjeeva P. Kalva, MD, Dallas, TX (*Abstract Co-Author*) Consultant, CeloNova BioSciences, Inc

TEACHING POINTS

1. Vascular complications are relatively common following liver transplantation and are associated with a significant risk of allograft dysfunction and patient morbidity and mortality. 2. It is important for the radiologist to understand the range of vascular anastomotic variants and the range of complications including stenosis and thrombosis.3. Imaging modalities such as Doppler ultrasound, CT and MR angiography, and traditional catheter angiography each play a critical role in the diagnosis of vascular complication. 4. A number of image-guided interventions can be utilized for these complications and can be suggested from diagnostic imaging.

TABLE OF CONTENTS/OUTLINE

Review of whole- vs partial-liver transplantation Typical anatomy following liver transplant Arterial anastomosis and variants Portal venous anastomosis Hepatic venous anastomosis Complications involving the hepatic artery Percutaneous interventions Angioplasty Thrombolysis Complications involving the portal vein Treatment options Complications involving the IVC and hepatic veins Treatment options

RC112

Imaging and Endografts (An Interactive Session)

Sunday, Nov. 29 2:00PM - 3:30PM Location: S103AB

VA IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC112A TEVAR Indications and Outcomes

Participants
Michael D. Dake, MD, Stanford, CA (*Presenter*) Scientific Advisory Board, W. L. Gore & Associates; Scientific Advisory Board, Abbott Laboratories; Research Consultant, Cook Group Incorporated; Research Consultant, TriVascular, Inc; Research Consultant, Medtronic, Inc; Research Consultant, Intact Vascular, Inc; Research Consultant, Novate Medical ; Research support, Cook Group Incorporated; Research support, Medtronic,Inc; Research support, W. L. Gore & Associates, Inc; ;

LEARNING OBJECTIVES

1) Understand the current applications of thoracic endografts for management of thoracic aortic pathologies. 2) Recognize the benefits and existing limitations of current endograft technologies for treatment of different aortic lesions. 3) Identify the complications and failure modes of TEVAR. 4) Know the current outcome metrics typically evaluated after TEVAR treatment of thoracic aneurysms and aortic dissections. 5) List the important imaging findings and criteria currently used to assess the suitability of aortic anatomy for TEVAR.

RC112B New Endografts for Complex AAA

Participants
Constantino S. Pena, MD, Miami, FL (*Presenter*) Speakers Bureau, Cook Group Incorporated; Advisory Board, C. R. Bard, Inc; Advisory Board, Boston Scientific Corporation; Advisory Board, General Electric Company;

LEARNING OBJECTIVES

1) Discuss the status of established AAA endografts. 2) Discuss new endografts for the treatment of AAA. Particularly discuss areas of improvement over established endografts. 3) Present data on novel endografts being developed.

RC112C Old Endografts with New Complications

Participants
Elliot K. Fishman, MD, Owings Mills, MD (*Presenter*) Research support, Siemens AG Advisory Board, Siemens AG Research support, General Electric Company Advisory Board, General Electric Company Co-founder, HipGraphics, Inc

LEARNING OBJECTIVES

1) Understand the spectrum of complications which may be seen in patients with endografts that have been in place for several years and the significance of these complications. 2) Develop a strategy for the evaluation of endovascular stents with specific scanning protocols and the role of post processing of the data into 3D. 3) understand the complexities of complications including involvement of bowel and adjacent organs and the CT findings that can suggest these complications.

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/

Elliot K. Fishman, MD - 2012 Honored Educator
Elliot K. Fishman, MD - 2014 Honored Educator

RC154

Precision Medicine through Image Phenotyping

Sunday, Nov. 29 2:00PM - 3:30PM Location: S403A

CA CH VA BQ IN

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Ella A. Kazerooni, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn what the term precision medicine means. 2) To understand how informatics intersects with clinical radiology to enable precision medicine in practice. 3) To learn through concrete examples how informatics based radiology precision medicine impacts health

ABSTRACT

Biomarkers have been emrabced by both the scientific and regulatory communities as surrogates end points for clinical trials, paving the way for their widespread use in medicine. The field of imaging biomarkers has exploded, and the their integration into clinical practice relies heaving on and intersects with the field of bioinformatics.. Once specific biomakers are show to have value, easily integrating them into the digital environment of the radiologist and communcating them to the health care providers and or directly to patients effeiciently and seamlessly is important for their value and impact on health to be realized. Culturally, it is taking radiologists from the era of description and largely qualitative reporting, into a quantitative future state, and leveraging informatics to extract information from imaging alone ot together with data available in the electronic medical record is essential for future sucess in this new world. To get there, understanding the impact of this approach as a value of our services, and standardization of imaging technques along the lines of what the RSNA QIBA initiative is designing, are essential, so that imaging biomarkers are robust, accurate and reprodicbile. Embraching this approach enables and facilitates new appracohes, relationships of imaging and IT researchers, vendors and consumers, to fully realize the possiblities. This course will discuss and describe the overall constructs, and use tangible exams of using this in practice today and for the future.

Sub-Events

RC154A Lung Nodules: Combining Population and Patient Specific Data to Inform Personalized Decision Making

Participants
Eliot L. Siegel, MD, Severna Park, MD (*Presenter*) Research Grant, General Electric Company; Speakers Bureau, Siemens AG; Board of Directors, Carestream Health, Inc; Research Grant, XYBIX Systems, Inc; Research Grant, Steelcase, Inc; Research Grant, Anthro Corp; Research Grant, RedRick Technologies Inc; Research Grant, Evolved Technologies Corporation; Research Grant, Barco nv; Research Grant, Intel Corporation; Research Grant, Dell Inc; Research Grant, Herman Miller, Inc; Research Grant, Virtual Radiology; Research Grant, Anatomical Travelogue, Inc; Medical Advisory Board, Fovia, Inc; Medical Advisory Board, Toshiba Corporation; Medical Advisory Board, McKesson Corporation; Medical Advisory Board, Carestream Health, Inc; Medical Advisory Board, Bayer AG; Research, TeraRecon, Inc ; Medical Advisory Board, Bracco Group; Researcher, Bracco Group; Medical Advisory Board, Merge Healthcare Incorporated; Medical Advisory Board, Microsoft Corporation; Researcher, Microsoft Corporation

LEARNING OBJECTIVES

1) Describe how data from a clinical trial can be repurposed as a decision support tool. 2) List some of the potential techniques that can be utilized to predict likelihood of a malignant nodule from the NLST database. 3) Explain how the Fleischner Guidelines can be personalized utilizing data from NLST and PLCO. 4) Detail the implications for lung screening trials of having access to NLST and PLCO data. 5) Demonstrate how a healthcare enterprise can create their own local reference database using information from their own patient population.

ABSTRACT

The era of personalized/precision medicine offers the potential to utilize patient and lesion specific data to personalize screening and diagnostic work-up, diagnosis, and treatment selection to a particular patient to optimize effectiveness. Although recently, the emphasis has been on utilization of genomic data in personalized medicine, there is a 'gold mine' of useful data in previously conducted clinical trials as well as patient medical electronic records that has, until now, gone largely untapped. The purpose of this presentation is to describe how the screening, diagnosis, and treatment of lung nodules can be personalized utilizing data from the NLST and PLCO clinical trials and how the Fleischner Guidelines and screening criteria for lung cancer can be modified according to the characteristics of an individual patient and individual nodule. The presentation will also include ways in which a facility can collect local data on their own patients to supplement these reference databases with experience from their own patient population.

RC154B Managing Cardiovascular Care through Image Phenotyping Combined with Patient Level Data

Participants
John J. Carr, MD, MS, Nashville, TN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

Cardiovascular diseases(CVD) develop over an individual's lifetime. CVD is the number one cause of death and morbidity worldwide. Integrated application of genomics, quantitative imaging and "big data" has the potential to positively transform cardiovascular

prevention and care and reduce the health and economic consequence of CVD. In this talk we will review how easily obtainable imaging biomarkers, already available, can power this change. Measures of cardiac and vascular structure and function as well as body composition provide great insight into and individual's risk of CVD, level of physical activity, diet, vascular health and general well-being.

RC212

Transcatheter Aortic Valve Replacement (TAVR)

Monday, Nov. 30 8:30AM - 10:00AM Location: N226

CH VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Dominik Fleischmann, MD, Palo Alto, CA (*Moderator*) Research support, Siemens AG;

Sub-Events

RC212A TAVR: The Surgeon's Perspective

Participants
Michael Fischbein, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the epidemiology, surgical and novel transcatheter treatment options for aortic stenosis. 2) Be able to analyze current evidence for the effectiveness of TAVR in different risk groups. 3) Comprehend the elements of a successful TAVR program implementation.

RC212B CTA for TAVR Planning: Current Evidence

Participants
Jonathon A. Leipsic, MD, Vancouver, BC (*Presenter*) Speakers Bureau, General Electric Company Speakers Bureau, Edwards Lifesciences Corporation Consultant, Heartflow, Inc Consultant, Circle Cardiovascular Imaging Inc

LEARNING OBJECTIVES

1) Review the recent advancements in the field of TAVR. 2) Review the published literature defining the role of MDCT for device selection and annular sizing. 3) Discuss the other ancillary roles of MDCT in TAVR planning.

Honored Educators

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Jonathon A. Leipsic, MD - 2015 Honored Educator

RC212C Measurements, Workflow, Training and Q/A

Participants
Shannon Walters, Stanford, CA, (shannon.walters@stanford.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define elements of an effective TAVR image analysis workflow. 2) Discuss the variety and applicability of measurement/imaging tools. 3) Develop training plans to improve inter observer agreement. 4) Improve efficiency and reliability through quality assurance.

RC214

Interventional Series: Venous Disease

Monday, Nov. 30 8:30AM - 12:00PM Location: S404CD

VA IR

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Marcelo Guimaraes, Charleston, SC (*Moderator*) Consultant, Cook Group Incorporated ; Consultant, Baylis Medical Company; Consultant, Terumo Corporation; Patent holder, Cook Group Incorporated
Wael E. Saad, MBBCh, Ann Arbor, MI (*Moderator*) Research Grant, Siemens AG ; Consultant, Siemens AG; Consultant, Boston Scientific Corporation; Consultant, Medtronic, Inc; Consultant, Getinge AB; Consultant, Merit Medical Systems, Inc;

LEARNING OBJECTIVES

1) Describe the use of radio frequency wire in central venous occlusion. 2) List rationale for venous thrombolysis. 3) Describe the indications for balloon retrograde transvenous occlusion (BRTO). 4) Discuss one approach to establishing a PE response team.

ABSTRACT

Sub-Events

RC214-01 PE I: Diagnosis and Triage of Pulmonary Embolism

Monday, Nov. 30 8:30AM - 8:55AM Location: S404CD

Participants
Akhilesh K. Sista, MD, New York, NY, (aks9010@med.cornell.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC214-02 Additional Catheter-Directed Thrombolysis for Proximal Deep Vein Thrombosis: 5 Year Results of a Randomized Controlled Trial (The Cavent Study)

Monday, Nov. 30 8:55AM - 9:05AM Location: S404CD

Participants
Ylva Haig, MD,PhD, Oslo, Norway (*Abstract Co-Author*) Nothing to Disclose
Ole Jorgen J. Grotta, MD, Oslo, Norway (*Presenter*) Nothing to Disclose
Tone R. Enden, MD,PhD, Oslo, Norway (*Abstract Co-Author*) Nothing to Disclose
Per M. Sandset, MD,PhD, Oslo, Norway (*Abstract Co-Author*) Nothing to Disclose
Carl-Erik Slagsvold, MD, Oslo, Norway (*Abstract Co-Author*) Nothing to Disclose
Gunnar Sandbek, MD,PhD, Oslo, Norway (*Abstract Co-Author*) Nothing to Disclose
Lars O. Holmen, MD, Krakeroy, Norway (*Abstract Co-Author*) Nothing to Disclose
Geir Hafsahl, MD, Billingstad, Norway (*Abstract Co-Author*) Nothing to Disclose
Nils-Einar Klow, MD,PhD, Oslo, Norway (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To examine whether additional catheter-directed thrombolysis (CDT) had a persistent benefit in reducing post-thrombotic syndrome (PTS), and if CDT increased patency and reduced reflux 5 years following a high proximal deep vein thrombosis (DVT)

METHOD AND MATERIALS

Patients with a first-time objectively verified DVT affecting the upper femoral vein and/or iliac vein were randomized to receive conventional therapy alone or to additional CDT. PTS was assessed using the Villalta scale and the venous system was examined by duplex ultrasound and air plethysmography to define the presence of patency and/or reflux.

CONCLUSION

Follow-up after 5 years showed an additional benefit of CDT in reducing PTS, which supports "the open vein hypothesis" and underpins the importance of early clot removal to prevent PTS.

CLINICAL RELEVANCE/APPLICATION

The results of this first randomized controlled trial to evaluate the effect of additional CDT for deep vein thrombosis supports the use of CDT in selected patients.

RC214-03 When are Advanced Inferior Cava Filter Retrieval Techniques Necessary? An Analysis in 724 Procedures

Monday, Nov. 30 9:05AM - 9:15AM Location: S404CD

Participants
Kush R. Desai, MD, Chicago, IL (*Presenter*) Nothing to Disclose
James L. Laws, BS, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Samdeep Mouli, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

Jennifer Karp, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Robert K. Ryu, MD, Chicago, IL (*Abstract Co-Author*) Consultant, Cook Group Incorporated Stockholder, EndoVention Inc Consultant, IORAD
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

PURPOSE

Retrievable inferior vena cava filters (rIVCF) with prolonged dwell time often cannot be removed with standard techniques. Advanced retrieval techniques, which are increasingly necessary with prolonged rIVCF dwell time, have positively impacted overall retrieval rates. We aim to derive a dwell time at which the use of advanced techniques becomes necessary to achieve retrieval success.

METHOD AND MATERIALS

All rIVCF retrieval procedures from 1/2009-2/2015 were identified from a prospectively acquired database. We assessed patient age/sex, filter dwell time, technical success, fluoroscopy time, adverse events, and advanced retrieval technique (loop wire, balloon disruption, directional sheath, endobronchial forceps, and Excimer laser sheath) use. The data were analyzed with binomial regression analysis to calculate a dwell time in months at which advanced techniques were necessary. Statistical significance was accepted at $p<0.05$.

RESULTS

724 retrieval procedures were performed during the study period, with an overall technical success rate of 97%. Filters encountered in the study period include devices manufactured by Cook, Cordis, Bard, Argon, Volcano, and ALN. After 3.1 months (95% CI 2.8-3.4, $p<0.01$), the likelihood of requiring advanced techniques to achieve retrieval success increased significantly.

CONCLUSION

At approximately 3 months rIVCF dwell time, the likelihood of requiring advanced techniques to maintain retrieval technical success increases significantly. In patients with rIVCFs in place beyond this time point, referral to centers with expertise in advanced filter retrieval techniques may facilitate their successful retrieval.

CLINICAL RELEVANCE/APPLICATION

Retrieval of prolonged dwell rIVCFs is not uniformly attempted and is often not successful due to lack of widespread expertise in advanced retrieval techniques. These devices with prolonged implantation time are prone to increased rates of complication. In accordance with a 2010 FDA safety communication, we strongly believe that rIVCFs that are no longer indicated should be removed. Identifying a time when advanced techniques will likely be necessary may improve overall retrieval of these devices.

RC214-04 Microbubble Augmented Ultrasound Thrombolysis of Deep Vein Thrombosis in an In-vitro Model

Monday, Nov. 30 9:15AM - 9:25AM Location: S404CD

Participants
Brahman Dharmarajah, MBBS, MRCS, London, United Kingdom (*Presenter*) Nothing to Disclose
Tom Mckinnon, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Christina Keravnou, Nicosia, Cyprus (*Abstract Co-Author*) Nothing to Disclose
Michalakis A. Averkiou, PhD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Mike t. Laffan, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Edward Leen, MD, FRCR, London, United Kingdom (*Abstract Co-Author*) Equipment support, Koninklijke Philips NV Equipment support, General Electric Company Equipment support, SuperSonic Imagine Research Consultant, General Electric Company Speakers Bureau, Bracco Group Speakers Bureau, Koninklijke Philips NV Speakers Bureau, AngioDynamics, Inc Speakers Bureau, General Electric Company
Alun Davies, FRCR, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Acute thrombus removal is recommended for extensive deep vein thrombosis (DVT) to prevent the long term sequelae of post thrombptic syndrome. However, catheter-directed thrombolysis confers a haemorrhage risk of up to 20%. Sonothrombolysis is the combination of high mechanical index ultrasound (US) and ultrasound contrast microbubbles (MBs) to achieve thrombus dissolution.

METHOD AND MATERIALS

Under venous shear stress, parallel plate flow chambers coated with tissue factor were used to create a DVT specific in-vitro clot model. Therapy groups included: control, US only and US and MBs (each n=8). US was applied via a Philips iU-22 platform with a C5-1 transducer using a custom bubble destruction sequence producing a triggered mechanical index pulse of 1.31 every 1500 milliseconds. SonoVue MBs were infused at 0.2% concentration. Fluroscopically tagged fibrin captured via video microscopy provided validated blinded offline image quantification of clot surface area coverage with statistical analysis performed using a one-way ANOVA.

RESULTS

Mean surface area coverage of the clot ± SD after treatment was 85.8 ± 5.6% in the control group, 52.7 ± 7.6% in the US only group and 10.7 ± 12.37% in the US and MBs group. A significant difference of US alone over control was identified ($P<0.05$), however, a further significant effect was displayed by US and MBs ($P<0.0001$). Qualitative video microscopy clot analysis revealed maintenance of the fibrin scaffold with areas of porosity with US only whilst complete dissolution of the fibrin structure with restoration of flow was observed with US and MBs.

CONCLUSION

This pilot study using commercially available MBs and US platform identifies sonothrombolysis as a feasible non-invasive, non-irradiating technique for the dissolution of DVT. Further translational research assessing both safety and efficacy of this novel technique is warranted before it can rival current thrombus removal strategies.

CLINICAL RELEVANCE/APPLICATION

Microbubble augmented ultrasound thrombolysis is feasible and may confer less risk of haemorrhage and irradiation than current thrombus removal strategies.

RC214-05 PE II: Treatment Options for the IR and the PE Response Team

Monday, Nov. 30 9:25AM - 9:50AM Location: S404CD

Participants
Robert A. Lookstein, MD, New York, NY (*Presenter*) Consultant, Johnson & Johnson; Consultant, Boston Scientific Corporation; Consultant, The Medicines Company

LEARNING OBJECTIVES

View learning objectives under main course title.

RC214-06 Unknown Case of the Session

Monday, Nov. 30 9:50AM - 10:15AM Location: S404CD

Participants
Wael E. Saad, MBBCh, Ann Arbor, MI (*Presenter*) Research Grant, Siemens AG ; Consultant, Siemens AG; Consultant, Boston Scientific Corporation; Consultant, Medtronic, Inc; Consultant, Getinge AB; Consultant, Merit Medical Systems, Inc;

LEARNING OBJECTIVES

View learning objectives under main course title.

RC214-07 Efficacy of TIPS/Embolization for Gastric Varices

Monday, Nov. 30 10:15AM - 10:25AM Location: S404CD

Participants
Janesh Lakhoo, BS, Chicago, IL (*Presenter*) Nothing to Disclose
Ron C. Gaba, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Gastric varices (GVs)-which occur in 5-35% of liver cirrhosis patients-may lead to severe bleeding and mortality rates ~25% at 2-years. Transjugular intrahepatic portosystemic shunt (TIPS) creation with/without variceal embolization serves to decompress and occlude varices in cases refractory to medical management. However, GVs may be difficult to treat with TIPS/embolization due to distance from TIPS shunt ("proximity" theory), large size resulting in competitive outflow with TIPS ("throughput" theory), and canalization of new feeders after embolization ("recruitment" theory). This study evaluated the efficacy of TIPS with or without embolization in decompressing or occluding GVs.

METHOD AND MATERIALS

In this single center, retrospective observational study, 79 patients with GV bleeding were selected from a cohort of 303 patients who underwent TIPS from 1999-2014. Individuals with bare metal stent TIPS and patients who lacked post-TIPS imaging/endoscopic follow-up were excluded. Chart and imaging review were used to assess variceal types, feeders, and post-procedure cross-sectional imaging or endoscopic patency. The primary study outcome measure was imaging and/or endoscopic GV patency rate as a surrogate for clinical efficacy of TIPS/embolization.

RESULTS

The final cohort consisted of 26 patients (M:F 16:10, median age 54 years, median MELD 16). GVs included GEV1 (10), GEV2 (2), IGV1 (3), IGV2 (2), and unspecified (9). TIPS were hemodynamically successful in 24/26 (92%) patients with median final portosystemic pressure gradient of 7 mm Hg. Multiple GV feeders (left/posterior/short gastric veins) were present in 62% (16/26) cases. embolization was performed in 75% (18/24). 13, 3, and 10 patients had imaging, endoscopic, or both imaging/endoscopic follow-up. The incidence of GV patency on post-TIPS follow-up was 77% (20/26) (78%/75% with/without embolization) at 129 days median follow-up time. The post-TIPS rebleeding incidence was 27% (7/26), and the 90-day mortality rate was 15% (4/26).

CONCLUSION

In this study, most GVs showed persistent patency despite TIPS decompression and variceal occlusion, and rebleeding incidence was high. The findings suggest suboptimal efficacy for GV therapy, and indicate need for study of alternative/adjunctive approaches to GV treatment, such as balloon-occluded antegrade or retrograde obliteration.

CLINICAL RELEVANCE/APPLICATION

TIPS/coil embolization may not optimally decompress or occlude gastric varices.

RC214-08 Comparison of Balloon-occluded Retrograde Transvenous Obliteration (BRTO) using Ethanolamine Olate Iopamidol (EOI), BRTO Using Sodium Tetradecyl Sulfate (STS) Foam and Modified BRTO (mBRTO)

Monday, Nov. 30 10:25AM - 10:35AM Location: S404CD

Participants
Young Hwan Kim, MD, Daegu, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young Hwan Kim, Daegu, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung Hee Hong, Daegu, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Byoung Je Kim, Daegu, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hye Min Son, Daegu, Korea, Republic Of (*Presenter*) Nothing to Disclose

PURPOSE

To compare the clinical outcomes of BRTO using EOI, BRTO using STS foam and mBRTO.

METHOD AND MATERIALS

From April 2004 to February 2015, Eighty-three patients underwent retrograde transvenous obliteration for gastric varices were analyzed retrospectively. BRTO with EOI was performed in 38 patients, BRTO with STS foam in 25 and mBRTO in 20. Among them, we obtained follow-up data in 66 patients. Recurrence of gastric varices was evaluated by follow-up endoscopy or CT. Medical records were reviewed for the clinical and technical efficacy. Statistical analyses were performed by Chi-square test, Fisher's exact test, Kruskal-Wallis test and Mann-Whitney U test.

RESULTS

Technical and clinical success was achieved in 79 patients (95.2%). As major complications, hemoglobinuria occurred in one patient with BRTO using EOI. Recurrence of gastric varices occurred more frequently in mBRTO group ($P<0.05$). Recurrence of gastric varices occurred in 1 patient in BRTO using EOI group and 4 patients in mBRTO group with 3.3% and 22.2% of each expected one-year recurrence rates. There was no recurrence of gastric varices in all patients underwent BRTO using STS foam. Abdominal pain occurred more frequently in BRTO using EOI than BRTO using STS foam and mBRTO ($P<0.05$). Procedure time of mBRTO was shorter than the other two conventional BRTO groups($P<0.05$).

CONCLUSION

Both BRTO using STS foam and mBRTO are better than BRTO using EOI for treatment of gastric varices in terms of complication and procedure time. However, mBRTO showed frequent recurrence of gastric varices during the long-term F/U rather than conventional BRTO.

CLINICAL RELEVANCE/APPLICATION

Modified BRTO is a time-saving procedure, but mBRTO has more recurrence rate. This article makes paying attention to perform mBRTO which has more recurrence rate of gastric varices.

RC214-09 Prediction for Improvement of Liver Function after B-RTO for Gastric Varices by Transient Elastography -To Manage Portosystemic Shunt Syndrome

Monday, Nov. 30 10:35AM - 10:45AM Location: S404CD

Participants
Akira Yamamoto, Osaka, Japan (*Presenter*) Nothing to Disclose
Norifumi Nishida, MD, PhD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroyasu Morikawa, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Atsushi Jogo, MD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Ken Kageyama, MD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Etsuji Sohgawa, MD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Shinichi Hamamoto, MD, PhD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Tohru Takeshita, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Yukimasa Sakai, MD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Yukio Miki, MD, PhD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Norifumi Kawada, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the predictive factors including transient elastography (TE) using Fibroscan® for improvement in liver function after B-RTO for GV.

METHOD AND MATERIALS

We retrospectively analyzed 47 consecutive patients who were followed up for more than 3 months after B-RTO and who had undergone TE before B-RTO between January 2011 and December 2013. The correlation between change in liver function (total bilirubin, albumin, and prothrombin time) and baseline liver function values and the liver stiffness measurement (LSM) by TE using FibroScan® was evaluated by Pearson's correlation test. Receiver operating characteristic (ROC) curves were used to determine the cut-off values with the best sensitivity and specificity in discriminating between patients who experienced improved liver function and those who did not. To clarify the cut-off level, time interval from B-RTO to aggravation of esophageal varix (EV) was also analyzed.

RESULTS

Of the 47 enrolled patients, B-RTO was successfully performed in all patients (100%).The serum albumin was significantly improved at 3 months after B-RTO (3.60 vs. 3.80, $p=0.001$). There was a significant negative correlation between the change in serum albumin and the baseline LSM ($r = -0.51$, $p<0.0001$). The best cut-off point for LSM was ≤ 22.9 kilopascals (kPa) with a sensitivity and specificity of 76.5% and 69.2%, respectively, and an area under the curve of 0.79 for predicting which patients would experience improved albumin after B-RTO. In the patient with ≤ 22 9 kPa LSM, serum albumin levels improved significantly from before to 3 months after BRTO (3.60 ± 0.46 vs. 3.90 ± 0.45 g/dl, $p<0.0001$). In the patient with ≤ 22 9 kPa LSM, serum albumin did not improve significantly from before to 3 months after B-RTO (3.50 ± 0.36 vs. 3.50 ± 0.40 g/dl, $p=0.75$). One year aggravation rate of EV after B-RTO was 9.5% in the patient with ≤ 22 9 kPa LSM, while 69.5% in the paient with > 22.9 kPa LSM.

CONCLUSION

The predictive factor for improvement in liver function after B-RTO was lower LSM (≤ 22 9 kPa) using TE. In the patients with ≤ 22 9 kPa LSM, aggravation rate of esophageal varices was very low.

CLINICAL RELEVANCE/APPLICATION

Predicter for improvement of liver function after B-RTO for garstric varices was identified by Transient Elastography.

RC214-10 BRTO-What Is It and When Should It Be Done

Monday, Nov. 30 10:45AM - 11:10AM Location: S404CD

Participants
Wael E. Saad, MBBCh, Ann Arbor, MI (*Presenter*) Research Grant, Siemens AG ; Consultant, Siemens AG; Consultant, Boston Scientific Corporation; Consultant, Medtronic, Inc; Consultant, Getinge AB; Consultant, Merit Medical Systems, Inc;

LEARNING OBJECTIVES

View learning objectives under main course title.

RC214-11 Chronic Venous Occlusions Treated with RFA

Monday, Nov. 30 11:10AM - 11:35AM Location: S404CD

Participants
Marcelo Guimaraes, Charleston, SC (*Presenter*) Consultant, Cook Group Incorporated ; Consultant, Baylis Medical Company; Consultant, Terumo Corporation; Patent holder, Cook Group Incorporated

LEARNING OBJECTIVES

View learning objectives under main course title.

RC214-12 Wrap Up and Discussion

Monday, Nov. 30 11:35AM - 12:00PM Location: S404CD

Participants

MSMC22

Cardiac CT Mentored Case Review: Part II (In Conjunction with the North American Society for Cardiac Imaging) (An Interactive Session)

Monday, Nov. 30 10:30AM - 12:15PM Location: S406A

CA VA CT

AMA PRA Category 1 Credits ™: 1.75
ARRT Category A+ Credits: 2.00

Participants
Pamela K. Woodard, MD, Saint Louis, MO (*Director*) Research Consultant, Bristol-Myers Squibb Company; Research Grant, Astellas Group; Research Grant, F. Hoffmann-La Roche Ltd; Research Grant, Bayer AG; Research agreement, Siemens AG; Research Grant, Actelion Ltd; Research Grant, Guerbet SA; ; ;
Geoffrey D. Rubin, MD, Durham, NC (*Moderator*) Consultant, Fovia, Inc; Consultant, Informatics in Context, Inc; Research Consultant, General Electric Company;
Arthur E. Stillman, MD, PhD, Atlanta, GA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify cardiac and coronary artery anatomy. 2) Recognize cardiac disease processes, including coronary atherosclerosis, as diagnosed on CT. 3) Understand methods of cardiac CT and coronary CT angiography post-processing.

Sub-Events

MSMC22A Coronary Atherosclerosis I

Participants
Geoffrey D. Rubin, MD, Durham, NC (*Presenter*) Consultant, Fovia, Inc; Consultant, Informatics in Context, Inc; Research Consultant, General Electric Company;

LEARNING OBJECTIVES

View learning objectives under main course title.

MSMC22B Coronary Atherosclerosis II

Participants
Smita Patel, MBBS, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

MSMC22C Valves and Cardiac Function

Participants
Andrew J. Bierhals, MD, Saint Louis, MO (*Presenter*) Research Grant, Johnson & Johnson

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

Cardiac CT can provide information on valves and function when retrospective ECG gating is used in the acquisition. These studies require extensive image post-processing to accurately depict the moving structures. This presentation will highlight basic image acquisition as well as the evaluation of normal and abnormal patients.

VIS-MOA

Vascular Interventional Monday Poster Discussions

Monday, Nov. 30 12:15PM - 12:45PM Location: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
Gretchen M. Foltz, MD, Saint Louis, MO (*Moderator*) Nothing to Disclose

Sub-Events

VI220-SD-MOA1 Quantitative Analysis of the Flow Dynamics in Percutaneous Isolated Pancreatic Perfusion Therapy using CT during Arteriography

Station #1

Participants
Satoru Murata, MD, Tokyo, Japan (*Presenter*) Nothing to Disclose
Shiro Onozawa, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Daisuke Yasui, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Tatsuo Ueda, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Fumie Sugihara, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Shinichiro Kumita, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Takahiko Mine, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Kenichi Suzuki, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Mitsuo Satake, MD, PhD, Kashiwa, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To analyze pancreatic flow dynamics during percutaneous isolated pancreatic perfusion (PIPP).

METHOD AND MATERIALS

All experiments were approved by our institution's Animal Experiment Ethics Committee. Fifteen pigs were divided into 5 groups, and PIPP was performed. Contrast media was circulated in an extracorporeal circuit through the pancreas at infusion rates of 12, 24, and 36 mL/min (groups 1, 2 and 3, respectively) in order to quantitatively evaluate pancreatic enhancement with computed tomography (CT) during arteriography. PIPP was performed in 2 additional groups at infusion rates of 12 and 24 mL/min without and with balloon occlusion of the anterior mesenteric artery (AMA) (groups 4 and 5, respectively). CT was performed before and during PIPP without AMA occlusion and during PIPP with AMA occlusion. The enhanced area was measured on CT axial images and summed to calculate the enhancement volume. The percentage of enhancement volume, relative to the volume of the whole pancreas, was compared in each case.

RESULTS

Without AMA occlusion, higher infusion rates significantly increased the enhancement volume of the pancreas ($P = 0.039$, Kruskal-Wallis test). The mean percentage of enhancement volume (groups 1, 2, and 3) was 60.3%, 72.6%, and 91.3%, respectively. Each enhancement area of the pancreases with AMA occlusion was significantly larger than the corresponding area without AMA occlusion ($P = 0.031$, Wilcoxon signed-rank test). The mean percentage with AMA occlusion (groups 4 and 5) was 92.7% and 95.9%, respectively.

CONCLUSION

Higher infusion rates, or infusion rates with AMA occlusion are suitable for pancreatic perfusion.

CLINICAL RELEVANCE/APPLICATION

High infusion rate and AMA occlusion will optimize the distribution of drugs to the pancreatic parenchyma in percutaneous isolated pancreatic perfusion therapy.

VI221-SD-MOA2 Percutaneous Endobiliary Radiofrequency Ablation with Stent Implantation for Malignant Biliary Obstruction: A Preliminary Study on Two-Step Method

Station #2

Participants
Hongyuan Liang, MD, Shenyang City, China (*Presenter*) Nothing to Disclose
Zaiming Lu, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Qiyong Guo, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To report our Preliminary result of two-step method(Two-step method means the RFA and stenting asynchronously) for percutaneous endobiliary radiofrequency ablation with stent implantation for malignant biliary obstruction.

METHOD AND MATERIALS

Between June 2013 and June 2014, 12 patients with malignant obstructive jaundice underwent percutaneous endobiliary radiofrequency ablation (RFA) by HabibTM EndoHBP catheter combined with sequential treatment of biliary stent implantation. 3-5 days after Percutaneous biliary drainage(PTBD) , PET-MR was used to display the lesions and intraluminal RFA was performed with

DSA guidance. 5-7days later, the patient received PET-MR to evaluate the effect of endobiliary RFA. If the tumor metabolism was significantly decreased , biliary stent was implanted directly. Otherwise another RFA was performed and stenting immediately. Procedure-related complications, stent patency, patient survival rate and postoperative biochemical tests were investigated.

RESULTS

All the 12 patients tolerated well a total of 16 RFA procedures with 17 self-expandable metal stents placed. 5 patients suffered with hilar obstruction, the others with distal lesions. The reasons for biliary obstruction are cholangiocarcinoma(8/12), pancreatic cancer(3/12) and metastasis(1/12). The main postablation complication was pain which could be controlled by analgesics. One patient suffered fever and biliary infection, cured by antibiotics. Stent patency was 198 days (106-405). Median survival was 265 days (78-625) from the time of the first RFA in each patient.

CONCLUSION

With the utility of PET-MR, two-step method of Percutaneous intraluminal RFA combined with biliary stenting may be more feasible and effective therapeutic option for unresectable extrahepatic malignant biliary obstruction.

CLINICAL RELEVANCE/APPLICATION

(deal with endobiliary RFA for biliary obstruction) two-step method of Percutaneous intraluminal RFA sequential treatment of with biliary stenting may be more feasible and effective therapeutic option for unresectable extrahepatic malignant biliary obstruction.

VI222-SD-MOA3 Non-ECG-Gated and Non-Enhanced MR Angiography in Arrhythmia with Flow-Sensitive Black Blood Technique

Station #3

Participants
Jun Isogai, MD, Asahi, Japan (*Presenter*) Nothing to Disclose
Takashi Yamada, Hasuda, Japan (*Abstract Co-Author*) Nothing to Disclose
Jun Kaneko, Hasuda, Japan (*Abstract Co-Author*) Nothing to Disclose
Kenji Yodo, Saitama, Japan (*Abstract Co-Author*) Employee, Toshiba Corporation
Mitsue Miyazaki, PhD, Vernon Hills, IL (*Abstract Co-Author*) Employee, Toshiba Corporation
Soichiro Iimori, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Tomoko Miyata, Saitama, Japan (*Abstract Co-Author*) Employee, Toshiba Corporation

PURPOSE

To selectively visualize the lower extremity arteries of arrhythmia patients without contrast media by the use of a free-ECG-gating Flow-Sensitive Black Blood (FSBB) technique.

METHOD AND MATERIALS

A principle of FSBB technique of the peripheral vascular imaging is a subtraction process between two images with subtle different b values. A protocol optimization was performed on the lower extremity of 10 healthy volunteers. Subsequently, the revised FSBB protocol parameters were applied to 40 chronic kidney disease (CKD) patients with arrhythmia, who complain intermittent claudication or have symptoms of lower limb ischemia. All the studies were performed on a 1.5T MRI system (EXCELART Vantage XGV Toshiba) equipped with a SPEEDER torso coil. FSBB imaging was performed as follows; T2*-weighted 3D gradient echo sequence, b value; difference between 0 and 0.1-0.4, and typical scan time=2-3min. The performance of FSBB on the lower extremity artery was assessed for the image contrast, as compared with unenhanced MRA techniques including time-of-flight (TOF) and Fresh Blood Imaging (FBI) using ECG-gated half-Fourier FSE MRA.

RESULTS

FSBB provided excellent anatomical depiction in arrhythmia at the lower limb arterial trees, especially in slow-flow and tortuous arterial branches. Selective visualization of the arterial stenosis or occlusion in the lower extremity was successfully achieved in all CKD patients with arrhythmia. The scan time of FSBB was almost reduced by half than that of FBI or TOF using ECG-gating technique.

CONCLUSION

FSBB technique is independent of ECG-gating and consequently shortens examination time so that it may provide a valuable procedure for diagnosis of peripheral vascular imaging. Selective visualization of the lower extremity artery in arrhythmia patients without contrast media is of increasing significance for an interventional procedure in our aging population.

CLINICAL RELEVANCE/APPLICATION

Visualization of the lower limb artery of arrhythmia patients without contrast material is quite difficult using conventional unenhanced MR angiography. FSBB imaging is a new clinical tool with the use of MR susceptibility difference between tissue and vessels. It has been proven to be useful for brain imaging. In this study, we extended the application of FSBB to the lower extremity to investigate if FSBB could provide an additional benefit outside the brain.

VI250-SD-MOA4 The Effect of Bridging Locoregional Therapy on Recurrence in HCC OLT Patients: UNOS Population Study

Station #4

Participants
Minzhi Xing, MD, New Haven, CT (*Presenter*) Nothing to Disclose
Hayley Oligane, DO, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Hyun S. Kim, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the incidence of hepatocellular carcinoma (HCC) recurrence after orthotopic liver transplant (OLT) in patients treated with bridging locoregional therapy (LRT) vs. best supportive care and to identify factors which predict recurrence in a national

population study.

METHOD AND MATERIALS

The United Network for Organ Sharing (UNOS) database was used to identify patients with HCC who were listed for OLT between 2002 and 2013. Patients within Milan Criteria for whom an HCC Model for End-Stage Liver Disease (MELD) exception was approved were included. Tumor histopathological characteristics from available explant data were assessed. Chi square tests were used to compare categorical variables and t-tests to compare continuous variables. Kaplan-Meier estimation was used for survival analysis with log-rank test and Cox proportional hazard models to assess independent prognostic factors for OS.

RESULTS

Of 17291 patients with HCC who were listed for OLT, 14511 received OLT, mean age 57.4 years, 76.8% male; 3889 (26.8%) received bridging LRT. The overall incidence of post-OLT HCC recurrence was 6.7%; it was 3.6% (140/3889) in the bridging LRT group and 7.65% (813/10622) in those who did not receive LRT (p=0.11). Of the 14511 patients, 2794 had complete explant data available. Of these, 11.4% had microvascular invasion on explant pathology. The incidence of recurrence in patients with microvascular invasion was 29.4% (92/313), and in patients without microvascular invasion it was 11.9% (295/2481) (p=0.001). On multivariate analysis, HCC recurrence was found to be an independent and significant prognostic factor of post-transplant survival, p=0.001; HR=3.2 (1.6-14.2).

CONCLUSION

In a large-scale population study, the rate of post-transplant recurrence of HCC in OLT patients who received bridging LRT was significantly lower than in those who did not receive bridging LRT. Presence of microvascular invasion on explant pathology was found to predict incidence of HCC recurrence, and recurrence was an independent prognostic factor for prolonged post-OLT survival.

CLINICAL RELEVANCE/APPLICATION

In HCC OLT patients, microvascular invasion on explant predicts HCC recurrence, which is an independent prognostic factor for post-OLT survival.

VI219-SD-MOA5 Assessment of the Reliability of 4D DSA Temporal Data

Station #5

Participants
Jimmy Xu, BS, Madison, WI (*Presenter*) Nothing to Disclose
Sebastian Schafer, Madison, WI (*Abstract Co-Author*) Consultant, Siemens AG
Gabe Shaughnessy, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Kevin Royalty, PhD,MBA, Hoffman Estates, IL (*Abstract Co-Author*) Employee, Siemens AG
Pengfei Yang, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Carolina Sandoval-Garcia, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Charles M. Strother, MD, Madison, WI (*Abstract Co-Author*) Research Consultant, Siemens AG Research support, Siemens AG License agreement, Siemens AG

PURPOSE

4D DSA generates time-resolved 3D vascular volumes using current angiographic systems. Factors that may invalidate the temporal information have not been adequately evaluated. The two goals of this project were to determine the association between contrast reflux and physiologic waveforms, and to identify other factors that may corrupt physiologic waveforms.

METHOD AND MATERIALS

From an internal database, 34 studies from 17 patients, including normal exams (n=4), AVMs (n=15), and aneurysms (n=15), were selected based on available clinical correlates. Projections for 4D DSA reconstructions were evaluated for reflux (defined as either retrograde contrast flow in the artery injected or retrograde flow into arteries proxmal to the injection site). 4D DSA volumes were reviewed using prototype software. Starting 3 arterial diameters distal to the injection site, flow waveforms were analyzed and categorized as either physiologic or corrupted. Physiologic waveforms were defined as having a regular interval between time to peaks, an equal full width/half max width, and at least 3 adjacent curves. Fisher's Exact test was used to determine an association between physiologic waveforms and reflux.

RESULTS

Of the 34 cases, 23 (68%) had reflux and 11 (32%) did not. Of those with reflux, 17 (74%) had physiologic waveforms. There was no association between waveform characteristics and reflux (p= 1). Of the 6 cases with reflux and corrupted waveforms, visual inspection showed that catheters were located ~1 cm proximal to a stenotic or tortuous segment, or near the carotid siphon or external/internal carotid artery bifurcation. Injection rates that drove contrast into the contralateral vertebral artery also had corrupted waveforms.

CONCLUSION

The presence or absence of physiologic waveforms was not associated with reflux. Catheter position and injection rate are two factors that can corrupt physiologic waveforms. These findings suggest that contrast reflux did not invalidate 4D reconstruction temporal information, and therefore quantitative analysis can often be made even with reflux, as flow waveforms remain physiologic.

CLINICAL RELEVANCE/APPLICATION

Measurement of blood flow based on 4D DSA seems to be feasible. The ability to obtain and recognize physiologic temporal information is a critical component of this process.

VI120-ED-MOA6 Minimally Invasive Treatment Options for Management of Angiomyolipoma

Station #6

Participants
Amr S. Moustafa, MBBCh, MSc, Birmingham, AL (*Presenter*) Nothing to Disclose
Ahmed K. Abdel Aal, MD, PhD, Birmingham, AL (*Abstract Co-Author*) Consultant, St. Jude Medical, Inc Consultant, Baxter International Inc Consultant, C. R. Bard, Inc
Jonathan R. Hinshelwood, MD, Homewood, AL (*Abstract Co-Author*) Nothing to Disclose
William A. Barret, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Nathan W. Ertel, MD, Hoover, AL (*Abstract Co-Author*) Nothing to Disclose
Rachel F. Oser, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Teaching points: 1- Review the incidence, presentation and complications of angiomyolipoma (AML). 2- Discuss the different imaging modalities used for the diagnosis AML including techniques used for the diagnosis of poor fat containing AML. 3- Discuss the endovascular management of AML. 4- Discuss the percutaneous ablation of AML. 5- Highlight the advantages of the interventional radiology based management for AML. 6- Highlight the outcomes and potential complications of the treatment of AML.

TABLE OF CONTENTS/OUTLINE

Outline:1. Introduction.2. Incidence.3. Clinical presentation and complications of AML.4. Types of AML.5. Imaging of AML by different modalities.6. Special imaging techniques for poor fat containing AML.7. Indications for treatment.8. Endovascular management of AML.9. Percutaneous ablation of AML.10. Alternative surgical treatment.11. Outcomes.12. Potential treatment complications.13. Summary and conclusion.

VI007-EB-MOA High-resolution Magnetic Resonance Angiography as an Assessment Tool for Vascularized Lymph Node Transfer

Hardcopy Backboard

Participants
Alexander C. Kagen, MD, New York, NY (*Abstract Co-Author*) Speakers Bureau, Bayer AG
Joseph Dayan, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Erez Dayan, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Nishi Talati, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Jody Shen, MD, New York, NY (*Presenter*) Nothing to Disclose
Omid Khalilzadeh, MD, MPH, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Mark Smith, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To educate the reader regarding primary and secondary lymphedema, and the current and evolving therapies for this disease, including vascularized lymph node transfer. To discuss the magnetic resonance angiography (MRA) protocol for imaging donor and recipient soft tissue and vascular anatomy, highlighting pertinent findings. To illustrate expected imaging findings in the pre and post-operative settings, as well as complications and common pitfalls relevant to the surgeon.

TABLE OF CONTENTS/OUTLINE

Lymphedema Etiology/pathophysiology Epidemiology Medical and non-surgical treatments Surgical management of lymphedema Indications and Procedure Imaging assessment Role of MRA MRA protocol Pre-operative approach Lymph nodes Soft tissue anatomy and limb volumes Venous and arterial anatomy Lymphatic anatomy Post-operative approach Flap viability Lymph node assessment Soft tissue anatomy and limb volumes Venous and arterial anatomy

VIS-MOB

Vascular Interventional Monday Poster Discussions

Monday, Nov. 30 12:45PM - 1:15PM Location: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
Gretchen M. Foltz, MD, Saint Louis, MO (*Moderator*) Nothing to Disclose

Sub-Events

VI223-SD-MOB1 Bowel Interposition is No Longer an Obstacle in MR-guided High-intensity Focused Ultrasound Ablation of the Uterus

Station #1

Participants
Young-Sun Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hyo Keun Lim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyunchul Rhim, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To know the influences of bowel interposition on procedure feasibility and to evaluate the effectiveness of bowel manipulation technique in MR-guided high-intensity focused ultrasound (MR-HIFU) ablation of the uterus

METHOD AND MATERIALS

A total of 375 screening MR exams and 206 MR-HIFU ablations for uterine fibroid and/or adenomyosis performed from August 2010 to March 2015 were retrospectively analyzed. Influences of bowel interposition on procedure feasibility were assessed by comparing pass rates of overall/bowel-interposed cases before and after adopting bowel manipulation technique that consisted of sequential bladder filling, rectal gel filling and bladder emptying (ie, BRB maneuver). In cases where BRB maneuver were adopted, success rate and details of the technique were reviewed. Risk factors for technical failure were also assessed (age, BMI, disease type, uterine size, uterine configuration, GnRH pretreatment; logistic regression analysis).

RESULTS

Overall pass rates of pre-BRB and post-BRB periods were 59.0% (98/166) and 71.7% (150/209) (P=0.001), and corresponding rates in bowel-interposed cases were 5.4% (2/37) and 72.9% (43/59; failures due to other reasons) (P<0.001), respectively. BRB maneuver was adopted in 60 cases and successfully established safe acoustic windows in 95.0% (57/60). Bladder filling/emptying was repeated 1.7±1.0 (1-5) times and the amount of gel used was 180±86.5 (100-400)mL. Additional time taken for BRB maneuver was 12.7min in average. In 3 cases, manual compression of the upper bladder margin during bladder emptying was necessary, and bladder re-filling and through-the-bladder sonication was performed in 8 cases. Regarding through-the-bladder sonication as technical failure (ie, technical success rate=81.7%), a small uterine size turned out to be the only independent risk factor for BRB failure (B=0.093, P=0.021). Uterine sizes of success and failure cases were 101.8±15.2mm and 84.6±10.9mm, respectively (P=0.001).

CONCLUSION

Owing to high effectiveness of the bowel manipulation technique, bowel interposition may have little influence on the procedure feasibility of MR-HIFU ablation of the uterus. However, the cases with small uterus should be screened with caution.

CLINICAL RELEVANCE/APPLICATION

Bowel interposition in screening MR exams of MR-HIFU ablation of the uterus should not be used as an exclusion criterion any longer, except in cases with small size of the uterus.

VI224-SD-MOB2 Quasi Static Ultrasound Elastography Characterization of Thrombus Maturation in the Aneurysmal Sac after Embolization of Endoleaks with Chitosan Gels

Station #2

Participants
Husain M. Alturkistani, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Antony Bertrand-Grenier, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Elie Salloum, MSc, BEng, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Guy Cloutier, PhD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Sophie Lerouge, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Gilles P. Soulez, MD, Montreal, QC (*Abstract Co-Author*) 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

PURPOSE

To study with quasi static ultrasound elastography (QSUE) the maturation of thrombus and the mechanical properties of embolizing gels after endoleak embolization following aneurysm endovascular repair (EVAR)

METHOD AND MATERIALS

Common iliac artery aneurysms were created on 9 Mongrel dogs (18 iliac arteries). Then EVAR were performed with creation of a Type I endoleak. Two types of embolization gels [Chitosan (Chi) or Chitosan-Sodium-Tetradecyl-Sulfate (Chi-STS)] were injected equally in the aneurismal sac to seal the endoleak and promote healing. Aneurysms healing and endoleak evolution were followed by

Doppler ultrasound and QSUE at 1-week, 1-month, 3-months and for 3 dogs at 6-months. At sacrifice, DSA, CT-scan and macroscopic and histological analyses were done to identify residual endoleaks (DSA, CT-scan) and segment different regions of interests (ROI) (thrombus, Chi and Chi-STS gel). Elasticity values expressed as strain in percentage were obtained by QSUE and compared between ROIs and during time evolution.

RESULTS

Residual endoleaks were observed at sacrifice in 10 out of 18 aneurismal sacs. There was no significant evolution of thrombus elasticity over time (median for thrombus: 0.12, 0.12, 0.13 and 0.13% at 1-week, 1-month, 3-months and 6-months respectively). The strain values of Chi gel were similar to that of thrombus (median= 0.18, 0.19, 0.13 and 0.27 at 1-week, 1-month, 3-months and 6-months respectively) (P=0.58 at 3-month). Chitosan-STS found to be more solid than thrombus at 1-week (P=0.04). The strain values of chitosan-STS (0.06, 0.06, 0.09 and 0.13 % at 1-week, 1-month, 3-months and 6-months respectively) are lower than chitosan (P=0.02 at 1 month). At 6-months, we notice a degradation of chitosan and chitosan-STS with higher strain values.

CONCLUSION

QSUE was not able to show thrombus maturation post-EVAR. However, it was useful to characterize the elasticity of embolizing gels and their degradation over time.

CLINICAL RELEVANCE/APPLICATION

Quasi-static elastography (QSUE) can be useful after endoleak embolization to assess the mechanical properties of embolizing gels.

VI225-SD-MOB3 Usefulness of the Synchronism Subtraction Method at CT Angiography for Dialysis Patients with Peripheral Arterial Diseases

Station #3

Participants
Noritaka Noda, Hiroshima, Japan (*Presenter*) Nothing to Disclose
Takanori Masuda, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Naoyuki Imada, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Takayuki Oku, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Tomoyasu Sato, 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; Reseach Grant, DAIICHI SANKYO Group; Medical Advisor, DAIICHI SANKYO Group; Research Grant, Eisai Co, Ltd; Research Grant, Nemoto-Kyourindo; ; ; ; ;
Yukari Yamashita, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

In peripheral arterial diseases (PAD) patients undergoing computed tomography angiography (CTA) of the lower extremities, intravascular contrast enhancement must be adequate for accurate evaluation of the distribution and degree of the lesions. However, it is difficult to evaluate the calcified lesions through CTA in dialysis patients with PAD. One method of evaluation is the synchronism subtraction method with non-enhancement and enhancement images by synchronizing the X-ray orbit. This method can diagnose the stenosis lesion within the calcified vessel without the blooming artifact. This study was performed to compare the detecting of stenosis lesions of the lower-extremity artery by synchronism subtraction CTA (SSCTA) and by digital subtraction angiography (DSA).

METHOD AND MATERIALS

Helical scans of the SSCTA were performed using 64-detector CT (GE VCT with tube voltage 100kVp, tube current 200mA~700mA, detector configuration 32 x 1.25mm, rotation time 0.4s/r, helical pitch 0.516). 84 patients underwent CT and DSA. The vascular tree was divided into 5 segments. The reader independently reviewed the axial scans, multi-planar oblique, three-dimensional (maximum intensity projection and volume rendering) and subtraction reconstruction images to assess stenosis in the vessel.

RESULTS

25 patients could be evaluated without SSCTA in dialysis patients. In 84 patients, 420 segments were evaluated. Compared with DSA, the sensitively, specificity, PPV, NPV and diagnostic accuracy for SSCTA were 89.2%, 81.2%, 94.3%, 68.4% and 87.4% respectively.

CONCLUSION

SSCTA shows potential for diagnosing stenosis lesions within calcified vessel walls of dialysis patients with PAD.

CLINICAL RELEVANCE/APPLICATION

SSCTA can aid in diagnosis of stenosis lesions in calcified vessel walls of dialysis patients.

VI251-SD-MOB4 Use of Whole Liver Volumetric Enhancement Quantification on MRI for Response Assessment and Prediction of Survival after Transarterial Chemoembolization in Infiltrative and Multifocal Hepatocellular Carcinoma - Preliminary Study

Station #4

Participants
Susanne Smolka, New Haven, CT (*Presenter*) Nothing to Disclose
Todd Schlachter, MD, Farmington, CT (*Abstract Co-Author*) Nothing to Disclose
Ruediger E. Schernthaner, MD, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Julius Chapiro, MD, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Sonia P. Sahu, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Jae Ho Sohn, MD,MS, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Yan Zhao, MS, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Florian N. Fleckenstein, MS, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Ming De Lin, PhD, Cambridge, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV

Roberto Ardon, Suresnes Cedex, France (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Rafael Duran, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Researcher, BTG International Ltd; Consultant, BTG International Ltd; Researcher, Koninklijke Philips NV; Consultant, Koninklijke Philips NV; Researcher, Guerbet SA; Consultant, Guerbet SA; Consultant, Terumo Corporation; Consultant, Threshold Pharmaceuticals, Inc; Consultant, PreScience Labs, LLC; Researcher, Boston Scientific Corporation; Consultant, Boston Scientific Corporation

PURPOSE

The ill-defined borders in infiltrative hepatocellular carcinoma (HCC) and the sheer number of lesions in multifocal HCC can pose a challenge in response assessment after Transarterial Chemoembolization (TACE) with traditional methods (i.e. RECIST, mRECIST, WHO, EASL). Our preliminary study investigates the feasibility of whole liver volumetric enhancement quantification to measure treatment response and predict survival.

METHOD AND MATERIALS

From 2000 to 2014, 68 HCC patients with infiltrative or multifocal growth were retrospectively included and underwent MRI before and 1 month after their first TACE. For each session separately the whole liver was segmented and pre-contrast and arterial phase T1 sequences were subtracted. Viable tumor was identified in voxels enhancing above 2 times the standard deviation of enhancement inside a region of interest (ROI) placed in non-tumorous liver parenchyma, as previous work has shown to correlate with pathology. Hyperenhancing volume was noted in percent relative to the whole liver volume and compared to overall survival (OS). Kaplan-Meier analysis with log-rank test and Cox regression were performed. A threshold at 35% reduction between baseline and follow-up MRI was used to separate responders from non-responders.

RESULTS

Mean age was 63.3 years, 77.9% of patients were male and 64.7% had portal venous invasion. 33.8% of patients showed infiltrative growth pattern only, 33.8% infiltrative with solid parts and 32.4% multifocal HCC (>20 lesions). There was a statistically significant difference between responders and non-responders (p=0.011). The hazard ratio of death for responders was 0.336 (95%CI 0.139-0.810). Responders (14.7% of the patients) had an OS of 21.0±7.0 months, whereas non-responders (85.3%) had an OS of 6.8±1.4 months. Responders had a mean 57.8% decrease in enhancing volume, whereas non-responders on average had a 19.1% increase.

CONCLUSION

Our preliminary findings indicate that whole liver volumetric enhancement quantification on MRI can be used as an imaging biomarker for tumor response and survival in infiltrative and multifocal HCC that evades standard assessment methods.

CLINICAL RELEVANCE/APPLICATION

Response assessment after TACE for infiltrative and multifocal HCC by whole liver volumetric enhancement quantification is possible and can predict survival.

VI141-ED-MOB5 CT Angiography and 3-D Imaging of Aortoiliac Occlusive Disease: Collateral Pathways in Leriche Syndrome

Station #5

Participants
Sameer . Ahmed, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Siva P. Raman, MD, Baltimore, MD (*Presenter*) Nothing to Disclose
Elliot K. Fishman, MD, Owings Mills, MD (*Abstract Co-Author*) Research support, Siemens AG Advisory Board, Siemens AG Research support, General Electric Company Advisory Board, General Electric Company Co-founder, HipGraphics, Inc

TEACHING POINTS

Leriche syndrome represents atherosclerotic occlusive disease of the abdominal aorta and/or iliac arteries. This educational exhibit will review the pathophysiology and CT angiographic appearance of Leriche syndrome, and will utilize a combination of 3-D images and medical illustrations to demonstrate a variety of collateral pathways that can develop with aortic or iliac artery occlusions.

TABLE OF CONTENTS/OUTLINE

Background and pathophysiology of aortoiliac occlusion CT Angiography and 3-D technique Collateral pathways following aortoiliac occlusion Case examples (both illustrations and 3-D images) Treatment Conclusion

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

MSMC23

Cardiac CT Mentored Case Review: Part III (In Conjunction with the North American Society for Cardiac Imaging) (An Interactive Session)

Monday, Nov. 30 1:30PM - 3:00PM Location: S406A

CA VA CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Pamela K. Woodard, MD, Saint Louis, MO (*Director*) Research Consultant, Bristol-Myers Squibb Company; Research Grant, Astellas Group; Research Grant, F. Hoffmann-La Roche Ltd; Research Grant, Bayer AG; Research agreement, Siemens AG; Research Grant, Actelion Ltd; Research Grant, Guerbet SA; ; ;
Harold I. Litt, MD, PhD, Philadelphia, PA (*Moderator*) Research Grant, Siemens AG ; Research Grant, Heartflow, Inc;
U. Joseph Schoepf, MD, Charleston, SC, (schoepf@musc.edu) (*Moderator*) Research Grant, Bracco Group; Research Grant, Bayer AG; Research Grant, General Electric Company; Research Grant, Siemens AG; Research support, Bayer AG; ; ;

LEARNING OBJECTIVES

1) Identify cardiac and coronary artery anatomy. 2) Recognize cardiac disease processes, including coronary atherosclerosis, as diagnosed on CT. 3) Understand methods of cardiac CT and coronary CT angiography post-processing.

Sub-Events

MSMC23A Pulmonary Veins and Pericardial Disease

Participants
Jacobo Kirsch, MD, Weston, FL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe normal versus anomalous pulmonary venous anatomy. 2) Understand the imaging findings of complications of ablation for atrial fibrillation. 3) Describe abnormalities of the pulmonary veins identifiable on routine CT. 4) Identify the most common pericardial abnormalities evaluated with CT.

Honored Educators

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Jacobo Kirsch, MD - 2013 Honored Educator

MSMC23B Coronary Atherosclerosis III

Participants
Elliot K. Fishman, MD, Owings Mills, MD (*Presenter*) Research support, Siemens AG Advisory Board, Siemens AG Research support, General Electric Company Advisory Board, General Electric Company Co-founder, HipGraphics, Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

The goal of this session is to learn how to interpret pathology involving the coronary arteries beyond the detection of coronary artery stenosis. Focus on exam acquisition protocols, study interpretation protocols, and minimizing radiation dose are addressed. Specific topics addressed will also include coronary artery aneurysm, myocardial bridging, anomalous coronary arteries as well as vasculitis. Potential pitfalls will be addressed and pearls for study optimization will also be discussed.

Honored Educators

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Elliot K. Fishman, MD - 2012 Honored Educator
Elliot K. Fishman, MD - 2014 Honored Educator

SSE25

Vascular/Interventional (The Latest Techniques in Dialysis Interventions)

Monday, Nov. 30 3:00PM - 4:00PM Location: N226

VA IR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Himanshu Shah, MD, Zionsville, IN (*Moderator*) Consultant, Cook Group Incorporated ; Consultant, C. R. Bard, Inc
Scott A. Resnick, MD, Chicago, IL (*Moderator*) Nothing to Disclose

Sub-Events

SSE25-01 Transjugular Access for the Endovascular Management of Non-matured Autogenous Arteriovenous Fistulas

Monday, Nov. 30 3:00PM - 3:10PM Location: N226

Participants
Seulgi You, MD, Suwon, Korea, Republic Of (*Presenter*) Nothing to Disclose
Yoolim Baek, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Je Hwan Won, MD, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jinoo Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of our study is to evaluate the feasibility and safety of transjugular access for the management of non-matured autogenous arteriovenous fistulas (AVF).

METHOD AND MATERIALS

We retrospectively reviewed fifty-four patients who underwent transjugular endovascular treatment for non-matured AVFs from August 2013 to February 2015. The internal jugular vein ipsilateral to the AVF was accessed under ultrasound guidance. After catheterization of the arterial limb of the fistula, fistulography was performed to identify stenotic lesions which were subsequently treated by percutaneous transluminal angioplasty (PTA). On occasions when directional guidance was necessary, venography was performed through a 23 gauge scalp needle placed distally in the outflow vein to facilitate catheterization. We assessed the types of autogenous fistulas treated, time to catheterization of the AVF from the transjugular access, and total procedure time. The technical and clinical success rates, complications rate, and primary and secondary patency rates were also evaluated. Patency following PTA was estimated using the Kaplan-Meier method.

RESULTS

Eighteen patients had brachiocephalic fistulas (33.3%) and thirty-six patients had radiocephalic fistulas (66.7%). The mean time to catheterization of the AVF was 9.8 minutes and the mean total procedure time was 36.6 minutes. Venography via a scalp needle in the distal outflow vein was required in 35.2% of the cases (19 of 54 procedures) to facilitate catherization. Technical and clinical success were achieved in 98.1% (53 of 54 AVFs) and 92.6% of patients (50 of 54 AVFs), respectively. Minor complication (oozing at the scalp needle puncture site) occurred in one patient. There were no major complications. Primary patency rates were 78.7% at 6months and 57.5% at 1year, respectively. Secondary patency rates were 87.7% at 6 months and 82.5% at 18months, respectively.

CONCLUSION

Transjugular access for PTA of non-matured autogenous AVF is feasible and safe. This alternative route tackles potential problems of conventional techniques in PTA of non-matured fistulas such as difficult cannulation of non-matured outflow veins and hematomas following direct access into outflow veins.

CLINICAL RELEVANCE/APPLICATION

Endovascular management through transjugular access can be the first management modality in the salvage of non-matured autogenous AVF, as lowers the complication rate of conventional transvenous access.

SSE25-02 Outcomes of Fluoroscopic and Ultrasound Guided Placement versus Laparoscopic Placement of Peritoneal Dialysis Catheters

Monday, Nov. 30 3:10PM - 3:20PM Location: N226

Participants
Ahmed K. Abdel Aal, MD, PhD, Birmingham, AL (*Presenter*) Consultant, St. Jude Medical, Inc Consultant, Baxter International Inc Consultant, C. R. Bard, Inc
Amr S. Moustafa, MBBCh, MSc, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Peter Morad, MBBCh, Cairo, Egypt (*Abstract Co-Author*) Nothing to Disclose
Asmaa Mokhtar, Cairo, Egypt (*Abstract Co-Author*) Nothing to Disclose
Islam H. Shawali, BSc, Cairo, Egypt (*Abstract Co-Author*) Nothing to Disclose
Timothy M. Beasley, PhD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Maysoon Hamed, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

A variety of Peritoneal dialysis catheter (PDC) placement techniques are available including laparoscopic placement by surgeons,

and percutaneous placement by Interventional Radiologists. The aim of this study was to compare our one-year outcomes of PDC placement using fluoroscopy and ultrasound guidance with those placed using the laparoscopic technique.

METHOD AND MATERIALS

We retrospectively reviewed the medical records of 201 patients who had their first PDC placed between January 2005 and October 2014. A total of 100 patients were included in the study. We compared the survival outcomes of the PDC placed using fluoroscopic and ultrasound guidance by interventional radiology (radiologic group, n=29), with the PDC placed using laparoscopic technique by surgeons (laparoscopic group, n=61). Survival analyses were performed with the primary outcome being complication-free PDC survival at 365 days. Secondary outcomes were complication-free PDC survival at 90 days, overall catheter survival, median days-to-first complication and median days-to-catheter removal.

RESULTS

In the radiologic group, the complication-free PDC survival at 90 and 365 days were 62% and 55% respectively, compared to 64% (p=0.99) and 38% (p=0.17) respectively, in the laparoscopic group. Catheter malfunction was the only complication that was statistically significantly higher in the laparoscopic group (41%) compared to the radiologic group (14%, p=0.05). The overall catheter survival was 83% and 72% in the radiologic and laparoscopic groups respectively (p=0.31). Further analysis of the PDC with complications and subsequent removal revealed that the median days-to-first complication and the median days-to-catheter removal were 31 and 14 respectively in the radiologic group which was significantly less, compared to 98 (p=0.0036) and 179 (p=0.0006) respectively, in the laparoscopic group.

CONCLUSION

The fluoroscopic and ultrasound guided placement of a PDC offers a clinically effective alternative to laparoscopic placement with similar one-year survival and complication rates. Subsequent PDC complications and removal occurred earlier in the radiologic group compared to the laparoscopic group.

CLINICAL RELEVANCE/APPLICATION

Peritoneal dialysis is an increasingly utilized dialysis modality due to its cost-effectiveness and patient survival equivalency compared to traditional in-center hemodialysis.

SSE25-03 Same-day versus Delayed Arteriovenous Dialysis Graft Declotting: Does Timing Affect Procedural Success and Graft Patencies?

Monday, Nov. 30 3:20PM - 3:30PM Location: N226

Participants
Mark Winkler, Durham, NC (*Presenter*) Nothing to Disclose
Waleska M. Pabon-Ramos, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Gemini L. Janas, RT, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Michael J. Miller JR, MD, Chapel Hill, NC (*Abstract Co-Author*) Speaker, Cook Group Incorporated Speaker, Boston Scientific Corporation Advisory Board, Boston Scientific Corporation Advisory Board, C. R. Bard, Inc Speaker, Kimberly-Clark Corporation
Tony P. Smith, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Charles Y. Kim, MD, Durham, NC (*Abstract Co-Author*) Research Grant, Galil Medical Ltd; Consultant, Kimberly-Clark Corporation; Consultant, Cryolife, Inc

PURPOSE

To prospectively determine whether the interval between prosthetic arteriovenous graft (AVG) thrombosis and declotting affects procedural success, postintervention primary patency, or postintervention secondary patency.

METHOD AND MATERIALS

From March 2012 to March 2014, 94 adult patients who were referred for AVG declotting were recruited prospectively. Patients were interviewed prior to the procedure to determine the date the patient or the dialysis unit detected AVG thrombosis. Patients were categorized into two groups: those whose procedure was performed the same day that AVG thrombosis was detected (same-day), or those whose procedure was performed later (delayed). Data regarding post-procedure AVG interventions and AVG failure was collected from electronic medical records, and by calling patients and their dialysis centers. Fisher's exact test was used to compare the groups' procedure success rates. The primary patency and secondary patency were estimated using the Kaplan-Meier technique and compared using the log rank test. Univariate and multivariate Cox regression models were used to determine factors associated with the primary and secondary patencies. Factors assessed were: age, sex, inpatient vs outpatient status, graft age, graft configuration, history of prior ipsilateral tunneled dialysis catheter, number of prior graft interventions, indwelling stent, procedure time, and patient category (same-day vs delayed).

RESULTS

There were 2/26 (8%) unsuccessful procedures in the same-day group, and 3/68 (4%) in the delayed group (p=0.6). The median primary patency was 125 days (95%CI 118-292) for the same-day group, and 58 days (95%CI 82-167) for the delayed group (p=0.06). The median secondary patency was 327 days (95%CI 264-481) for the same-day group, and 300 days (95%CI 292-431) for the delayed group (p=0.9). On multivariate regression only, inpatient status (HR=2.6, 95%CI 1.3-5.3, p=0.01) and delayed declotting (HR=2.3, 95%CI 1.2-4.5, p=0.01) were independently associated with an increased risk of re-intervention.

CONCLUSION

Declotting thrombosed AVG the same day thrombosis is detected versus on a later day does not affect procedure success, primary patency, or secondary patency.

CLINICAL RELEVANCE/APPLICATION

Timing of declotting thrombosed AVG (on the same-day thrombosis is detected vs later) does not affect procedure success, primary patency, or secondary patency.

SSE25-04 Five-years Clinical Experience with Paclitaxel-coated Balloon Angioplasty for Stenoses Causing Dysfunction of Dialysis Arteriovenous Fistula and Synthetic Grafts

Monday, Nov. 30 3:30PM - 3:40PM Location: N226

Participants
Stavros Spiliopoulos, MD, Patra, Greece (*Presenter*) Consultant, C. R. Bard, Inc; Research funded, C. R. Bard, Inc
Panagiotis Kitrou, Rio, Greece (*Abstract Co-Author*) Nothing to Disclose
Konstantinos Katsanos, MD, London, United Kingdom (*Abstract Co-Author*) Consultant, Medtonic, Inc; Consultant, C. R. Bard, Inc
Panagiotis Papadimatos, MD, Rio, Greece (*Abstract Co-Author*) Nothing to Disclose
Andreas Valsamos, MD, Rio, Greece (*Abstract Co-Author*) Nothing to Disclose
Dimitris Siablis, PhD, Rion, Greece (*Abstract Co-Author*) Nothing to Disclose
Dimitrios Karnabatidis, MD, PhD, Patra, Greece (*Abstract Co-Author*) Consultant, C. R. Bard, Inc; Research funded, C. R. Bard, Inc

PURPOSE

This was an audit performed to evaluate the long-term safety and efficacy of paclitaxel-coated balloon (PCB) angioplasty of dysfunctional dialysis vascular access.

METHOD AND MATERIALS

From May 2010 to August 2014, we analysed 62 patients (40 male; mean age: 60±14 years) treated with PCBs due to dysfunctional arteriovenous fistulas (AVF; n=37) or grafts (AVG; n=25). Follow up period terminated on March 2015. Eighty eight procedures were performed (28 in AVGs, 60 in AVFs) to treat 88 lesions (38 de novo, 43.18%) with 97 PCBs (mean diameter: 5.9 ± 1.1mm, mean length: 67±24mm). In 26/88 cases (29.5%) post-dilation was necessary. Primary outcome measure was target lesion primary patency (TLPP). Secondary outcome measures included the identification of factors influencing TLPP and complications rates.

RESULTS

According to Kaplan-Meier analysis, TLPP was 70.3%, 28.6%, 8.9% and 5.9% at follow up 6, 12, 18 and 24 months, respectively. Cox multivariate regression analysis identified restenotic lesions (HR: 2.54; 95%CI: 1.42-4.56, p=0.002), previous stroke (HR: 3.11; 95%CI: 1.56-6.18, p=0.001) and thrombosed vascular access at presentation (HR: 2.67; 95%CI: 1.25-5.72, p=0.01) were independent predictors of decreased TLPP. Access age <3 years was correlated with superior TLPP (HR: 0.38; 95%CI: 0.20-0.70, p=0.002). Major complication rate was 1.1% (one cephalic vein rupture managed intra-procedurally with stent graft deployment).

CONCLUSION

In this series, Paclitaxel-coated balloon angioplasty of dysfunctional dialysis access was safe and provided very satisfactory primary patency rates. Treatment of de novo lesions was correlated with significantly better patency.

CLINICAL RELEVANCE/APPLICATION

PCB angioplasty of dysfunctional dialysis access is safe and yields superior long-term patency outcomes than those reported for plain balloonn angioplasty.

SSE25-06 Complications and Tip-point Location of Hemodialysis Catheter Scheduled into Superior Vena Cava: Findings on HR-MRCP and HR-T2WI

Monday, Nov. 30 3:50PM - 4:00PM Location: N226

Participants
Yigang Pei, MD, Changsha, China (*Presenter*) Nothing to Disclose
Wenzheng Li, MD,PhD, Changsha, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the performance of displaying the tip-location and relative complications of double lumen dialysis catheter scheduled into superior vena cava(SVC) using high resolution MRCP(HR-MRCP) and T2WI(HR-T2WI).

METHOD AND MATERIALS

The study protocol was approved by the local Research Ethics Committee.Informed consent was obtained from all subjects.Forty two consecutive hemodialysis patients with suspicion of related complications were scanned by HR-MRCP and HR-T2WI using peripheral pulse wave and respiration gated technique after each catheter lumen installed with 5 ml saline.All images was assessed by two experienced radiologists in order to show the catheter tip-location and relative complications such as fibrin sheaths(FS),thrombus(Th)and intraluminal clot(ILC).All subjects would be taken chest X-ray within 1-3days.For those patients with relative complications would be withdraw the catheter within 3-10 days.The tip location on X-ray was as the gold standard and was only in SVC and right atrium as normal.

RESULTS

40 out of 42 subjects were undergone successfully MRI.12 subjects showed normal with"double-eyes"sign on HR-T2WI and "double track"sign on HR-MRCP.For the tip-point location,6 patients showed catheter's tip-point abnormal including inside of the right ventricle (n=2),right brachiocephalic vein (n=2),inferior vena cava (n=1),right subclavian vein (n=1).The accuracy rate of HR-MRCP displaying catheter tip-point was 95% (38/40) in comparison with X-ray.For related complication,abnormal findings were detected in 28 (70%) subjects including FS (n=17;42.5%),Th (n=8;20%) and ILC (n=5;12.5%).ILC was determined using the "single eye"sign displayed on HR-T2WI and "single track"on HR-MRCP when one catheter lumen was filled with blood clot (n=3),and the absence of "eye sign"on HR-T2WI when both lumens were obstructed (n=2).28 subjects with relative complications had catheter's surgical withdraw where the findings were FS(n=10),Th(n=5),ILC(n=4),and died (n=2) due to pulmonary embolism.

CONCLUSION

HR-MRCP and HR-T2WI are excellent methods for visualizing catheter tip-point and related complications in patient with dialysis catheter scheduled into SVC,which is helpful to avoid pulmonary embolism and adjust the treatment plan.

CLINICAL RELEVANCE/APPLICATION

The evaluation of relative complications and tip-point of dialysis catheter is vital for hemodialysis patients and is helpful to adjust

the tip-location for further dialysis and surgical withdraw.

MSCT22

Case-based Review of Thoracic Radiology (An Interactive Session)

Monday, Nov. 30 3:30PM - 5:00PM Location: S100AB

CH VA ER

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Diana Litmanovich, MD, Haifa, Israel (*Director*) Nothing to Disclose

Sub-Events

MSCT22A Airway Disorders

Participants
Diana Litmanovich, MD, Haifa, Israel (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the current imaging technique for evaluating of airway disorders in adult population, with an emphasis on radiation dose reduction. 2) Learn important clinical aspects and characteristic imaging features (both static and dynamic) of various airways abnormalities . 3) Discuss key imaging findings which allow differentiation among various airway disorders, as well as alternative imaging modalities such as thoracic MRI.

ABSTRACT

MSCT22B Pulmonary Arteries and Aorta

Participants
Charles S. White, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

To review pathology of the pulmonary arteries and aorta, focusing on cross-sectional imaging.

MSCT22C Thoracic Civil and Military Trauma

Participants
John P. Lichtenberger III, MD, Bethesda, MD, (john.lichtenberger@usuhs.edu) (*Presenter*) Author, Reed Elsevier

LEARNING OBJECTIVES

1) Incorporate up-to-date epidemiological understanding of thoracic trauma into clinical practice. 2) Identify key imaging features of thoracic trauma in modern civilian and military settings with an emphasis on those features which alter clinical management. 3) Describe the pathogenesis of blast lung injury, its imaging appearance and prognosis.

ABSTRACT

Thoracic trauma is a key component of clinical practice, and radiological evaluation of trauma patients is integral to their surgical management. The medical understanding of civilian thoracic trauma has historically been informed by experiences in military combat. In turn, the development of modern imaging technology in the civilian sector has revolutionized triage and operative planning of trauma patients in both civilian and military settings. This complex interplay between civilian and military trauma care continues today, particularly with the advent of urban warfare. One example of the applicability of military thoracic trauma to the civilian sector is blast injury, a hallmark of modern combat trauma that has increased significantly in the civilian developed world. Most radiologists will care for thoracic trauma patients in medical treatment facilities equipped with modern imaging and surgical capabilities in a civilian setting and with civilian patterns of injury. However, in addition to conventional trauma radiology, exposure to modern combat-specific trauma cases will continue the educational and mutually beneficial interaction between civilian and military trauma medicine and ultimately benefit patient care.

MSMC24

Cardiac CT Mentored Case Review: Part IV (In Conjunction with the North American Society for Cardiac Imaging) (An Interactive Session)

Monday, Nov. 30 3:30PM - 5:30PM Location: S406A

CA VA CT

AMA PRA Category 1 Credits ™: 2.00
ARRT Category A+ Credits: 2.00

Participants
Pamela K. Woodard, MD, Saint Louis, MO (*Director*) Research Consultant, Bristol-Myers Squibb Company; Research Grant, Astellas Group; Research Grant, F. Hoffmann-La Roche Ltd; Research Grant, Bayer AG; Research agreement, Siemens AG; Research Grant, Actelion Ltd; Research Grant, Guerbet SA; ; ;
David A. Bluemke, MD, PhD, Bethesda, MD (*Moderator*) Research support, Siemens AG
Vincent B. Ho, MD, MBA, Bethesda, MD (*Moderator*) In-kind support, General Electric Company

LEARNING OBJECTIVES

1) To understand the clinical indications for retrospective ECG gated cardiac CT. 2) To illustrate methods to assess myocardial function from cine cardiac CT images. 3) To illustrate methods to assess normal and abnormal valvular function from cine cardiac CT images.

ABSTRACT

The mentored case review provides the opportunity for the attendees to learn the image acquistion, post-processing, and diagnosis for a wide variety of cardiac diseases commonly encountered in CT.

Sub-Events

MSMC24A Coronary Artery Disease and Incidental Noncardiac Findings

Participants
Frank J. Rybicki III, MD, PhD, Ottawa, ON (*Presenter*) Research Grant, Toshiba Corporation;

LEARNING OBJECTIVES

1) To review coronary CTA principles, including details related to image acquisition. 2) Demonstrate examples of CAD as depicted by CT. 3) Discuss strategies to assess the hemodynamic significance of individual coronary lesions. 4) Illustrate non-cardiac findings on coronary CTA images.

ABSTRACT

CT Angiography (CTA) is a guideline endorsed strategy to assess symptomatic patients with low to intermediate risk of coronary artery disease in both the non-emergent and emergent settings. Coronary CTA uses ECG gating to freeze cardiac motion and enables assessment of the lumen for stenosis. Coronary CTA has a high negative predictive value, but suffers when a lesion is detected with a moderate stenosis. Emerging CT methods are also exploring the role of CT to assess individual lesions, including ones that have been problematic, for hemodynamic significance. The clinical relevance relates to the fact that only lesions that are hemodynamically significant should undergo intervention, for example with balloon angioplasty and stenting. In addition, each coronary CTA should include images reconstructed "skin to skin" over the entire craniocaudal field of view that encompasses the heart. Thus, incidental lesions can and should be reported for all coronary CTA studies.

MSMC24B Congenital Heart Disease

Participants
Dianna M. Bardo, MD, Seattle, WA (*Presenter*) Speaker, Koninklijke Philips NV; Consultant, Koninklijke Philips NV; Author, Thieme Medical Publishers, Inc

LEARNING OBJECTIVES

1) Recognize the most common congenital heart disease (CHD) findings found in adults with unsuspected CHD. 2) Recognize and understand findings of CHD in patients with known CHD and the findings which may trigger surgical intervention. 3) Recognize the CT findings of commonly performed surgical procedures for palliation of CHD. 4) Develop an organized pattern for search and reporting of CHD findings. 5) Understand why CT is chosen as the advanced imaging modality over MR.

ABSTRACT

Adults with congenital heart disease (CHD) now outnumber children with CHD two to one. This phenomenon is due to the success of surgical palliation and medical management of patients with even the most severe forms of CHD. Surgical intervention is often performed at the time of diagnosis and in patients with residual hemodynamic lesions is often required throughout life. Though echocardiography is typically the initial imaging modality of choice, diagnosis and imaging surveillance of complex hemodynamic and anatomic CHD lesions is now most often accomplished with CT and MR. CT and CTA imaging techniques may be used to show detailed anatomic and functional images of the heart, postoperative changes and long term consequences of CHD.An organized, reproducible approach to identify cardiac anatomy of CHD lesions and surgical palliation should be adopted in order to accurately and thoroughly describe findings.

Active Handout:Dianna M. Ehrhart Bardo

http://abstract.rsna.org/uploads/2015/9001152/MSMC24B.pdf

MSMC24C Coronary Atherosclerosis and Bypass Grafts

Participants
Gautham P. Reddy, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify focal areas of stenosis in the coronary arteries on CT. 2) Describe the appearance of bypass graft stenosis on coronary CT. 3) Review the diagnosis of aneurysms in the native coronary arteries and in bypass grafts.

ABSTRACT

Honored Educators

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Gautham P. Reddy, MD - 2014 Honored Educator

MSMI24

Molecular Imaging Symposium: Case-based MI

Monday, Nov. 30 3:30PM - 5:00PM Location: S405AB

CA NR VA MI RO

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Vikas Kundra, MD, PhD, Houston, TX (*Moderator*) License agreement, Introgen Therapeutics, Inc
Jeffrey T. Yap, PhD, Salt Lake City, UT (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify molecular imaging. 2) Comprehend the basis of aspects of molecular imaging. 3) Describe molecular imaging performed in a radiology setting.

ABSTRACT

This course will describe molecular imaging, identify the mechanisms of some aspects of molecular imaging, and give examples of molecular imaging in oncology. Cases will include those from current practice. Mechanisms and scientific basis of examples will be discussed. Sample applications will be discussed and illustrated. Translational examples, including those that have good potential for clinical application, will be used to illustrate interesting aspects of molecular imaging in oncology.

Sub-Events

MSMI24A Oncology

Participants
Vikas Kundra, MD, PhD, Houston, TX (*Presenter*) License agreement, Introgen Therapeutics, Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

MSMI24B Neurology

Participants
Rathan M. Subramaniam, MD, PhD, Baltimore, MD, (rsubram4@jhmi.edu) (*Presenter*) Travel support, Koninklijke Philips NV

LEARNING OBJECTIVES

View learning objectives under main course title.

MSMI24C Cardiology

Participants
Robert J. Gropler, MD, Saint Louis, MO (*Presenter*) Advisory Board, Bracco Group Advisory Board, GlaxoSmithKline plc Advisory Board, Pfizer Inc Advisory Board, Bayer AG Research Grant, GlaxoSmithKline plc Research Grant, Pfizer Inc Research Grant, Clinical Data, Inc Research Grant, Lantheus Medical Imaging, Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

MSMI24D Vascular Inflammation

Participants
Chun Yuan, PhD, Seattle, WA (*Presenter*) Research Grant, Koninklijke Philips NV; Consultant, Koninklijke Philips NV; ;

LEARNING OBJECTIVES

View learning objectives under main course title.

MSMI24E Instrumentation

Participants
Jeffrey T. Yap, PhD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC312

Vascular Series: MR Angiography: New Techniques and Their Application

Tuesday, Dec. 1 8:30AM - 12:00PM Location: S102AB

VA MR

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Dominik Fleischmann, MD, Palo Alto, CA (*Moderator*) Research support, Siemens AG;

Sub-Events

RC312-01 Non-contrast MRA Techniques

Tuesday, Dec. 1 8:30AM - 8:55AM Location: S102AB

Participants
Scott B. Reeder, MD, PhD, Madison, WI (*Presenter*) Institutional research support, General Electric Company Institutional research support, Bracco Group

RC312-02 Depiction of Transplant Renal Vascular Anatomy and Complications: Unenhanced MR Angiography by Using Spatial Labeling with Multiple Inversion Pulses

Tuesday, Dec. 1 8:55AM - 9:05AM Location: S102AB

Participants
Hao Tang, Wuhan, China (*Presenter*) Nothing to Disclose

PURPOSE

To evaluate the ability to depict anatomy and complications of renal vascular transplant with unenhanced magnetic resonance (MR) angiography with spatial labeling with multiple inversion pulses (SLEEK) and to compare the results with color Doppler (CD) ultrasonography (US), digital subtraction angiography (DSA), and intraoperative findings.

METHOD AND MATERIALS

This study was approved by the institutional review board, and written informed consent was received before examination. Seventy-five patients who underwent renal transplantation were examined with unenhanced MR angiography with SLEEK and CD US. DSA was performed in 15 patients. Surgery was performed in eight patients. The ability of SLEEK to show transplant renal vascular anatomy and complications was evaluated by two experienced radiologists who compared the results with CD US, DSA, and intraoperative findings.

RESULTS

Patients successfully underwent SLEEK MR angiography. Transplant renal vascular anatomy was assessed in 87 arteries and 78 veins. Renal vascular complications from transplantation were diagnosed in 23 patients, which included 14 with arterial stenosis, three with arterial kinking, two with arteriovenous fistulas, two with venous stenosis, one with pseudoaneurysms, and one with fibromuscular dysplasia. Three patients had two renal transplants and nine patients had nine accessory renal arteries. More accessory renal arteries were detected with SLEEK than with CD US. Correlation was excellent between the stenosis degree with SLEEK and DSA (r= 0.96; P ,.05). For those with significant artery stenosis (.50% narrowing) proved with DSA (n= 7) or surgery (n= 3), positive predictive value was 91% (10 of 11).

CONCLUSION

Unenhanced MR angiography with SLEEK preliminarily proved to be a reliable diagnostic method for depiction of anatomy and complications of renal vascular transplant. It may be used for evaluation of patients with renal transplant, and in particular for those with renal insufficiency.

CLINICAL RELEVANCE/APPLICATION

Unenhanced MR angiography with SLEEK may be used for evaluation of patients with renal transplant, and in particular for those with renal insufficiency.

RC312-03 Nonenhanced ECG-gated Quiescent-interval Single Shot (QISS) MRA of the Lower Extremity for Planning of Interventional Procedures: Results in 43 PAD Patients

Tuesday, Dec. 1 9:05AM - 9:15AM Location: S102AB

Awards
RSNA Country Presents Travel Award

Participants
Peter Liersch, Duesseldorf, Germany (*Presenter*) Nothing to Disclose
Patric Kroepil, MD, Duesseldorf, Germany (*Abstract Co-Author*) Nothing to Disclose
Christoph K. Thomas, MD, Dusseldorf, Germany (*Abstract Co-Author*) Speaker, Siemens AG
Joel Aissa, Duesseldorf, Germany (*Abstract Co-Author*) Nothing to Disclose
Gerald Antoch, MD, Duesseldorf, Germany (*Abstract Co-Author*) Nothing to Disclose
Rotem S. Lanzman, MD, Duesseldorf, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the clinical value of nonenhanced ECG-gated Quiescent-Interval Single-Shot MR angiography (QISS-MRA) for planning of interventional procedures in patients with peripheral artery disease (PAD).

METHOD AND MATERIALS

43 patients (mean age 68.5 ± 10.8 years) with peripheral artery disease were included in this study. Nonenhanced QISS-MRA of the distal aorta and the lower extremity were acquired at 1.5T with 3mm slice thickness, with 0.6 mm overlap and an inplane resolution of 1.0 x 1.0 mm, resulting in a total scan time of approx. 9 min. ECG-gating was applied for synchronization of the quiescent interval with the period of maximum systolic inflow. The degree of stenosis was assessed by using a 4-point scale (grade 1, normal appearing vessel; grade 2, vessel narrowing < 50%; grade 3, stenosis 50%-99%; grade 4, vessel occlusion) for 15 predefined anatomical segments. QISS-MRA was used to plan interventional procedures. Interventional digital subtraction angiography (DSA) served as the reference standard.

RESULTS

QISS-MRA was performed successfully in all patients. 434 of 645 segments visible on QISS-MRA were evaluated with DSA during interventional procedures and were considered for further analysis. With QISS-MRA the degree of stenosis was assessed correctly in 404 of 434 (93.1%) segments, overestimated in 26 of 434 (5.9%) segments and underestimated in 4 of 434 (0.9%) segments. As compared to DSA, QISS-MRA had a high sensitivity (99.3%), specificity (97.2%) as well as positive and negative predictive value (89.3% and 97.3%) for the detection of significant stenosis (grade 3 and 4). Based on QISS-MRA, an appropriate arterial access was selected in all patients and the estimated length of stenosis or vessel occlusion was assessed correctly. 6 of 6 (100%) stented segments were not assessable.

CONCLUSION

ECG-gated QISS-MRA is a solid nonenhanced imaging technique for assessment of stenosis of the lower extremities and provides a reliable basis for interventional procedures. A limitation of QISS-MRA is the evaluation of stented segments.

CLINICAL RELEVANCE/APPLICATION

QISS-MRA is a reliable and precise nonenhanced imaging technique for assessment of peripheral arterial disease and can be applied safely in patients with contraindications for contrast material.

RC312-04 Qualitative and Quantitative Image Quality of Lower Extremity Angiography Using Non-Contrast-Enhanced Quiescent Interval Single-Shot (QISS) MRA: Comparison with CTA

Tuesday, Dec. 1 9:15AM - 9:25AM Location: S102AB

Participants
Akos Varga-Szemes, MD, PhD, Charleston, SC (*Presenter*) Nothing to Disclose
Giuseppe Muscogiuri, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Carlo N. De Cecco, MD,PhD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Pal Suranyi, MD, PhD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Julian L. Wichmann, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
U. Joseph Schoepf, MD, Charleston, SC (*Abstract Co-Author*) Research Grant, Bracco Group; Research Grant, Bayer AG; Research Grant, General Electric Company; Research Grant, Siemens AG; Research support, Bayer AG; ; ;
Stefanie Mangold, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Paola Maria Cannao, MD, San Donato Milanese, Italy (*Abstract Co-Author*) Nothing to Disclose
Shivraman Giri, PhD, Chicago, IL (*Abstract Co-Author*) Employee, Siemens AG
Thomas M. Todoran, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the qualitative and quantitative image quality of non-contrast quiescent interval single-shot (QISS) MRA in patients with peripheral artery disease (PAD).

METHOD AND MATERIALS

Twenty patients (67±6 years, 11 male) with PAD referred for a clinically indicated lower extremity CTA were consented for a non-contrast enhanced lower extremity MRA on a 1.5 clinical scanner (MAGNETOM Avanto, Siemens AG, Erlangen, Germany) using an investigational prototype QISS sequence (FOV 400x260mm2, TR/TE 3.5/1.4ms, flip angle 90°, acquisition length 144mm). Contrast to noise ratio (CNR) based on the vascular and peri-vascular signal was measured according to an 18-segment model. The segmental vascular enhancement and the image noise were rated on five-point scales (1-poor/non-diagnostic, 5-excellent) by two readers. Additionally, the number of non-diagnostic segments were counted and compared between CTA and QISS-MRA.

RESULTS

A total of 360 segments were evaluated. The average CNR measured in QISS-MRA images was 63.4±17.5. QISS-MRA vascular enhancement ratings by the two readers were 3.7±0.5 and 3.8±0.4, respectively, while the CTA readings were 4.0±0.4 and 4.1±0.5, respectively, resulting in no significant difference between the two modalities. QISS-MRA image noise ratings were 3.4±0.7 and 3.6±0.5, respectively, while those for CTA were 4.0±0.5 and 4.2±0.5, respectively. Excellent inter-reader agreement was found in image quality ratings (κ>0.8). Thirty-one segments (8.6%) were excluded from the CTA analysis due to stent artifacts (11), total occlusion (14), or heavy calcification (6) and 26 segments (7.2%) were non-diagnostic at MRA due to major image artifacts (12) or total occlusion (14). Five out of the six heavily calcified segments were diagnostic at QISS MRA.

CONCLUSION

In this study, image quality of non-contrast QISS-MRA was comparable to that of contrast enhanced CTA. In certain circumstances, such as in heavily calcified segments, QISS-MRA provides superior lumen visibility compared to CTA. Such a non-contrast technique may have potential advantage in patients with severe renal disease or with other risk factors that prohibit the use of iodinated or gadolinium-based contrast material.

CLINICAL RELEVANCE/APPLICATION

QISS-MRA enables non-contrast evaluation of the lower extremity arteries with comparable image quality to CTA, and is potentially

beneficial for patients with severe renal disease.

RC312-05 Role of Preoperative Dynamic Time Resolved MRA (DTR MRA) for Detection and Localization of Perforators in Patients Undergoing Free Fibula Flap (FFF) for Head and Neck Reconstruction

Tuesday, Dec. 1 9:25AM - 9:35AM Location: S102AB

Participants
Manohar Kuruva, MBBS, MD, Little Rock, AR (*Presenter*) Nothing to Disclose
Mauricio A. Moreno, MD, Little Rock, AR (*Abstract Co-Author*) Nothing to Disclose
Tarun Pandey, MD, FRCR, Little Rock, AR (*Abstract Co-Author*) Nothing to Disclose
Roopa Ram, MD, Little Rock, AR (*Abstract Co-Author*) Nothing to Disclose
Kedar Jambhekar, MD, Little Rock, AR (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

This study aimed at evaluating the accuracy of preoperative DTR MRA for the detection and localization of lower extremity septo-cutaneous perforators in patients undergoing free fibula flap (FFF) for head and neck reconstruction.

METHOD AND MATERIALS

Retrospective chart review of 43 patients who underwent pre-operative DTR MRA prior to FFF in a tertiary academic setting from 2009-2015. DTR MRA scans were evaluated for presence of perforators and their location relative to fibular head, and subsequently correlated with intra-operative findings. We considered location of perforator to be in concordance if the vessel was within 3cms based on DTR MRA and surgical findings, and hypothesized that differences within this range could represent distal perforator branches presenting radiologically as separate vessels.

RESULTS

DTR MRA and surgery identified at least one perforator in 42/43, and 41/43 patients respectively. The technique appropriately detected the presence of perforators in 40/41 patients and ruled out perforators in 1/2 patients, yielding a sensitivity, specificity and accuracy of 97.5%, 50% and 95.3%. Collectively, DTR-MRA accurately predicted the location of the perforators in 75% of the cases (48/64). On a patient-based analysis, DTR MRA correctly predicted the location of at least one perforator in 37/41 patients yielding an accuracy of 90% for this purpose.

CONCLUSION

DTR MRA accurately predicts the presence and location of cutaneous perforators in patients undergoing FFF reconstruction.

CLINICAL RELEVANCE/APPLICATION

To our knowledge, this is one of the largest study validating the role of MRA for this purpose. Preoperative localization of the vessels significantly impacts surgical planning and may prevent unnecessary surgical explorations in a percentage of patients.

RC312-06 One-stop-shop Preoperative Evaluation for Living Liver Donors with Gd-EOB-DTPA-enhanced MRI: Can it be More Cost-effective and Convenient?

Tuesday, Dec. 1 9:35AM - 9:45AM Location: S102AB

Participants
Shuangshuang Xie, Tianjin, China (*Presenter*) Nothing to Disclose
Wen Shen, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Chenhao Liu SR, PhD,PhD, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Tao Ren, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Lihua Chen, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Lixiang Huang, MD, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Yue Cheng, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Qian Ji, PhD, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Jianzhong Yin, MD, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the efficacy, cost-effectiveness and convenience between one-stop-shop gadoxetic-acid-disodium (Gd-EOB-DTPA)-enhanced MR imaging (MRI) and multi-detector CT combined with conventional magnetic resonance cholangiopancreatography (MDCT-MRCP) in preoperative evaluation for living liver donors.

METHOD AND MATERIALS

Eighty living liver donors were included in this prospective study. They were randomly grouped in Gd-EOB-DTPA-enhanced MRI group (n=40) and MDCT-MRCP group (n=40). Anatomical variations determined by pre- and intra-operative findings, costs, and time for preoperative images were recorded. Image quality for the depiction of hepatic vessels, bile ducts and graft volume were ranked on a 4-point scale and compared between both groups.

RESULTS

Gd-EOB-DTPA-enhanced MRI provided better image quality than MDCT-MRCP for the depiction of hepatic and portal veins, and graft volume by both reviewers ($P<0.01$), and for the depiction of bile ducts by one reviewer ($P<0.01$). MDCT provided better image quality than Gd-EOB-DTPA-enhanced MRI for the depiction of hepatic arteries by both reviewers ($P<0.01$). Fifty nine living donors proceeded to liver donation (n=21 for Gd-EOB-DTPA-enhanced MRI group and n=38 for MDCT-MRCP group) with all anatomical findings of hepatic vessels and bile ducts accurately confirmed by intraoperative findings ($P>0.05$). The repeatability for graft volume measurements on Gd-EOB-DTPA-enhanced MRI was higher than MDCT-MRCP. Gd-EOB-DTPA-enhanced MRI was cheaper than MDCT-MRCP (US$519.72 vs US$631.85). The effective "in room" time in the Gd-EOB-DTPA-enhanced MRI was 3 minutes longer than MDCT-MRCP (25±5 min vs 28±6 min, $P<0.05$).

CONCLUSION

One-stop-shop Gd-EOB-DTPA-enhanced MRI is a more cost-effective and convenient modality with the similar diagnostic accuracy

One-stop-shop Gd-EOB-DTPA-enhanced MRI is a more cost-effective and convenient modality with the similar diagnostic accuracy as MDCT-MRCP in preoperative evaluation.

CLINICAL RELEVANCE/APPLICATION

Gd-EOB-DTPA-enhanced MRI is equal to MDCT-MRCP in preoperative evaluation of hepatic vessels, bile ducts and graft volume and is more cost-effective and convenient for living donors.

RC312-07 Contrast Enhanced MRA with Gadolinium and Ferumoxytol

Tuesday, Dec. 1 9:45AM - 10:10AM Location: S102AB

Participants
J. Paul Finn, MD, Los Angeles, CA (*Presenter*) Research Grant, Bracco Group; ; ;

LEARNING OBJECTIVES

1) Be familiar with the major clinical applications of Contrast Enhanced MRA using Gadolinium Agents and Ferumoxytol. 2) Be aware of the relative advantages and disadvantages of Gadolinium agents and Ferumoxytol for CEMRA in various clinical scenarios. 3) Be familiar with differences in techniques and acquisition protocols for CEMRA using Gadolinium agents and Ferumoxytol.

ABSTRACT

Contrast enhanced MR angiography (CEMRA) with gadolinium based contrast agents (GBCA) is well established as a reliable clinical tool for a variety of applications. Within the past decade, concerns about the risk of nephrogenic systemic fibrosis (NSF) has impacted the utilization of CEMRA and has stimulated the search for safer GBCA and alternatives to gadolinium agents. High stability and high relaxivity GBCA are now recommended for CEMRA to minimize risk of NSF in patients with renal failure, and dose reduction strategies have become standard. Also, early results with non-gadolinium CEMRA, specifically with ferumoxytol, are becoming available and suggest that in many cases, ferumoxytol may be a powerful alternative to GBCA for CEMRA. In this talk, we will review techniques and applications for CEMRA both with GBCA and ferumoxytol in adults and children over a spectrum of disease states.

RC312-08 Principles and Applications of 4D-flow

Tuesday, Dec. 1 10:20AM - 10:45AM Location: S102AB

Participants
James C. Carr, MD, Chicago, IL (*Presenter*) Research Grant, Astellas Group Research support, Siemens AG Speaker, Siemens AG Advisory Board, Guerbet SA

RC312-09 4D Flow can Depict and Quantify the Reflected Flow in the Lower Abdominal Aorta in Patients with Arteriosclerosis

Tuesday, Dec. 1 10:45AM - 10:55AM Location: S102AB

Participants
Masataka Sugiyama, Hamamatsu-Shi, Japan (*Presenter*) Nothing to Disclose
Yasuo Takehara, MD, Hamamatsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Naoki Ooishi, Hamamatsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Marcus T. Alley, PhD, Stanford, CA (*Abstract Co-Author*) Research Funding, General Electric Company; Research Consultant, Arterys;
Tetsuya Wakayama, PhD, Hino-shi, Japan (*Abstract Co-Author*) Employee, General Electric Company
Atsushi Nozaki, Hino, Japan (*Abstract Co-Author*) Employee, General Electric Company
Hiroyuki Kabasawa, Bunkyo, Japan (*Abstract Co-Author*) Employee, General Electric Company
Shuhei Yamashita, MD, Hamamatsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Hatsuko Nasu, Hamamatsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Harumi Sakahara, MD, Hamamatsu, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Majorities of physiological evidences indicate that the increase of Oscillatory Shear Index (OSI) produces an expression of pro-atherogenic genes. In patients with arteriosclerosis, reflected flow appears within the lower abdominal aorta during early diastolic phase. 3D cine PC MRI (4D-Flow) has enabled the coverage of full spatial and cardiac phase resolved data of the velocity vectors of the flowing blood within the whole abdominal aorta, thereby allow OSI mapping and flow volume analysis. The purpose of our study was to test if 4D Flow can depict reflected flow in the lower abdominal aorta, to quantitate the retrograde flow volume, and to verify their association with atherosclerosis, in the non-dilated lower abdominal aorta.

METHOD AND MATERIALS

37 patients (30 to 84 y.o.) underwent 3.0T MR study including 4D-Flow and Gd-3D MRA. The wall shear stress (WSS), the OSI, and aortic flow volume were measured for abdominal aorta. The ratio of retrograde to antegrade flow (R/A ratio) volume was calculated. Two experienced radiologists rated the presence of atherosclerosis in three grades in terms of the presence of the intimal lipidemic deposits with CT. Multiple regression analysis with explanatory variables of age, sex, systolic and diastolic blood pressure, diameters, systolic and diastolic WSS, OSI, maximum progressive and retrograde flow volume, and the R/A ratio was performed. The response variable was CT determinations of atheroma in the lower abdominal aorta.

RESULTS

Among flow dynamic parameters R/A ratio (p=0.019), and OSI (p=0.0364) were the determinant factors for the presence of atheroma. Prominent back flow collided with antegrade flow was also visually observed at early diastole in atherosclerotic patients and was considered to have induced instable shear stress directions, which resulted in higher OSI. The prominent retrograde flow represents reflected flow from the iliac arteries, which may be due to the lack of compliance of the atherosclerotic aorta and peripheral arteries.

CONCLUSION

4Dflow can depict and quantify the prominent retrograde flow during early diastole, which is closely related to the presence of

atheroma in the lower abdominal aorta.

CLINICAL RELEVANCE/APPLICATION

4DFlow could be an indicator of a loss of arterial volumetric compliance and increased OSI in the lower abdominal aorta, which might be the initiation factors of atherosclerotic degradation that leads to various fatal aortic diseases.

RC312-10 Assessment of Wall Shear Stress in Patients without Aortic Disease, with Aortic Aneurysms and with Penetrating Aortic Ulcers using Velocity Encoding 4D MRI

Tuesday, Dec. 1 10:55AM - 11:05AM Location: S102AB

Participants
Michael Rasper, Munich, Germany (*Presenter*) Nothing to Disclose
Jan Rudolph, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Christian Maegerlein, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Bettina M. Gramer, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Marcus Settles, PhD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Christian Reeps, MD, Muenchen, Germany (*Abstract Co-Author*) Nothing to Disclose
Hans-Henning Eckstein, MD, Muenchen, Germany (*Abstract Co-Author*) Nothing to Disclose
Ernst J. Rummeny, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Armin M. Huber, MD, Munchen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine whether patients with aortic aneurysms and penetrating aortic ulcers have an increased or reduced peak average wall shear stress magnitude compared to patients without aortic disease.

METHOD AND MATERIALS

26 patients (10 patients without aortic disease, 8 patients with aortic aneurysms (AA) and 8 patients with penetrating aortic ulcers (PAU)) underwent velocity encoded time resolved 3D MRI (4D PC MRI) of the aorta after contrast material (0.15 mmol/kg gadobenate dimeglumine) application during high resolution contrast-enhanced MR angiography of the aorta. 4D PC MRI was performed using ECG Gating and navigator echo based respiratory gating. Data acquisition was accelerated by SENSE in two directions (AF 1.5 x 2.5). The spatial resolution was 1.5 x 1.5 x 1.5 mm3. The temporal resolution was 40 ms. The peak velocity and the peak average wall shear stress magnitude were determined using the software GT-Flow (Version 2.0.10, Gyrotools, Switzerland).

RESULTS

The peak velocity was 71.6 ± 6.8 cm/s in patients without aortic disease, 35.6 cm/s ± 3.2 cm/s in patients with penetrating aortic ulcer and 18.2 ± 2.7 cm/s in patients with aortic aneurysms. The peak average wall shear stress magnitude was 0.35 ± 0.09 N/m2 in patients without aortic disease, 0.13 ± 0.004 N/m2 in patients PAU and 0.07 ± 0.018 N/m2 in AA patients. Both patients with aortic ulcera and patients with aortic aneurysms showed lower mean values for peak velocity ($p < 0.001$ and $p < 0.00001$) and peak average wall shear stress magnitude ($p < 0.01$ and $p < 0.004$) compared to patients without aortic disease. Patients with AA had significantly lower wall shear stress magnitude values than PAU patients.

CONCLUSION

Compared to patients without aortic disease, peak velocity and wall shear stress were significantly reduced in patients with penetrating aortic ulcers and patients with aortic aneurysms.

CLINICAL RELEVANCE/APPLICATION

Aortic segmental wall shear stress and flow velocity can reliably be determined with velocity encoded 4D MRI. Reduced wall shear stress is associated with aneurysma growth and might therefore help to identify patients at risk.

RC312-11 A Speeding Ticket for Perfusion MRI? Acceleration Techniques and Their Effect on Arterial Input Function Sampling: Non-accelerated versus View-sharing and Compressed Sensing Sequences

Tuesday, Dec. 1 11:05AM - 11:15AM Location: S102AB

Participants
Matthias Benz, MD, Basel, Switzerland (*Presenter*) Nothing to Disclose
Georg M. Bongartz, MD, Basel, Switzerland (*Abstract Co-Author*) Research Grant, Bayer AG; Research Grant, Siemens AG; Research Grant, Guerbet SA
Sebastian T. Schindera, MD, Basel, Switzerland (*Abstract Co-Author*) Research Grant, Siemens AG; Research Grant, Ulrich GmbH & Co KG; Research Grant, Bayer AG
Johannes M. Froehlich, PhD, Bern, Switzerland (*Abstract Co-Author*) Consultant, Guerbet SA
Tobias Heye, MD, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Initiatives such as the Quantitative Imaging Biomarkers Alliance and the American College of Radiology Imaging Network seek to identify sources of variation that may contribute to the overall measurement error in dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI). The aim of this study was to determine the ability of various DCE-MRI sequences to image the arterial input function (AIF) of an arterial bolus in comparison to a reference standard in a flow-phantom.

METHOD AND MATERIALS

The dynamic flow-phantom consists of three input ports representing the venous backflow and three mixing chambers simulating the cardiopulmonary circulation with 4L/min. A 25 mm diameter cylindrical outflow representing the aorta, a water- and a muscle-phantom were scanned on a 3T MRI (Magnetom Prisma, Siemens Healthcare, Erlangen, Germany) using fast low angle shot 2d (Fl2d; temporal resolution [tr] 0.6s; reference standard) and 3d (Fl3d; tr 2.4s [P2=parallel imaging factor 2] and 3.9s), time-resolved imaging with stochastic trajectories (TWIST; tr 2.2s), and golden-angle radial sparse parallel imaging (GRASP, tr 1.1s) GRE sequences. Each acquisition with administration of 10 ml contrast agent (Dotarem, Guerbet) via a power injector (2ml/s flow rate)

was repeated three times. Essential sequence parameters were standardized: flip angle 15°; spatial resolution 2.3x2.3x3mm3. Signal over time curves were normalized and analyzed by full width half maximum (FWHM) measurements to asses within sequence (coefficient of variation [COV]) and between sequence variations (percentage difference).

RESULTS

Water and muscle signal COV ranged from 0.1-0.8%. Within sequence FWHM COV was 1.0% for Fl3d, 1.0% for Fl3dP2, 9.1% for TWIST and 0.3% for GRASP. Percentage difference FWHM in comparison to Fl2d as reference standard was 2.2% for Fl3d, 0.3% for Fl3dP2, 45.9% for TWIST, and 7.8% for GRASP.

CONCLUSION

MRI acceleration techniques vary in reproducibility and sampling of arterial input function. Incomplete coverage of the k-space with TWIST as representative of view-sharing techniques demonstrates incoherent data over time and thus limitations in the evaluation of AIF.

CLINICAL RELEVANCE/APPLICATION

In order to establish DCE-MRI as a reproducible quantitative imaging biomarker it is necessary to assess how various forms of accelerated sequences handle the dynamic signal over time.

RC312-12 Clinical Impact of MRA in Site Selection in Patients Undergoing Free Fibular Flap Transfer (FFF)

Tuesday, Dec. 1 11:15AM - 11:25AM Location: S102AB

Participants
Manohar Kuruva, MBBS, MD, Little Rock, AR (*Presenter*) Nothing to Disclose
Roopa Ram, MD, Little Rock, AR (*Abstract Co-Author*) Nothing to Disclose
Kedar Jambhekar, MD, Little Rock, AR (*Abstract Co-Author*) Nothing to Disclose
Mauricio A. Moreno, MD, Little Rock, AR (*Abstract Co-Author*) Nothing to Disclose
Tarun Pandey, MD, FRCR, Little Rock, AR (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the role and clinical impact of Dynamic Time-Resolved Magnetic Resonance Angiography (DTR MRA) for selecting the site for free fibula flap (FFF) harvest.

METHOD AND MATERIALS

A retrospective review of medical records of 69 patients who underwent pre-operative lower extremity DTR MRA prior to head and neck reconstructive surgery was done. Clinical findings were compared with MRA in determining the appropriate site of graft harvest.

RESULTS

DTR MRA identified vascular abnormalities, which led to change in management plan in 18/67 (27%) patients. Clinical findings were abnormal only in 4/18 (22%) of these patients. The two most common abnormalities included atherosclerotic narrowing (12 patients) and anatomical variations (4 patients). DTR MRA had significantly higher sensitivity to detect vascular abnormalities with implications in management than clinical examination alone (p=0.002). Addition of venous phase of imaging led to clinically occult venous pathologies in 4 patients, including deep venous thrombosis (2), varicose veins (1) and arteriovenous malformation/fistula (1).

CONCLUSION

Preoperative DTR MRA detected significant vascular abnormalities in patients undergoing FFF for head and neck reconstructive surgeries when compared to clinical examination,with a change in management in 28% of patients..

CLINICAL RELEVANCE/APPLICATION

DTR MRA prior to FFF can identify vascular pathology and anatomic variations and can potentially reduce the rate of complications and morbidity post fibular transfer for head and neck reconstructive surgeries.

RC312-13 Contrast-enhanced T1 Free-breathing Gradient Echo Sequences in the Assessment of Aortic Disease: Diagnostic Efficacy in Comparison with Standard T1 Breath-hold Gradient Echo Sequences

Tuesday, Dec. 1 11:25AM - 11:35AM Location: S102AB

Participants
Cammillo R. Talei Franzesi, Milan, Italy (*Presenter*) Nothing to Disclose
Davide Ippolito, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Pietro A. Bonaffini, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Davide Fior, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Giulia Querques, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Sandro Sironi, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the diagnostic accuracy of contrast-enhanced T1 free-breathing gradient echo sequences in comparison with standard MR-angiographic sequences in the evaluation of aortic disease.

METHOD AND MATERIALS

From January 2012 to January 2015, 57 patients (35 men; mean age 62.1 years) with aortic disease were evaluated. All patients were examined with a 1.5T magnet (Achieva, Philips), using a phased array multi-coil, after the intravenous injection of 0.1 mL*Kg of gadobutrol. The standard thoracoabdominal MR angiography (MRA) protocol included 3D-angiographic T1 gradient-echo fat-suppressed (3D-HR) sequences and T1 breath-hold gradient-echo fat-suppressed sequences (THRIVE). Multiplanar T1 free-breathing gradient-echo fat-suppressed (THRIVE-FB) sequences were additionally performed in all the examinations. Two

radiologists independently compared the diagnostic quality of the different angiographic sequences, in terms of visualization of aortic wall and lumen and main arterial branches. The vascular calipers at different aortic levels were calculated, compared and statistically analyzed among the different sequences. The interobserver agreement was then evaluated using the Intraclass Correlation Coefficient (ICC).

RESULTS

THRIVE-FB sequences showed high diagnostic accuracy in the assessment of vascular calipers and walls, with no significant differences in comparison with standard breath-hold sequences. They also demonstrated high sensitivity and specificity in the evaluation of vascular plaques, thrombus and adjacent structures. Not significant differences were obtained in terms of overall diagnostic quality between THRIVE-FB sequences and standard angiographic sequences (interobserver agreement ICC of 0.97).

CONCLUSION

Contrast-enhanced T1 free-breathing gradient-echo fat-suppressed sequences have shown higher diagnostic efficacy, with any significant differences, in comparison with standard breath-hold angiographic sequences, permitting to correctly visualize and evaluate the aorta and its major branches.

CLINICAL RELEVANCE/APPLICATION

Free-breathing angiographic protocol represents a useful tool, even in not-compliant patients, offering high diagnostic quality images, able to correctly evaluate thoracic and abdominal arteries.

RC312-14 Role of MR in Cardiovascular Disease Research

Tuesday, Dec. 1 11:35AM - 12:00PM Location: S102AB

Participants
Tim Leiner, MD, PhD, Utrecht, Netherlands, (t.leiner@umcutrecht.nl) (*Presenter*) Speakers Bureau, Koninklijke Philips NV; Research Grant, Bayer AG; Research Grant, Bracco Group

LEARNING OBJECTIVES

1) To identify how MRI can contribute to understanding the pathophysiology of non-cardiac vascular disease and to describe its merits and shortcomings in relation to other commonly used imaging modalities. 2) To describe different MR methods that can be used to study vascular disease such as vessel wall imaging, atherosclerotic plaque imaging and measurement of pulse wave velocity. 3) To explain which of the above MR methods can be used clinically, and which methods are primarily experimental.

RC313

Pediatric Series: CV/Chest

Tuesday, Dec. 1 8:30AM - 12:00PM Location: E353A

CH VA CT MR PD

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 3.50

FDA Discussions may include off-label uses.

Participants
Shreyas S. Vasanawala, MD, PhD, Palo Alto, CA (*Moderator*) Research collaboration, General Electric Company; Consultant, Arterys; Research Grant, Bayer AG;
Lorna Browne, MD, FRCR, Denver, CO (*Moderator*) Nothing to Disclose
Rajesh Krishnamurthy, MD, Houston, TX (*Moderator*) Research support, Koninklijke Philips NV; Research support, Toshiba Corporation
R. Paul Guillerman, MD, Houston, TX (*Moderator*) Nothing to Disclose

Sub-Events

RC313-01 Imaging of Aortopathies

Tuesday, Dec. 1 8:30AM - 8:50AM Location: E353A

Participants
Cynthia K. Rigsby, MD, Chicago, IL, (crigsby@luriechildrens.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define aortopathy. 2) Describe the imaging features of common aortopathies. 3) Show potential complications associated with aortopathies.

RC313-02 4D flow MRI Based Volumetric Aortic Peak Velocity Quantification: Efficiency, Observer Variability and Comparison to 2D Phase Contrast MRI

Tuesday, Dec. 1 8:50AM - 9:00AM Location: E353A

Participants
Michael Rose, Chicago, IL (*Presenter*) Nothing to Disclose
Kelly Jarvis, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Varun Chowdhary, MD, BS, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Alex Barker, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Bradley D. Allen, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Joshua D. Robinson, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Michael Markl, PhD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Susanne Schnell, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Cynthia K. Rigsby, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Standard methods for measuring peak blood flow velocity include Doppler echocardiography and 2D CINE phase contrast (PC) MRI. Due to their reliance on single-direction velocity encoding and regional flow analysis (2D planes) both methods can underestimate peak velocities, especially in cases of complex flow jets as commonly seen in patients with abnormal aortic valves. The aim of this study was to test the feasibility and efficiency of a new method for volumetric peak velocity quantification of aortic peak systolic blood flow velocities in a cohort of pediatric BAV patients using 4D flow MRI and velocity maximum intensity projections (MIPs).

METHOD AND MATERIALS

51 pediatric BAV patients (age = 14 ± 5, range = 3-24 years, 18 female) underwent aortic 4D flow MRI (1.5T Aera, Siemens, Germany). After pre-processing (velocity anti-aliasing, phase offset correction) and 3D segmentation of the aorta, velocity MIPs were generated to determine peak velocities in the ascending aorta, arch, and descending aorta by two independent observers. 4D flow derived peak velocities were compared to results from 2D CINE PCMRI from the same study for 36 BAV patients.

RESULTS

4D flow peak systolic velocities were significantly higher than 2D CINE PC MRI (2.02±0.72 m/s vs 1.72±0.81 m/s, p = 0.0001, Wilcoxon signed-rank test). Bland-Altman analysis of peak velocity assessment showed excellent inter-observer variability (mean difference = -0.005 m/s, limits of agreement = ± 0.192 m/s) with low average inter-observer error 2.0 %. The estimated time for 4D flow MRI pre-processing and segmentation was 20 min. Average analysis time (calculation of velocity MIP, ROI analysis) was 92 ± 49 s.

CONCLUSION

4D flow MRI in combination with 3D segmentation of the aorta and velocity MIP analysis can be used to determine aortic peak systolic velocity with high efficiency and low observer variability. The full volumetric coverage and 3-directional velocity of 4D flow MRI fully captures complex aortic flow patterns and is thus better suited to identify the highest velocity in an entire aortic segment compared to 2D CINE PC MRI, which underestimated peak velocities in our BAV cohort by 15%.

CLINICAL RELEVANCE/APPLICATION

In patients with aortic valve disease such as bicuspid aortic valve (BAV), the severity of valve disease is characterized using peak blood velocity to estimate the peak transvalvular pressure gradient (via the simplified Bernoulli equation).

RC313-03 Accuracy of Ventricular Septal Defect Measurements by High Pitch Computed Tomography Angiography of the Thorax in Pediatric Patients Younger Than One Year Compared to Echocardiographic and Intraoperative Measurements

Tuesday, Dec. 1 9:00AM - 9:10AM Location: E353A

Participants
Matthias S. May, Erlangen, Germany (*Presenter*) Speakers Bureau, Siemens AG
David Nau, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Oliver Rompel, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Matthias Hammon, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Uder, MD, Erlangen, Germany (*Abstract Co-Author*) Speakers Bureau, Bracco Group; Speakers Bureau, Siemens AG; Research Grant, Siemens AG;
Michael M. Lell, MD, Erlangen, Germany (*Abstract Co-Author*) Research Grant, Siemens AG; Speakers Bureau, Siemens AG; Research Grant, Bayer AG ; Speakers Bureau, Bayer AG; Research Consultant, Bracco Group; ;
Wolfgang Wust, MD, Erlangen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG

PURPOSE

Preoperative assessment of VSDs is routinely performed by echocardiography. However, it seems to be challenging to obtain precise and reproducible findings, due to the limited angulations that are available. Additional preoperative evaluation by Computed Tomography (CT) has become reasonable in the recent years for complex congenital heart disease and allow for assessment of the size of VSDs in a static and isovolumetric dataset. Our aim was to evaluate the accuracy of size measurement of congenital ventricular septal defects (VSD) using High Pitch Computed Tomography Angiography of the thorax compared to echocardiography and intraoperative findings in children with congenital heart disease below 1 year.

METHOD AND MATERIALS

Angiography of the chest was performed using a second and third generation Dual-Source CT in 54 patients (median age 7 days, range 1-348 days) with a high-pitch protocol (p=3.2-3.4) at low tube voltages (70-80 kV). The margins of the VSDs were angulated by Multiplanar Reformations and Minimum Intensity Projection (MinIP) was used to overcome partial volume effects. The results were compared to the measurements from echocardiography and intraoperative measurements served as reference.

RESULTS

Mean deviation of the CT-measurements compared to the intraoperative findings was not statistically significant (3.5 ± 3.0 mm, p=0.21), while the mean difference compared to echocardiography was significantly higher (7.4 ± 4.8 mm, p<0.01). The VSDs can be classified into four different types by CT. With the exception of apical septal defects the size of the defects seems not to correlate with a specific location. Median radiation dose was as low as 0.37 mSv (range 0.12 - 2.00 mSv).

CONCLUSION

High Pitch Computed Tomography Angiography of the thorax provides precise measurements of VSDs in pediatric patients with congenital heart disease younger than one year.

CLINICAL RELEVANCE/APPLICATION

Preoperative High Pitch Computed Tomography Angiography of the thorax, besides the advantages in imaging of the coronaries and great intrathoracic vessels, provides precise measurements of VSDs at reasonable low radiation dose.

RC313-04 Image Quality and Accuracy of a Prototype Self-Navigated 3D Whole-heart Sequence for the Assessment of Coronary Artery Anomalies in a Pediatric Patient Population

Tuesday, Dec. 1 9:10AM - 9:20AM Location: E353A

Participants
Giuseppe Muscogiuri, MD, Charleston, SC (*Presenter*) Nothing to Disclose
Akos Varga-Szemes, MD, PhD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Carlo N. De Cecco, MD,PhD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Pal Suranyi, MD, PhD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Julian L. Wichmann, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
U. Joseph Schoepf, MD, Charleston, SC (*Abstract Co-Author*) Research Grant, Bracco Group; Research Grant, Bayer AG; Research Grant, General Electric Company; Research Grant, Siemens AG; Research support, Bayer AG; ; ;
Paola Maria Cannao, MD, San Donato Milanese, Italy (*Abstract Co-Author*) Nothing to Disclose
Stefanie Mangold, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Davide Piccini, Lausanne, Switzerland (*Abstract Co-Author*) Employee, Siemens AG
Wolfgang Rehwald, Erlangen, Germany (*Abstract Co-Author*) Employee, Siemens AG
Anthony M. Hlavacek, MD, Charleston, SC (*Abstract Co-Author*) Investigator, Siemens AG Research Grant, Siemens AG
Arni C. Nutting, MD, Charleston, SC (*Abstract Co-Author*) Research Grant, Siemens AG

PURPOSE

The aim of this study was to assess the feasibility, image quality, and diagnostic performance of a prototype non-contrast enhanced self-navigated 3D (SN3D) whole-heart MRA acquisition in comparison with coronary CT angiography (cCTA) for delineating the coronary artery origin and proximal course in pediatric patients with suspected coronary artery anomalies.

METHOD AND MATERIALS

Seven patients (13±3 years) with suspected coronary artery anomalies underwent a reference standard cCTA (SOMATOM Flash, Siemens Healthcare, Forchheim, Germany) and a research non-contrast cardiac MRA (MAGNETOM Avanto 1.5T, Siemens Healthcare, Erlangen, Germany) for the assessment of the origin and proximal course of the coronary arteries. The steady-state free precession based SN3D MRA was performed using the following parameters: TR/TE 3.1/1.5ms, flip angle 115°, FOV 220mm, voxel size: 1.1mm3, and 12064 radial views distributed over 377 heartbeats. Subjective image quality of the SN3D MRA and cCTA was evaluated using a 4-grade scale (1, nondiagnostic; 2, sufficient; 3, good; 4, excellent). Visualization of the left main, left anterior descending (LAD), circumflex (LCX) and right coronary arteries (RCA), as well as the time of acquisition and signal to noise

ratio (SNR), were assessed. Wilcoxon test was used to compare subjective image quality between cCTA and MRA.

RESULTS

The acquisition time of the SN3D MRA was 5.9±1.4min with an average heart rate of 81bpm, while the mean SNR was 27±9. MRA and cCTA image quality ratings were 2.3±0.7 and 3.3±0.7, respectively (p>0.05). SN3D MRA allowed the visualization of the left main, the LAD and the RCA with good agreement to cCTA in all cases, but failed to visualize the LCX in a single case.

CONCLUSION

In this preliminary study there was good agreement for the evaluation of coronary artery anatomy between SN3D MRA and cCTA. The novel radial SN3D sequence allows for the acquisition of an isotropic volume in a free-breathing fashion in about half the time as a standard respiratory-navigated coronary MRA, with an improved ease of use, without penalties in image quality, and without radiation exposure, contrast agent administration or the need for general anesthesia.

CLINICAL RELEVANCE/APPLICATION

This non-contrast self-navigated MRA sequence provides relatively rapid, free-breathing radiation-free evaluation of anomalies of the coronary artery origin and proximal course in children.

RC313-05 Contrast Material Injection via Fenestrated Catheters is Useful in Pediatric Patients with Congenital Heart Disease Undergoing CT Angiography

Tuesday, Dec. 1 9:20AM - 9:30AM Location: E353A

Participants
Takanori Masuda, Hiroshima, Japan (*Presenter*) Nothing to Disclose
Yoshinori Funama, PhD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Masao Kiguchi, RT, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Takayuki Oku, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Naoyuki Imada, 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; Reseach Grant, DAIICHI SANKYO Group; Medical Advisor, DAIICHI SANKYO Group; Research Grant, Eisai Co, Ltd; Research Grant, Nemoto-Kyourindo; ; ; ; ;
Tomoyasu Sato, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Noritaka Noda, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

While 3D CT angiography (CTA) images are useful for evaluating the complex anatomy in patients with congenital heart disease, they require higher contrast enhancement to identify blood vessels and soft tissues. However, the thin pediatric vessel wall imposes an injection pressure limit and can result in poor CT enhancement. As the gauge of the fenestrated- is smaller than of the conventional nonfenestrated catheter, optimal enhancement can be achieved by controlling the injection pressure. We compared the injection rate, aortic enhancement, and injection pressure when intravenous contrast material was injected with fenestrated- and conventional non-fenestrated catheters.

METHOD AND MATERIALS

We randomly divided 34 pediatric patients seen between December 2014 and March 2015 into two groups. Group A consisted of 18 children (age one week to 8 months, body weight 3.6 ± 1.2 kg) and group B of 16 (age one week to 12 months, body weight 3.3 ± 0.9 kg). In group A we delivered the contrast medium via a 22-gauge conventional non-fenestrated catheter and in group B we used a 24-gauge fenestrated catheter. Whole-heart helical CTA scans were performed on a 64-detector scanner (GE VCT, tube voltage 80 kVp, detector configuration 64 x 0.625 mm, rotation time 0.4s/r, helical pitch 1.375, preset AEC noise index 12) and the injection rate, aortic enhancement, and injection pressure were compared in groups A and B.

RESULTS

The mean injection rate and aortic enhancement were 0.9 ± 0.1 ml/sec and 468 ± 45.0 HU in group A and 0.87 ± 0.3 ml/sec and 444 ± 63.5 HU in group B. There was no significant difference in the injection rate and aortic enhancement ($p = 0.34$, $p = 0.38$). The maximum injection pressure was significantly lower in group B than group A (0.33 vs. 0.55 kg/cm2, $p < 0.05$).

CONCLUSION

Use of the fenestrated catheter decreases the injection pressure limit while retaining the injection rate and aortic enhancement of conventional catheters.

CLINICAL RELEVANCE/APPLICATION

With use of the fenestrated catheter, pediatric CT angiography obtains the optimal aortic enhancement by changing injection rate in safety.

RC313-06 The Impact of Dual-source Parallelradiofrequency Transmission with Patient-adaptive Shimming on the 3.0 T Cardiac Magnetic Resonance in Children

Tuesday, Dec. 1 9:30AM - 9:40AM Location: E353A

Participants
Haipeng Wang, Jinan, China (*Abstract Co-Author*) Nothing to Disclose
Cuiyan Wang, MD, PhD, Jinan, China (*Abstract Co-Author*) Nothing to Disclose
Fei Gao, Jinan, China (*Abstract Co-Author*) Nothing to Disclose
Bin Zhao, MD, Jinan, China (*Presenter*) Nothing to Disclose

PURPOSE

To evaluate the effect of dual-source parallel RF transmission on the B1 homogeneity, the image quality (image contrast and off-resonance artifacts) in the cine b-SSFP sequence and the repeatability of left-ventricle cardiac function in 3.0T CMR of children.

METHOD AND MATERIALS

The prospective intraindividual comparison study was approved by the institutional ethics committee and written informed consent was obtained. The 3.0T cardiac magnetic resonance (CMR) was performed in 30 chronic myocarditis children by using the dual-source radiofrequency (RF) transmission with patient-adaptive RF shimming. B1 homogeneity and image contrast with and without RF shimming were quantitatively evaluated and t-test was used for statistical significance. The off-resonance artifacts were evaluated independently by two readers. Statistical significance was assessed by the Mann-Whitney U test and inter-observer agreement by Cohen's kappa test. The inter-observer agreement of LV cardiac function with dual-source RF transmission was evaluated by Bland-Altman analysis and the intra-class correlation coefficient (ICC).

RESULTS

Compared with single-source RF transmission, dual-source RF transmission with patient-adaptive RF shimming performed a higher mean percentage of flip angle (FA), lower coefficient of variation (CV) and higher image contrast in both free-breathe (NBH) and breathe-hold (BH) scanning($P < 0.05$ for all). The scores of off-resonance artifacts with patient-adaptive RF shimming were lower than that without RF shimming ($P < 0.05$) and inter-observer agreement between two readers was good to very good (kappa values from 0.66 to 0.86). A high level inter-observer agreement for cardiac function with RF shimming was acquired both in NBH scanning (CV: 1.91%-11.84%; ICC, 0.83-0.98) and BH scanning (CV: 0.52%-4.44%; ICC, 0.98-0.99)

CONCLUSION

Dual-source parallel RF transmission with patient-adaptive RF shimming could significantly improve the B1 homogeneity and image contrast, reduce the off-resonance artifacts in the b-SSFP cine image and show excellent reproducibility of cardiac function in the 3.0T CMR of children.

CLINICAL RELEVANCE/APPLICATION

Dual-source parallel RF transmission could significantly improve the B1 homogeneity and image quality and is suitable for the 3.0T cardiac magnetic resonance in children.

RC313-07 Estimation of Functional Lung Capacity and Correlation with the Results of Infant Pulmonary Function Test and Quantitative CT Assessment in Infants with Postinfectious Bronchiolitis Obliterans

Tuesday, Dec. 1 9:40AM - 9:50AM Location: E353A

Participants
Mi-Jung Lee, MD, PhD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Yoon Hee Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyun Joo Shin, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myung-Joon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myung Hyun Sohn, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the possibility for estimating functional lung capacity from ventilation inhomogeneity using infant pulmonary function test (iPFT) and quantitative CT assessment for air trapping in infants with postinfectious bronchiolitis obliterans (BO).

METHOD AND MATERIALS

This prospective study included infants with clinically and radiologically proven BO since 2009. We performed iPFT in these patients and measured tidal volume (TV), functional residual capacity (FRC) and lung clearance index (LCI) by sulphur hexafluoride multiple breath washout using an ultrasonic flow meter. From chest CT, we calculated total lung volume (CT-TLV) and imaging functional lung volume (CT-FLV) which showed higher attenuation than the mean attenuation of the grossly normal and air trapping areas. We compared iPFT and CT parameters using Spearman correlation analysis.

RESULTS

Thirteen infants (M:F = 11:2) were included in this study. The age was 3-17 months with the mean of 10.4 ± 4.5 months. The mean body weight and height were 9.4 ± 1.7 kg and 75.9 ± 8.0 cm. The values of TV, FRC and LCI were 82.0 ± 19.9 ml, 184.1 ± 49.1 ml and 8.2 ± 1.3, respectively. For chest CT, the effective radiation dose was 0.2-1.8 mSv with the mean of 1.0 ± 0.5 mSv. The values of normal lung attenuation and air trapping attenuation on CT were -571.3 ± 63.1 HU and -767.1 ± 58.3 HU. And the calculated CT-TLV and CT-FLV were 268.8 ± 90.9 ml and 202.9 ± 70.4 ml. In the correlation analysis, CT-TLV had a positive correlation with TV ($\gamma = 0.602$, $p = 0.029$) and FRC ($\gamma = 0.731$, $p = 0.005$). CT-FLV also showed a significant negative correlation with LCI ($\gamma = -0.670$, $p = 0.012$) which represented ventilation inhomogeneity.

CONCLUSION

Both iPFT and chest CT can demonstrate ventilation inhomogeneity and estimate functional lung capacity in infants with postinfectious BO with good correlation. Both methods can be useful and complementary for evaluating in these patients.

CLINICAL RELEVANCE/APPLICATION

Not only infant pulmonary function test but also quantitative chest CT assessment can demonstrate ventilation inhomogeneity and estimate functional lung capacity in infants who are not easy to evaluate lung function due to limited compliance.

RC313-08 Coronary Artery Imaging in Children

Tuesday, Dec. 1 9:50AM - 10:10AM Location: E353A

Participants
Lorna Browne, MD, FRCR, Denver, CO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) How to successively image the coronary arteries in children with both MR and CT. 2) How to interpret a range of coronary artery anomalies and pathologies.

RC313-09 Dynamic Airway Imaging

Tuesday, Dec. 1 10:30AM - 10:50AM Location: E353A

Participants
Rajesh Krishnamurthy, MD, Houston, TX (*Presenter*) Research support, Koninklijke Philips NV; Research support, Toshiba Corporation

LEARNING OBJECTIVES

1) Discuss indications and protocols for dynamic airway imaging in children using CT and MRI, with emphasis on advantages offered by new generation CT scanners. 2) Learn appropriate use of common post-processing tools and measurement metrics for the pediatric airway that correlate well with bronchoscopy. 3) Understand imaging findings that distinguish between intrinsic and extrinsic airway pathology. 4) Review common applications for dynamic airway imaging, including tracheobronchomalacia, vascular mediated airway compromise, complete tracheal rings, mediastinal masses, and airway tumors.

ABSTRACT

This talk will provide an overview of indications and protocols for dynamic airway imaging in children using CT and MRI, with emphasis on advantages offered by new generation CT scanners, and post-processing tools that allow derivation of metrics similar to bronchoscopy, We will review examples of intrinsic and extrinsic airway pathology in children, including tracheobronchomalacia, vascular mediated airway compromise, complete tracheal rings, mediastinal masses, and airway tumors.

RC313-10 Comparison of a ROI-based and a Whole-lung Segmentation Based Approach for MR Lung Perfusion Quantification in Two-year Old Children after Congenital Diaphragmatic Hernia Repair

Tuesday, Dec. 1 10:50AM - 11:00AM Location: E353A

Participants
Meike Weidner, Mannheim, Germany (*Presenter*) Nothing to Disclose
Verena Sommer, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Frank G. Zoellner, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Claudia Hagelstein, MD, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas Schaible, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Stefan O. Schoenberg, MD, PhD, Mannheim , Germany (*Abstract Co-Author*) Institutional research agreement, Siemens AG
Wolfgang Neff, MD, PhD, Alzey, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

By the means of a region-of-interest (ROI) based approach it has been demonstrated that 2-year old children after congenital diaphragmatic hernia (CDH) repair show reduced MR lung perfusion values on the ipsilateral side. As ROI-based approaches only cover parts of the lung tissue, this study aimed to evaluate if results can be reproduced by segmentation of whole lung, whether there are differences between both approaches and as a consequence which technique should be applied.

METHOD AND MATERIALS

DCE-MRI was performed in 30 children (24.3±1.8 month) after CDH repair using a 3D TWIST sequence (Siemens Healthcare, Germany). 0.05 mmol/kg body weight of contrast agent (Dotarem, Guerbet, France) were administered. Pulmonary blood flow (PBF) was calculated based on a pixel-by-pixel deconvolution approach. For ROI-based quantification, three circular ROIs (apical, middle and basal) per lung side were used both in the ventral and dorsal lung. Propagation of those circular ROIs through five adjacent sliced generated 6 cylindrical ROIs in the ventral and dorsal lung respectively. For whole-lung analysis, the whole lung was contoured. In both techniques larger vessels were excluded from analysis (Fig. A).

RESULTS

In the ROI-based approach, PBF was significantly reduced on the ipsilateral side (74.5±30.3 ml/100ml/min) in comparison to the contralateral side (113.1±40.4 ml/100ml/min; $p<0.0001$). Also in the whole-lung based approach ipsilateral PBF was significantly lower (73.9±25.5 ml/100ml/min) than in the contralateral lung (102.3±31.8 ml/100ml/min; $p<0.0001$). In the ipsilateral lungs, quantification results of the ROI-based and the whole-lung segmentation based approach were equal ($p=0.50$). In the contralateral lungs, the ROI-based approach significantly overestimated PBF in comparison to the whole-lung approach by approximately 9.5% ($p=0.0013$; Fig. B).

CONCLUSION

MR lung perfusion in 2-year children after CDH is significantly reduced ipsilaterally, both when quantified by a ROI-based and a whole-lung based approach. In the contralateral lung, the ROI-based approach significantly overestimates perfusion results and therefore whole lung segmentation should be preferred.

CLINICAL RELEVANCE/APPLICATION

With MR lung perfusion imaging, perfusion deficits after congenital diaphragmatic hernia can be depicted. Whole-lung segmentation for quantification is advisable, as a ROI-based approach can overestimate results.

RC313-11 Functional Lung MRI for Non-invasive Monitoring of Regional Effects of Inhaled Hypertonic Saline in Children with Cystic Fibrosis

Tuesday, Dec. 1 11:00AM - 11:10AM Location: E353A

Participants
Till F. Kaireit, Hannover, Germany (*Presenter*) Nothing to Disclose
Julius Renne, MD, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose
Christian O. Schoenfeld, MD, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose
Andreas Voskrebenzev, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose
Marcel Gutberlet, Dipl Phys, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose
Angela Schulz, Hanover, Germany (*Abstract Co-Author*) Nothing to Disclose
Gesine Hansen, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose

Tobias Welte, 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
Burkhard Tuemmler, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose
Jens Vogel-Claussen, MD, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Quantification of regional effects of inhaled hypertonic saline (7% NaCl) by functional lung MRI in adolescents with cystic fibrosis (CF).

METHOD AND MATERIALS

The clinical effect of a single treatment with hypertonic saline inhalation in patients with CF is still under debate. 17 CF patients prospectively underwent two functional lung MRI scans and pulmonary function tests on the same day before and 1h after a single treatment of inhaled hypertonic saline (n=10, mean 15,2y, mean FEV1% 80±21) or without any treatment (n=7, mean 13,9y, mean FEV1% 80±20) at 1.5T. As a 2nd control group 12 healthy volunteers (mean 28,5y) were included. Assessed parameters for both cohorts were as follows: MRI-derived T1 relaxation measurements breathing room air (T1(21)) and 100% oxygen as well as the calculated oxygen transfer function (OTF), normalized fractional ventilation (FV) obtained by ventilation-weighted Fourier Decomposition MRI; pulmonary blood flow (PBF) obtained by dynamic contrast enhanced MRI, a morpho-functional CF-MRI score and the lung clearance index (LCI). After manual segmentation of each lobe mean and coefficient of variation (CoV) were calculated.

RESULTS

Comparing the CF group to healthy controls, mean values of T1(21) (1176ms vs. 1246 ms, $p < 0.01$) and FV (0.67 vs. 0.95, $p < 0.001$) were significantly lower and the CoV significantly higher (CoV T1(21) 0.08 vs. 0,04; CoV FV 0.73 vs. 0.37, $p < 0.001$ for all). In CF group receiving treatment, mean values in the whole lung of OTF (pre 13.1/post 12.7 10-4/s/%O2), FV (pre 0.69/post 0.76), PBF (pre 98/post 102ml/100 ml/min), LCI (pre 12.1/post 13.1) and the morpho-functional score (pre 15 / post 17) did not show a significant difference between pre and post treatment measurements ($p > 0.05$). Also data on a lobar level in the treatment group as well as measurements in the CF-control group did not show any significant differences between the 2 MRI exams ($p > 0.05$).

CONCLUSION

Compared to healthy controls functional lung MRI detects significantly increased ventilation heterogeneity in CF patients. After a single treatment with inhalation of hypertonic saline (7% NaCl) neither functional lung MRI nor LCI detected a significant change in CF patients.

CLINICAL RELEVANCE/APPLICATION

This study shows the feasibility of functional lung MRI, as a non-invasive, radiation-free tool for visualization and quantification of potential regional treatment effects in patients with CF.

RC313-12 Comparison of Lung Ultrasound and Chest Radiographyin Estimating Lung Edema after Surgery for Congenital Heart Disease in Children

Tuesday, Dec. 1 11:10AM - 11:20AM Location: E353A

Participants
Laura Martelius, Helsinki, Finland (*Presenter*) Nothing to Disclose
Anu Kaskinen, Helsinki, Finland (*Abstract Co-Author*) Nothing to Disclose
Kirsi Lauerma, MD, Helsinki, Finland (*Abstract Co-Author*) Nothing to Disclose
Paula Rautiainen, Helsinki, Finland (*Abstract Co-Author*) Nothing to Disclose
Sture Andersson, Helsinki, Finland (*Abstract Co-Author*) Nothing to Disclose
Olli Pitkanen, Helsinki, Finland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Lung edema is a frequent complication after surgery for congenital heart disease in children. A readily available accurate measure for lung edema is lacking. Chest radiographs (CXR) are commonly used for this purpose. CXR, however, is inaccurate especially in intensive care when portable supine radiographs are used. In lung ultrasound (US) vertical artifacts known as B-lines have been shown to correlate with lung liquid. In adults with congestive heart disease B-lines in US correlates with lung edema scored from CXR. Our aim was to compare lung US and CXR in estimating lung edema in children after surgery for congenital heart disease.

METHOD AND MATERIALS

Lung US was performed on 50 children 1-6 h postoperatively using a high-frequency linear transducer. Videoclips from three anterolateral intercostal spaces on both sides were stored. An observer blinded to the patient data and CXR scored the abundance of B-lines on each videoclip using a 5-step scale (0 = no artefact, 1 = B-lines in <25% of surface area, 2 = <50%, 3 = <75%, and 4 = >75%). The postoperative CXR were evaluated for lung edema at the right and left upper and lower lobes, the middle lobe and lingula using a 4-step scale (0 = normal lung, 1 = minimal opacity, 2 = opacity partially obscuring lung vessels, 3 = opacity totally obscuring lung vessels). For each patient a mean score for lung US (B-line score), and for CXR (CXR LE score) was calculated.

RESULTS

There was a significant positive correlation between the B-line score and the CXR LE score ($R = 0.65$, $p < 0.001$).

CONCLUSION

Lung US is a promising diagnostic tool in evaluation of postoperative lung edema in patients with congenital heart disease.

CLINICAL RELEVANCE/APPLICATION

Lung US has great potential since the current methods for estimating lung edema are unsatisfactory (CXRs are nonspecific, invasive techniques are unreliable in patients with intracardiac shunts).

RC313-13 Computerized Texture Analysis of Pulmonary Nodules in Pediatric Osteosarcoma Patients:

Differentiation of Pulmonary Metastases from Non-metastatic Nodules

Tuesday, Dec. 1 11:20AM - 11:30AM Location: E353A

Participants
Yeon Jin Cho, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Young Hun Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yoo Jin Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ji-Eun Park, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyun Suk Cho, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sang Joon Park, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung-Eun Cheon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Woo Sun Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
In-One Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the value of computerized 3D texture analysis for differentiation of pulmonary metastases from non-metastatic lesions in pediatric osteosarcoma patients.

METHOD AND MATERIALS

Our study comprised 42 pathologically confirmed pulmonary nodules in 16 children with osteosarcoma who had undergone preoperative CT scans between January 2009 and December 2014. Each pulmonary nodule was manually segmented and its computerized texture features were extracted by using an in-house software program. Multivariate logistic regression analysis was performed to investigate the differentiating factors of metastatic nodules from non-metastatic lesions. A subgroup analysis was performed to identify significant differentiating parameters in non-calcified pulmonary nodules. The ROC curve was created to evaluate the discriminating performance of established model.

RESULTS

There were 24 metastatic pulmonary nodules and 18 non-metastatic pulmonary lesions. Pulmonary metastases and non-metastatic lesions exhibited significant differences in various histograms and volumetric parameters (P< .05). Multivariate analysis revealed that higher mean Hounsfield units (HU) (adjusted odds ratio (OR), 1.02) and larger effective diameter (OR, 17.03) are significant differentiators (P< .05). The subgroup analysis with non-calcified pulmonary nodules (13 metastases and 18 non-metastases) revealed significant differences between metastases and non-metastases in various parameters. Multivariate logistic regression analysis revealed that lower entropy (OR, 0.01) and larger effective diameter (OR, 38.92) are significant predictors of non-calcified pulmonary metastases (P< .05). The established logistic regression model of subgroup showed excellent discriminating performance in ROC analysis (AUC, 0.927).

CONCLUSION

Metastatic pulmonary nodules from osteosarcoma can be accurately differentiated from non-metastatic pulmonary lesions by using computerized texture analysis. High HU and larger effective diameter were the significant predictors for pulmonary metastases, while lower entropy and larger effective diameter were for non-calcified pulmonary metastases from non-metastatic lesions.

CLINICAL RELEVANCE/APPLICATION

The computerized 3D texture analysis can accurately differentiate pulmonary metastases from non-metastatic pulmonary lesions in pediatric osteosarcoma patients.

RC313-14 Extralobar pulmonary sequestration: initial CT findings predicting spontaneous regression in neonates

Tuesday, Dec. 1 11:30AM - 11:40AM Location: E353A

Participants
Hee Mang Yoon, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jin Seong Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ahyoung Jung, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young Ah Cho, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Chong Hyun Yoon, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

In general, it is accepted that extralobar pulmonary sequestration (EPS) may spontaneously regress. However, radiologic features associated with spontaneous regression of EPS have not been well documented. Therefore, we tried to find the CT features predicting spontaneous regression of EPS.

METHOD AND MATERIALS

A total of 51 patients were included in our study with the following inclusion criteria: (a) antenatally diagnosed with EPS, (b) underwent a CT scan within 1 month after birth, and (c) had more than one follow-up CT without treatment. Spontaneous regression of EPS was determined by percent decrease of volume (PDV) and decrease in diameter of feeders. Volume of EPS and diameters of feeding systemic arteries (FSA) were evaluated on all 148 CT. For the enhancement degree of EPS, CT attenuation number of EPS and the back muscle were measured on initial CT and the ratio of EPS-to-back muscle was calculated. The PDV and the changes in diameter of FSA between initial and follow-up CT scans were calculated. Univariate and multivariate linear regression analysis were performed to assess factors related to PDV and decrease in diameter of FSA.

RESULTS

PDV more than 50% (PDV≥50%) was noted in 20 patients (38.5%) within one year, in other 12 patients (23.1%) between one and two years, and in 6 patients after two years. The enhancement degree of EPS was significantly different between 38 patients with PDV≥50% and 13 patients with PDV<50 % (1.0±5.4 vs 2.1±1.1, respectively, p<0.001). Enhancement degree of EPS was the only significant factors predicting PDV≥50% (B=-26.227, p<0.001), and the decrease in diameter of FSA (B=-21.476, p=0.009). In addition, PDV showed significant correlation with decrease in the diameter of the FSA (r=0.602, p<0.001).

CONCLUSION

The volume of EPS had spontaneously decreased more than 50 % within 2 years without treatment in 63% of patients. The most important factor predicting spontaneous regression of the EPS was the enhancement degree on initial CT scan. Therefore, a significant volume regression and decrease in diameter of FSA can be expected without any treatment in a neonate with EPS showing hypoenhancement on initial CT scan.

CLINICAL RELEVANCE/APPLICATION

The enhancement degree of EPS on initial CT scan is significantly associated with spontaneous regression of EPS during follow-up. Based on this result, we can more confidently predict spontaneous regression of EPS in neonates.

RC313-15 Pediatric Chest Interventions

Tuesday, Dec. 1 11:40AM - 12:00PM Location: E353A

Participants
Kamlesh U. Kukreja, MD, Bellaire, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1. Describe different types of chest interventions for children.

RC314

Interventional Series: Embolotherapy

Tuesday, Dec. 1 8:30AM - 12:00PM Location: E351

VA IR

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 3.50

FDA Discussions may include off-label uses.

Participants
Brian S. Funaki, MD, Riverside, IL (*Moderator*) Data Safety Monitoring Board, Novate Medical
Rakesh C. Navuluri, MD, Chicago, IL (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe rationale of bariatric embolization. 2) Explain the rationale and treatment of high flow malformations. 3) Describe the preparation of cyanoacrylates for embolization. 4) List two complications related to embolization. 5) Recognize the significance of Type III endoleaks. 6) Describe approach to treatment of visceral aneurysms.

Sub-Events

RC314-01 Using Glue-How I Do It

Tuesday, Dec. 1 8:30AM - 8:45AM Location: E351

Participants
Yasuaki Arai, Tokyo, Japan (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC314-02 Empiric Embolization in Endoscopically Confirmed Non-variceal Acute Upper Gastrointestinal Hemorrhage is Expensive and Fails to Improve Clinical Outcome

Tuesday, Dec. 1 8:45AM - 8:55AM Location: E351

Participants
Karunakaravel Karuppasamy, MBBS,FRCR, Westlake, OH (*Presenter*) Nothing to Disclose
Bradley Martin, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Gordon McLennan, MD, Chagrin Falls, OH (*Abstract Co-Author*) Research Grant, Siemens AG; Research Grant, C. R. Bard, Inc; Research Consultant, C. R. Bard, Inc; Research Consultant, Medtronic, Inc; Research Consultant, Siemens AG; Research Consultant, Surefire Medical, Inc; Research Consultant, Rene Medical; Advisory Board, Siemens AG; Advisory Board, Surefire Medical, Inc; Advisory Board, Medtronic, Inc;
Abraham Levitin, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Baljendra S. Kapoor, MBBS, Cleveland, OH (*Abstract Co-Author*) Advisory Board, BTG International Ltd; Speaker, F. Hoffmann-La Roche Ltd
Mark J. Sands, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Ram Kishore R. Gurajala, MBBS, FRCR, Beachwood, NJ (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare clinical outcomes, radiation exposure and costs of empiric embolization to no embolization after a negative angiogram in patients with esophagogastroduodenoscopically (EGD) confirmed non-variceal acute upper gastrointestinal source of bleeding (GIB).

METHOD AND MATERIALS

A retrospective review was performed of patients who had angiogram after EGD confirmed upper GIB between May 2011 and April 2013. 64 patients (43 male, 21 female) had no contrast extravasation. They were divided into two groups. Group 1 (n=30) had no embolization. Group 2 (n=34) had empiric embolization of gastroduodenal artery (n=23) or left gastric artery (n=11). Logistic and linear regression analyses were used to compare the groups. After adjusting for age and Rockall score, following clinical outcomes were measured: 30-day mortality, hospital stay, repeat procedures and transfusion requirements. Radiation exposure (fluoroscopy time and reference point air kerma) in both groups and cost of embolization in group 2 were collected.

RESULTS

Patients in groups 1 and 2 were similar in age and had similar Rockall scores (68.3 vs. 67.5 years, p=0.80, and 7.1 vs. 7.3, p=0.53, respectively). The 30-day mortality (30.0% vs. 23.5% (p=0.58)) and the mean hospitalization after angiogram (25.2 vs. 23.0 days (p=0.67)) were similar. Patients who had at least one repeat procedure (angiogram or endoscopy) after the initial angiogram was similar (50% vs. 50%, p=1.0). Among the available transfusion records (group 1=15; group 2=14), there was no difference in the units of packed red blood cells transfused after the initial angiogram (4.6 vs. 5.4, p=0.80). Reference point air kerma was similar (2147 vs. 2773 mGy, p= 0.19) but the fluoroscopy time was significantly higher in group 2 (17.7 vs 24.7 min, p=0.03). A total of 183 coils and 34 coil pushers were used during 32 angiograms in group 2. The mean combined cost of coils and coil pushers was $1747 (SD 1573, range 30 to 6213).

CONCLUSION

In the absence of contrast extravasation, empiric embolization in acute non-variceal upper GIB fails to improve clinical outcomes compared to no embolization and is associated with higher fluoroscopy time and embolization costs.

CLINICAL RELEVANCE/APPLICATION

Small retrospective reviews have supported empiric embolization in acute upper GIB. However, with one of the largest series, our review fails to support the same which is associated with higher fluoroscopy time and costs.

RC314-03 Endovascular Management of Delayed Postpancreatectomy Hemorrhage

Tuesday, Dec. 1 8:55AM - 9:05AM Location: E351

Participants
Maxime Ronot, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Edwige Pottier, Villejuif, France (*Abstract Co-Author*) Nothing to Disclose
Sebastien Gaujoux, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Alain Sauvanet, MD, Clichy, France (*Abstract Co-Author*) Nothing to Disclose
Valerie Vilgrain, MD, Clichy, France (*Presenter*) Nothing to Disclose

PURPOSE

To assess the efficacy of endovascular management of delayed postpancreatectomy hemorrhage (PPH) as first line treatment.

METHOD AND MATERIALS

Between January 2005 and November 2013, all consecutive patients referred for endovascular treatment of PPH were included. Presence of active bleeding, pseudoaneurysm, arterial stenosis, collection, and culprit artery were recorded on pretreatment CT scans. Endovascular procedures were classified as technical success if bleeding origin was identified and treated, technical failure if identified bleeding was incompletely treated; and radiologic abstention if no abnormality was depicted and no treatment performed. Factors associated with postprocedural rebleeding were analyzed, together with second line treatments.

RESULTS

69 patients (53 men) were included with a mean age of 59 years (32-75). Pretreatment CT showed 27 (39%) active bleeding, 25 (36%) pseudoaneurysms, 2 (3%) arterial stenosis, and 44 (64%) postoperative collections. In 22 (32%) cases, no obvious culprit artery was found. Technical success, technical failure , or radiologic abstention were observed in 48 (70%), 9 (13%), and 12 patients (17%), respectively. 30 patients (44%) experienced rebleeding after a median delay of 2 days (range 0-46). Rebleeding rates were 29%, 58%, and 100% in case of success, abstention or failure at the first endovascular procedure, respectively ($p < 0.001$). Treatment efficacy was the only factor associated with rebleeding (success vs failure $p < 0.001$; success vs. abstention $p = 0.09$, abstention vs. failure $p = 0.04$, overall $p < 0.001$). Rebleeding was treated by endovascular treatment, surgery, or both, in 12 (40%), 11 (37%) and 7 (23%) patients, respectively. Overall, 72% of the patients were successfully treated by endovascular procedures alone.

CONCLUSION

After a first endovascular procedure for PPH, almost half of patients rebleed. Rebleeding risk depends on the initial success of the procedure. Most patients are successfully treated by endovascular approach alone.

CLINICAL RELEVANCE/APPLICATION

Despite a high rebleeding rate, embolizaton should be proposed as first line treatment of post pancreatectomy hemorrhage because the majority of patients can be successfully treated by endovascular approach alone.

RC314-04 Preoperative Embolization to Enhance Collateral Blood Flow via the Gastroduodenal Artery in Patients Undergoing Distal Pancreatectomy with Resection of the Celiac Axis

Tuesday, Dec. 1 9:05AM - 9:15AM Location: E351

Participants
Markus Zimmermann, MD, Aachen, Germany (*Presenter*) Nothing to Disclose
Martin Liebl, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Maximilian F. Schulze-Hagen, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Federico Pedersoli, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Maximilian Schmeding, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Peter Isfort, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Christiane K. Kuhl, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Bruners, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Locally advanced pancreatic cancer with infiltration of the celiac axis carries a grave prognosis and has previously widely been considered as irresectable. Nevertheless, selected patients may benefit from distal pancreatectomy with resection of the celiac axis (DP-CAR). However, resection of the celiac axis may result in postoperative hepatic or gastric ischemia if collateral blood flow from the superior mesenteric artery (SMA) via the gastroduodenal artery (GA) is insufficient. We present a technique for preoperative angiographic evaluation and possibly enhancement of blood flow in this collateral by embolization of the celiac axis (CA) or the common hepatic artery (CHA).

METHOD AND MATERIALS

Between 2010 and 2015 six patients with locally advanced pancreatic cancer with invasion of the celiac axis underwent preoperative angiography and embolization of the celiac axis (4) or the common hepatic artery (2) before DP-CAR.5F sheaths were placed in both common femoral arteries and through one sheath a catheter was introduced and placed in the SMA. Through the other sheath another catheter was simultaneously placed in the CA/CHA and an Amplatzer™ vascular plug was deployed - without releasing it - for temporary occlusion of the CA/CHA.Subsequently, an angiography of the SMA was performed to evaluate retrograde blood flow from the SMA via the GA to the proper hepatic artery.If sufficient retrograde flow via the GA was present, the Amplatzer™ plug was permanently released in order to further increase the flow rate in this collateral.

RESULTS

All six patients demonstrated sufficient collateral blood flow via the GA and consecutively underwent successful embolization of

either the CA or the CHA. No peri-interventional complications were noted. Eventually, five patients were treated with DP-CAR, of which four histologically demonstrated clear surgical margins (R0). One patient did not undergo DP-CAR because of intraoperatively discovered peritoneal metastases.

CONCLUSION

The presented technique allows safe preoperative angiographic evaluation and possibly enhancement of collateral bloodflow from the SMA via the GA in patients undergoing DP-CAR, in order to reduce the risk of postoperative morbidity from hepatic or gastric ischemia.

CLINICAL RELEVANCE/APPLICATION

Our technique allows preoperative evaluation and possibly enhancement of collateral blood flow from the SMA via the gastroduodenal artery in patients undergoing DP-CAR.

RC314-05 Embolotherapy-My Worst Cases

Tuesday, Dec. 1 9:15AM - 9:30AM Location: E351

Participants
Robert A. Morgan, MD, London, United Kingdom, (robert.morgan@stgeorges.nhs.uk) (*Presenter*) Proctor, Medtronic, Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

RC314-06 The Type III Endoleak-The Great Pretender

Tuesday, Dec. 1 9:30AM - 9:45AM Location: E351

Participants
Brian S. Funaki, MD, Riverside, IL (*Presenter*) Data Safety Monitoring Board, Novate Medical

LEARNING OBJECTIVES

View learning objectives under main course title.

RC314-07 Case of the Session-Splenic Artery Embolization (or Lack Thereof)

Tuesday, Dec. 1 10:05AM - 10:20AM Location: E351

Participants
Brian S. Funaki, MD, Riverside, IL (*Presenter*) Data Safety Monitoring Board, Novate Medical

LEARNING OBJECTIVES

View learning objectives under main course title.

RC314-08 High Flow Malformations-How I Treat Them

Tuesday, Dec. 1 10:20AM - 10:35AM Location: E351

Participants
James E. Jackson, MD, London, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the indications for treatment of high-flow vascular malformations. 2) To understand the differing vascular anatomy of arteriovenous malformations and how this affects treatment approach and outcome. 3) To understand those methods of embolization of arteriovenous malformations that are likely to improve results and reduce complications.

ABSTRACT

The most important aspect of embolization of high-flow vascular malformations is an understanding of the anatomy of the vascular communications within them as this has a bearing both upon the method of vascular occlusion and on the final result. Whatever the anatomy, however, the general principle is that occlusion is performed at the site of the abnormal arteriovenous shunts and not in the vessel proximal to this point. The embolization of arterial feeding vessels, which was performed for many years with metallic coils or particulate matter such as polyvinyl alcohol, is akin to proximal surgical ligation and must be avoided. It has little effect upon symptoms in most individuals and renders subsequent treatment more difficult because the arterial inflow vessels have been occluded. If, however, the embolization is directed at the AV communications themselves, from an arterial approach, via a direct percutaneous puncture or retrogradely from the venous side, and these are totally obliterated - often with a liquid embolic agent - then a long-term improvement in symptoms can be achieved. This presentation will concentrate on the radiological management of these high-flow lesions.The cure of a high flow vascular anomaly is uncommon although there is no doubt that radiological and clinical obliteration of more malformations has come with a better understanding of their radiological anatomy and the use of agents that are directed at the AV shunts themselves rather than at the proximal feeding vessels.

RC314-09 Value of Embolization in the Management of Pelvic Venous Incompetence

Tuesday, Dec. 1 10:35AM - 10:45AM Location: E351

Participants
Marc Antoine Jegonday, Caen, France (*Presenter*) Nothing to Disclose
Vincent Le Pennec Sr, MD, Caen, France (*Abstract Co-Author*) Educator, Cook Group Incorporated
Audrey Fohlen, Caen, France (*Abstract Co-Author*) Nothing to Disclose
Bertrand Lamy, Caen, France (*Abstract Co-Author*) Nothing to Disclose

Jean-Pierre J. Pelage, MD, PhD, Caen, France (*Abstract Co-Author*) Research Grant, Merit Medical Systems, Inc; Consultant, Merit Medical Systems, Inc; Research Grant, Cook Group Incorporated; Consultant, Cook Group Incorporated; Research Grant, Keocyt; Medical Board, Keocyt; Research Grant, Terumo Corporation; Consultant, Terumo Corporation; Research Grant, ALN; Consultant, ALN; Consultant, Boston Scientific Corporation; Research Grant, BTG International Ltd

PURPOSE

To assess the efficacy of embolotherapy to treat symptomatic pelvic venous incompetence (PVI).

METHOD AND MATERIALS

Retrospective evaluation of women with symptomatic PVI treated with embolization. Primary clinical success defined as decrease in pelvic and lower limb pain using a visual analogue scale (VAS). Associated symptoms including dyspareunia, vulvar pain or lower limb venous insufficiency as well as complications were also assessed.

RESULTS

A total of 114 women (mean age 40.9 ± 10.3 years) including 74% with pelvic pain (VAS of 6.5 ± 1.8) and 64% with lower limb pain (VAS of 5.6 ± 2.1) were treated. The most common incompetent veins were the left ovarian (82%), internal pudendal (right 49%; left 39%), inferior gluteal (right 32%; left 31%) and uterine (right 19%; left 23%) veins. Technical success was 89%. Follow-up included consultation organized after 3.5 ± 4.0 months and consultation or telephone interview after 50 ± 34.6 months, respectively. Pelvic pain VAS decreased to 1.6 ± 2.4 ($p<0.0001$) and 1.0 ± 2.2 ($p<0.0001$) at the first and second visits, respectively, with a long term success of 94%. Mean lower limb pain VAS decreased to 3.6 ± 2.7 ($p<0.0001$) and 2.5 ± 2.6 ($p<0.0001$) at the 2 time-points, with a long term success of 88%. VAS decreased significantly between short and long term evaluations. Clinical improvement of associated symptoms was also observed. Major complication rate was low (9%).

CONCLUSION

Embolization of symptomatic PVI is a safe and effective treatment in well-selected patients, with a progressive and long-lasting clinical success.

CLINICAL RELEVANCE/APPLICATION

Embolization is safe and effective to treat symptomatic PVI and is recommended when a pelvic venous origin of symptoms is etablished.

RC314-10 Endovascular Management of Hemoptysis Including Coil and/or Particle Embolization: 6 Year Single Institution Comparative Experience

Tuesday, Dec. 1 10:45AM - 10:55AM Location: E351

Participants
Orrie N. Close, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose
Kevin M. McCluskey, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Donghoon Shin, MS, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Kevin Ching, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Robert F. Short, MD, PhD, Charlottesville, VA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate clinical outcomes for endovascular treatment of hemoptysis with microcoils and/or microparticles for bronchial and non-bronchial systemic artery embolization

METHOD AND MATERIALS

A single institution IRB-approved review included all patients who underwent embolization for hemoptysis from 12/2008 to 12/2014. Patient demographics, technical details, angiographic findings, complications, rate of recurrence, and need for repeat intervention were reviewed. Person-years were calculated to evaluate the incidence of recurrence by endovascular treatment method. Statistical analyses were performed using Fisher's exact and chi-square tests.

RESULTS

114 embolizations were performed in 97 patients for hemoptysis. 56 embolization procedures performed in 48 patients (mean: 58 y; range 20-91y) employed microcoils (<0.18 inch). (Of these, 10 patients received microcoil embolization only.) 58 microparticle embolizations were performed in 49 patients (52 y; range 24-84y). Rebleeding occurred following 23 (41.1%) coil embolizations and 24 (42.1%) microparticle embolizations ($p=1.00$). Incidence of rebleeding in the coil and particle embolization groups were 50.6 and 64.6 per 100 person-years respectively ($p=.5$). The incidence ratio between the groups was 1.28 (95% CI: 0.69, 2.37). Complication rate was 7.1% in the coiling group (bronchial arterial dissections: n= 4) vs. 10.3% in the particle embolization only group (arterial dissections: n= 4, spinal cord infarction: n= 1, and access site retroperitoneal hemorrhage: n= 1). ($p= 1.0$). One procedure for recurrent hemorrhage was impeded by previously placed embolization coils.

CONCLUSION

Transcatheter embolization for hemoptysis is safe and effective using microcoils and/or microparticles. The incidence rate of recurrent hemoptysis following microcoil vs. microparticle embolization is not significantly different.

CLINICAL RELEVANCE/APPLICATION

Use of microcoils for transcatheter embolization in the treatment of hemoptysis can be safely performed with similar clinical efficacy and complication rates as that of microparticles.

RC314-11 Amplatzer Plugs versus Coils for Pulmonary Arteriovenous Malformations Embolization in HHT Patients - Long Term Results

Tuesday, Dec. 1 10:55AM - 11:05AM Location: E351

Participants

Noam Tau, MD, Petah Tikva, Israel (*Presenter*) Nothing to Disclose
Eli Atar, MD, Petah Tikva, Israel (*Abstract Co-Author*) Nothing to Disclose
Meir Mei-Zahav, MD, Petach Tikva, Israel (*Abstract Co-Author*) Nothing to Disclose
Tamir Dagan, MD, Petach Tikva, Israel (*Abstract Co-Author*) Nothing to Disclose
Einat Birk, MD, Petach Tikva, Israel (*Abstract Co-Author*) Nothing to Disclose
Elchanan Bruckheimer, MBBS, Petach Tikva, Israel (*Abstract Co-Author*) Medical Director, RealView Imaging Ltd; Employee, RealView Imaging Ltd; Shareholder, RealView Imaging Ltd; Consultant, Getinge AB; Consultant, Valtec Cardio Ltd; Consultant, Enopace Biomedical Ltd; Medical Director, Vascular Platforms Ltd; Shareholder, Vascular Platforms Ltd; Medical Director, Restore Medical, Inc; Shareholder, Restore Medical, Inc

PURPOSE

Evaluation of safety and efficacy of Amplatzer vascular plugs in percutaneous embolization of PAVMs in HHT patients, and comparison to the use of coils.

METHOD AND MATERIALS

Retrospective analysis of all percutaneous PAVMs embolization performed between 2004 and 2014 in our institution. Data from patient files was collected regarding method of embolization (Amplatzer plugs, coils or both) and regarding all complications. Data regarding rates of re-canalization in treated PAVMs was assessed from follow-up imaging (following percutaneous procedure or CT Angiography).

RESULTS

36 patients [19M, 17F], median age 32.5 years [1.9-72.7 years] underwent 51 percutaneous trans-catheter procedures at our institution and 8 procedures in outside institutions, with embolization of a total of 142 simple or complex PAVMs [72 coils, 56 Amplatzer plugs and 14 plugs and coils]. Two patients had self-resolving mild hemoptysis following embolization. No other major procedure-related complications occurred.Of this group, 16 patients with 63 PAVMs that were occluded [37 with coils, 21 with Amplatzer plugs and 5 with both plugs and coils] underwent follow-up imaging [13 angiographies, 1 CT Angiography].7 PAVMs showed re-canalization of occluded vessels, at a median follow-up of 8.6 years [1.5-18.11 years].All re-canalizations occurred in coiled vessels. No re-canalizations occurred through Amplatzer plugs [7/37 vs. 0/21], p-value = 0.0413 (Fisher's exact test).

CONCLUSION

The use of Amplatzer plugs for PAVMs embolization in HHT patients appears to be safe and effective, and has a lower re-canalization rate of feeding vessels compared to coils.

CLINICAL RELEVANCE/APPLICATION

The use of coils as the standard of care for PAVMs embolization should be re-evaluated, since the use of Amplatzer vascular plugs is shown to have better long term results, without additional risks.

RC314-12 Bariatric Embolization for Morbid Obesity, First Western Hemisphere Experience: Gastric Artery Embolization Trial for Lessening Appetite Nonsurgically (GET LEAN)

Tuesday, Dec. 1 11:05AM - 11:15AM Location: E351

Participants
Mubin I. Syed, MD, Dayton, OH (*Presenter*) Consultant, CareFusion Corporation;
Kamal Morar, MD, Dayton, OH (*Abstract Co-Author*) Nothing to Disclose
Azim Shaikh, MD,MBA, Dayton, OH (*Abstract Co-Author*) Nothing to Disclose
Paul Craig, MD, MA, Minneapolis, MN (*Abstract Co-Author*) Nothing to Disclose
Talal Akhter, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Hooman Khabiri, MD, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose
Omar Khan, Dayton, OH (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this pilot study is to achieve the collection of safety and efficacy data in patients undergoing left gastric artery embolization for morbid obesity in the Western Hemisphere.

METHOD AND MATERIALS

This is an FDA-IDE pilot study. 5 patients have been approved to undergo the left gastric artery embolization procedure for the purpose of weight loss using Beadblock 300-500 micron particles. All patients will undergo EGD follow up pre and post procedure. Ghrelin, Leptin and CCK levels will also be measured at baseline and post procedure per follow up protocol. Inclusion Criteria Morbid obesity with a BMI ≥ 40 Age ≥ 22years Ability to lay supine on an angiographic table <400lbs due to table weight limits Appropriate anesthesia risk as determined by certified anesthesia provider evaluation preprocedureSubjects who have failed previous attempts at weight loss through diet, exercise, and behavior modification (as it is recommended that conservative options, such as supervised low-calorie diets combined with behavior therapy and exercise, should be attempted prior to enrolling in this study).

RESULTS

The first patient has lost 30lbs at 3 months. Second patient has lost 12lbs at 1 month. Third patient has lost 6lbs in 1 week. There have been no major adverse events. The final 2 patients in this study are still being selected.

CONCLUSION

This is the first experience in the United States of performing left gastric artery embolization for the purpose of treating morbid obesity. Early results are promising and show no major adverse events thus far. The radial artery has also proven to be a feasible approach to performing this procedure with implications for a safer access site.

CLINICAL RELEVANCE/APPLICATION

Morbid obesity is a prevalent and deadly public health problem. Obesity affects about 30% of the United States population. It is responsible for numerous comorbidities including diabetes mellitus and its complications, cardiovascular disease, sleep apnea, and premature osteoarthritis. This is the first use of left gastric artery embolization in the Western Hemisphere to treat morbid obesity.

This is also the first radial artery access experience with implications for the morbidly obese where groin access may be more challenging.

RC314-13 Bariatric Embolization. Is This the Next Big Thing?

Tuesday, Dec. 1 11:15AM - 11:30AM Location: E351

Participants
Mubin I. Syed, MD, Dayton, OH (*Presenter*) Consultant, CareFusion Corporation;

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

Bariatric embolization is an exciting new procedure for the postential treatment of obesity. This talk outlines the background behind the procedure as well as the latest human experience.

RC314-14 Visceral Aneurysms

Tuesday, Dec. 1 11:30AM - 11:45AM Location: E351

Participants
Michael D. Darcy, MD, Saint Louis, MO (*Presenter*) Speakers Bureau, W. L. Gore & Associates, Inc; Speaker, Cook Group Incorporated;

LEARNING OBJECTIVES

1) The incidence and presentation of visceral aneurysms. 2) The indications for treating visceral aneurysms. 3) Techniques for treating visceral aneurysms. 4) Potential complications from treatment of visceral aneurysms.

RC314-15 Wrap Up and Discussion

Tuesday, Dec. 1 11:45AM - 12:00PM Location: E351

Participants

RC350

CTA from Head to Toe

Tuesday, Dec. 1 8:30AM - 10:00AM Location: S404AB

CA CT VA IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Alison Wilcox, MD, Los Angeles, CA (*Moderator*) Speaker, Toshiba Corporation

Sub-Events

RC350A Cardiac CT- Pre, Peri and Post Procedural Management

Participants
Cameron Hassani, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review pre-procedural patient preparation including appropriate patient selection, beta blockade, contraindications and alternatives to beta blockers 2) Discuss how to manage non-standard scenarios (atrial fibrillation, pacemaker, young adults) 3) Peri-procedural issues including vasodilation, continued heart rate control, and breathholding requirements. 4) Image acquisition including radiation dose reduction techniques, technique choice, and post CABG patient. 5) Postprocedural complications include contrast reactions and their management.

ABSTRACT

Cardiac CTA involve slightly more preparation than the standard CT acquisition. Heart rate control is the most important aspect that needs to be addressed prior to the patient arriving in the radiology department. Periprocedural issues mostly involved how to optimize technique while having the lowest radiation dose especially in the new age of dose reduction. Almost as important as heart rate management is how to treat postprocedural complications especially contrast reactions. This presentation will discuss these aspects and include treatment options as well as their alternatives.

RC350B TEVAR/EVAR- Pre, Post and Periprocedural Evaluation

Participants
Alison Wilcox, MD, Los Angeles, CA (*Presenter*) Speaker, Toshiba Corporation

LEARNING OBJECTIVES

1) What are some clinical indications for acute aortic imaging. 2) What are some CT parameters that can aid in various diagnosis? 3) What are some of common complications seen in TEVAR and EVAR? 4) What are the important measurements and vessel variants that help guide surgical approach. 5) New suggestions for type B management. 6) What are some imaging problems and pitfall and some methods to assist. 7) Briefly discuss TAVR acquisition.

ABSTRACT

The acute aorta is part of a syndrome of diseases affecting the aorta with significant overlap of findings and clinical presentations. Clinically the diagnosis is difficult as there is overlap between patients with suspected coronary disease, pulmonary embolism and acute aortic syndrome. In the past several years, minimally invasive surgery with Thoracic Endovascular Aortic Repair (TEVAR) or Endovascular Aortic Repair (EVAR) have become increasingly popular. The images choices include gated vs non gated studies, non-contrast imaging, and delayed imaging. The literature is mixed on how and when to use these modalities. The complications of these procedures is often complex and subtle as well. Knowledge of these vascular complications is imperative for patient management. In addition, these patients often have significant atherosclerotic disease elsewhere that might be limiting factors for stent placement, including renal insufficiency. Newer scanners and imaging techniques can reduce radiation dose, and limit the amount of contrast delivery to preserve renal function while preserving image quality. TAVR is an example of another minimally invasive technique gaining popularity that has imaging challenges. Again, newer scanning techniques with limited contrast delivery can provide excellent image quality while limiting radiation dose and preserving renal function.

RC350C Peripheral CTA-A How-to

Participants
Ilya Lekht, MD, los angeles, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Enhance knowledge of normal and abnormal coronary and cardiac anatomy, with an emphasis on differentiating benign from significant variants. 2) Demonstrate the spectrum of nonatherosclerotic congenital and acquired diseases that may affect the coronary arteries. 3) Demonstrate the spectrum of non-atherosclerotic congenital and acquired diseases that may affect the heart.

ABSTRACT

A variety of non-atherosclerotic conditions are detectable on cardiac CT scans, including diseases of the heart, and disease processes which may affect the coronary arteries, or other vascular structures. Cardiac CT has a number of unique advantages in detecting non-atherosclerotic conditions, including congenital and acquired diseases. The focus of this presentation will be non-atherosclerotic conditions of the coronary arteries and of the heart. Variants of normal and abnormal anatomy of the coronary arteries will be discussed, including tips for identifying when coronary anatomic variants are significant. Acquired, non-atherosclerotic diseases of the coronary arteries will also be discussed. This presentation will also discuss the spectrum of non-

atherosclerotic diseases of the heart which may be detected at cardiac CT, including congenital and acquired valvular and cardiac diseases. At the end of this exhibit, the viewer will have a better appreciation for abnormal coronary and cardiac anatomy and the broad spectrum of non-atherosclerotic cardiovascular diseases which may be seen at cardiac CT.

RC352

Carotid and Renal Doppler (Hands-on)

Tuesday, Dec. 1 8:30AM - 10:00AM Location: E264

GU VA US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Gowthaman Gunabushanam, MD, New Haven, CT, (gowthaman.gunabushanam@yale.edu) (*Moderator*) Editor, WebMD Health Corp ;
Gowthaman Gunabushanam, MD, New Haven, CT, (gowthaman.gunabushanam@yale.edu) (*Presenter*) Editor, WebMD Health Corp ;
Mark E. Lockhart, MD, Birmingham, AL, (mlockhart@uabmc.edu) (*Presenter*) Nothing to Disclose
Shweta Bhatt, MD, MBBS, Rochester, NY (*Presenter*) Nothing to Disclose
Wui K. Chong, MD, Chapel Hill, NC, (wk_chong@med.unc.edu) (*Presenter*) Nothing to Disclose
Corinne Deurdulian, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Vikram S. Dogra, MD, Rochester, NY (*Presenter*) Editor, Reed Elsevier
Edward G. Grant, MD, Los Angeles, CA (*Presenter*) Research Grant, General Electric Company ; Medical Advisory Board, Nuance Communications, Inc
Ulrike M. Hamper, MD, MBA, Baltimore, MD (*Presenter*) Nothing to Disclose
Felix A. Hester, Helena, AL (*Presenter*) Nothing to Disclose
Michelle L. Robbin, MD, Birmingham, AL, (mrobbin@uabmc.edu) (*Presenter*) Consultant, Koninklijke Philips NV;
Leslie M. Scoutt, MD, New Haven, CT (*Presenter*) Consultant, Koninklijke Philips NV
Ravinder Sidhu, MD, Rochester, NY, (ravinder_sidhu@urmc.rochester.edu) (*Presenter*) Nothing to Disclose
Sadhna Verma, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
Margarita V. Revzin, MD, Wilton, CT, (margarita.revzin@yale.edu) (*Presenter*) Nothing to Disclose
Davida Jones-Manns, Hampstead, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the technique and optimally perform carotid Doppler ultrasound. 2) Describe the technique and optimally perform renal Doppler ultrasound. 3) Review qualitative and quantitative criteria for diagnosing abnormalities in carotid and renal ultrasound Doppler examinations.

ABSTRACT

This hands-on course will provide participants with a combination of didactic lectures and an extended 'live' scanning opportunity on normal human volunteers, as follows: Didactic lectures (30 minutes): 1. Carotid Doppler Ultrasound: scanning technique, diagnostic criteria and interesting teaching cases. 2. Renal Doppler Ultrasound: scanning technique, diagnostic criteria and interesting teaching cases. Mentored scanning (60 minutes): Following the didactic lectures, the participants will proceed to a scanning area with normal human volunteers and ultrasound machines from different manufacturers. Participants will be able to perform live scanning with direct assistance (if needed) by faculty. Faculty will be able to offer feedback, help participants improve their scanning technique as well as answer any questions. Faculty will also be available to answer general questions relating to all aspects of vascular Doppler, not limited to carotid and renal Doppler studies.

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
Sadhna Verma, MD - 2013 Honored Educator

VIS-TUA

Vascular Interventional Tuesday Poster Discussions

Tuesday, Dec. 1 12:15PM - 12:45PM Location: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
James T. Bui, MD, Chicago, IL (*Moderator*) Nothing to Disclose

Sub-Events

VI226-SD-TUA1 Significance and Efficacy of Super-selective ACTH-stimulated Adrenal Venous Sampling, Compared to Conventional Sampling Method

Station #1

Participants
Masahiro Kobayashi, MD, Tokyo, Japan (*Presenter*) Nothing to Disclose
Nobuyuki Shiraga, MD, Ohta-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Keiko Matsumoto, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Kenichi Suzuki, Ota, Japan (*Abstract Co-Author*) Nothing to Disclose
Hideaki Suzuki, MD, PhD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Jyunichi Kodera, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the utility and superiority of super-selective ACTH (adrenocortiotropic hormone) -stimulated AVS (adrenal venous sampling), comparing to conventional sampling method.

METHOD AND MATERIALS

Institutional review board approval and written informed consent were obtained. Between January 2010 and March 2015, 122 patients (mean age: 54.0 ± 11.4 years, range: 27 - 73 years) with primary aldosteronism underwent super-selective AVS. Before and after ACTH stimulation, conventional venous sampling was performed at infra and supra renal inferior vena cava (IVC), and left renal vein, common trunk of left inferior phrenic and adrenal vein, and right adrenal vein. Proceedingly, super-selective venous sampling was performed with microcatheter at left central adrenal vein, superio-medial, superior-lateral, and lateral branch of left adrenal vein. Aldosterone/Cortisol ratio was calculated in all sites and compared each other to detect unilateral lesion.

RESULTS

We could successfully perform super-selective AVS for all subjects. Seventeen patients (13.9% of total) had negative findings of primary aldosteronism on adrenal venous sampling. Sixty-six patients (54.1% of total) had bilateral excess aldosterone secretion. Thirty-nine (32.0% of total) patients had unilateral excess production of aldosterone. Six cases out of 39 (15.4%, 5.0% of total) had negative results on conventional AVS, whereas unilaterality was proved by super-selective AVS. Those cases are thought to have the possibility to miss the opportunity of surgical treatment with conventional AVS.

CONCLUSION

Super-selective AVS is superior to detect the unilaterality of excess secretion of aldosterone, as well as identifying the location of the lesion in adrenal grand, compared to conventional AVS. Without super-selective AVS, 5% of primary aldosteronism patients have possibility to miss the opportunity of surgical treatment.

CLINICAL RELEVANCE/APPLICATION

Adrenal venous sampling with high accuracy is needed for primary aldosteronism to decide treatment options.

VI227-SD-TUA2 Robust Image Quality with a 60% Reduction in Both Contrast Material and Radiation Dose using 70-kV Images in Third Generation Dual-source CT

Station #2

Participants
Erina Suehiro, RT, Kobe, Japan (*Presenter*) Nothing to Disclose
Tatsuya Nishii, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Kiyosumi Kagawa, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Noriyuki Negi, RT, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshiaki Watanabe, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Atsushi K. Kono, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Satoru Takahashi, 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
Hideaki Kawamitsu, MD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

This study aimed to evaluate radiation and contrast material requirements for thoraco-abdominal CT angiography (CTA) at 70-kV compared with conventional 120-kV CTA using third-generation dual-source CT (3rd DSCT)..

METHOD AND MATERIALS

Seventy-nine consecutive patients (mean, 72 years old, 25 females) who had undergone helical CTA with a bolus tracking method

using 3rd DSCT were retrospectively reviewed. We excluded 36 patients who already had stenting or coiling, which could affect image quality by artifacts. In 120-kV scanning (n = 19), 400 mgI/kg of contrast material was injected for 30 s. For 70-kV scanning (n = 24), 240 mgI/kg (60%) of contrast material was injected at the same rate as that for 120-kV scanning. For objective image quality, the CT value and standard deviation in the ascending, descending, and abdominal aorta, and bifurcation were obtained. The signal-to-noise ratio (SNR) in each part of the aorta, contrast-to-noise ratio (CNR) of the abdominal aorta compared with the psoas muscle, and CNR per unit dose (CNRD = CNR / square root of the CT dose index) were evaluated. Differences in objective image quality, amount of contrast material, and radiation dose between the two methods were assessed by Welch's test.

RESULTS

The SNR and CNR were not significantly different between the two methods. However, in the 70-kV scan, the CNRD was significantly higher (11.6 ± 4.2 vs. 9.4 ± 2.9; P = 0.04), with a significantly lower amount of contrast material (14.3 ± 2.7 vs. 23.5 ± 5.6 gI; P < 0.01) and radiation dose (DLP, 570.5 ± 55.5 vs. 842.0 ± 221.3 mGy*cm; P < 0.01) compared with the 120-kV scan.

CONCLUSION

CTA at 70-kV with 3rd DSCT results in robust image quality with a significantly reduced amount of contrast material and radiation dose compared with 120-kV CTA.

CLINICAL RELEVANCE/APPLICATION

CTA at 70-kV with 3rd DSCT results in a 60% reduction in the amount of contrast material and radiation dose with robust image quality compared with 120-kV CTA.

VI228-SD-TUA3 Efficacy of Ultrasound-guided Axillary Brachial Plexus Blocks for Analgesia during Percutaneous Transluminal Angioplasty for Dialysis Access

Station #3

Participants
Emiko Chiba, MD, Saitama, Japan (*Presenter*) Nothing to Disclose
Kohei Hamamoto, MD, Saitama, Japan (*Abstract Co-Author*) Nothing to Disclose
Tomohisa Okochi, MD, Saitama, Japan (*Abstract Co-Author*) Nothing to Disclose
Keisuke Tanno, Saitama, Japan (*Abstract Co-Author*) Nothing to Disclose
Katsuhiko Matsuura, MD, Saitama, Japan (*Abstract Co-Author*) Nothing to Disclose
Osamu Tanaka, MD, Saitama, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

During percutaneous transluminal angioplasty (PTA) for dialysis access, the pain of balloon dilatation is severe. Previously, local injection of anesthetic or venous injection of analgesic agent was used, but the efficiency of these procedures lacked stability or they were difficult to use for outpatients. We evaluated the efficacy of ultrasound (US)-guided ABP blocks for analgesia during PTA for dialysis access.

METHOD AND MATERIALS

From April to 2014 to March 2015, 21 patients who underwent PTA for dialysis access shunts and who had an experience of PTA without analgesia were included. The access type in all patients was forearm native arteriovenous fistulae. Two radiologists performed US-guided ABP blocks before PTA; 5 mL of 1.8% lidocaine was injected around both the radial and musculocutaneous nerves. The patients' responses were evaluated using a visual analog scale (VAS), and motor/sensory paralysis after PTA was examined.

RESULTS

The mean time required to achieve nerve block was 8 min. The success rate of this procedure was 100%, and there were no significant complications. All 21 patients reported a decrease in their VAS score (100 to 22) ($p<0.05$). All patients requested an ABP block for future PTA sessions, if required. Motor paralysis occurred in 2 patients, but resolved in all after 1 h.

CONCLUSION

With US-guided ABP blocks, all cases exhibited significantly decreased VAS scores.US-guided ABP blocks were effective and utilized safe analgesia during PTA for dialysis access. US-guided ABP block with lidocaine is suitable for outpatients because it does not result in prolonged motor paralysis or affect consciousness and respiration.

CLINICAL RELEVANCE/APPLICATION

Previously, no studies have reported the efficacy of US-guided ABP blocks for PTA for dialysis access. US-guided ABP block is an effective and safe technique for analgesia during PTA for dialysis access. Time required for this procedure is less than 10 min. It can ease the severe pain of dilatation and improve patients' compliance to medical treatment.

VI149-ED-TUA5 Congenital Anomalies of Inferior Vena Cava: Understanding the Embryology

Station #5

Participants
Daniela Segura, MD, Bogota, Colombia (*Presenter*) Nothing to Disclose
Carlos Corredor, MD, Bogota, Colombia (*Abstract Co-Author*) Nothing to Disclose
Felipe Aluja, MD, Bogota, Colombia (*Abstract Co-Author*) Nothing to Disclose
Juan M. Lozano, MD, Bogota, Colombia (*Abstract Co-Author*) Nothing to Disclose
Daniel Upegui, MD, Bogota, Colombia (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

-To review the congenital IVC variants -To explain the embryologic development of the vena cava- To show the imaging findings based on the embryology -To review the importance of planning the vascular procedures

TABLE OF CONTENTS/OUTLINE

- Embryologic development explained with graphics- Congenital anomalies: cases and embryologic explanationa. Left IVCb. Double IVCc. Retrocaval Ureterd. Transposition of the IVCe. Absence of the Infrarenal IVCf. Interruption of the IVC- Differential diagnosis

VIS-TUB

Vascular Interventional Tuesday Poster Discussions

Tuesday, Dec. 1 12:45PM - 1:15PM Location: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
James T. Bui, MD, Chicago, IL (*Moderator*) Nothing to Disclose

Sub-Events

VI229-SD-TUB1 Feasibility of Non-contrast-enhanced Magnetic Resonance Angiography with Time-spatial Labeling Inversion Pulse for the Assessment of Pulmonary Arteriovenous Malformation

Station #1

Participants
Kohei Hamamoto, MD, Saitama, Japan (*Presenter*) Nothing to Disclose
Emiko Chiba, MD, Saitama, Japan (*Abstract Co-Author*) Nothing to Disclose
Tomohisa Okochi, MD, Saitama, Japan (*Abstract Co-Author*) Nothing to Disclose
Keisuke Tanno, Saitama, Japan (*Abstract Co-Author*) Nothing to Disclose
Katsuhiko Matsuura, MD, Saitama, Japan (*Abstract Co-Author*) Nothing to Disclose
Osamu Tanaka, MD, Saitama, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study was to evaluate the diagnostic performance of non-contrast-enhanced magnetic resonance angiography with time-spatial labeling inversion pulse (NCE-TSMRA) in the assessment of pulmonary arteriovenous malformation (PAVM).

METHOD AND MATERIALS

Twelve consecutive patients (3 men, 9 women; age, 21-81 years) with 36 documented PAVMs (30 untreated and 6 treated lesions at initial examination) underwent NCE-TSMRA with a 3.0-tesla unit. Eight patients with 20 lesions were examined twice, once before and once after the embolotheraphy for follow-up examination. The lesions were divided into two groups: "Initial diagnosis" and "Follow-up" corresponding to untreated and treated lesion, respectively, and were evaluated separately. For evaluation of the "Initial diagnosis" group, two reviewers assessed the presence, location, and classification of PAVM on NCE-TSMRA, and all results were compared with those of digital subtraction angiography. Image quality was also rated on a qualitative 4-point scale (1: not assessable to 4: excellent). For evaluation of the "Follow-up" group, the reviewers assessed the status of treated PAVM on NCE-TSMRA. The reperfusion and occlusion of PAVMs on NCE-TSMRA are defined as visualization and disappearance of aneurysmal sac corresponding to treated lesions, respectively. The diagnostic accuracies of NCE-TSMRA were assessed and compared with standard reference images.Interobserver agreement was evaluated with the k statistic.

RESULTS

In the "Initial diagnosis" group, NCE-TSMRA correctly determined the presence, location, and classification of PAVMs in all but one patient with one lesion, who represented image degradation due to irregular breath. Additionally, NSE-TSMRA could selectively visualize the feeding artery and venous sac, which provide hemodynamic information for the diagnosis of PAVM. Image quality were considered excellent (3.5 ± 0.7) and the k coefficient was 0.85. In the "Follow-up" group, the sensitivity and specificity of NSE-TSMRA for reperfusion of PAVM was all 100%, and the k coefficient was 1.00.

CONCLUSION

NCE-TSMRA is technically and clinically feasible and represents a promising technique for non-invasive assessment of PAVM.

CLINICAL RELEVANCE/APPLICATION

NCE-TSMRA is a good alternative modality for the assessment of PAVMs, particularly in young subjects, women of childbearing age, and patients with renal sufficiency.

VI230-SD-TUB2 Percutaneous Transluminal Angioplasty versus Drug Eluting Stents for Infrapopliteal Lesions in Critical Limb Ischemia, PADI Trial

Station #2

Participants
Marlon Spreen, MD, MSc, Den Haag, Netherlands (*Presenter*) Nothing to Disclose
Jasper M. Martens, MD, Arnhem, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Willem P. Mali, MD, PhD, Utrecht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Hans Van Overhagen, MD, Den Haag, Netherlands (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The PADI (Percutaneous transluminal Angioplasty and Drug eluting stents for Infrapopliteal lesions in critical limb ischemia) trial is designed to investigate the safety and efficacy of primary implantation of drug eluting stents (DES) versus standard endovascular therapy (PTA and bailout stent implantation) in patients with critical limb ischemia and infrapopliteal lesions.

METHOD AND MATERIALS

Adults with CLI (Rutherford score >= 4) and infrapopliteal lesions were randomized to receive PTA with bail-out bare metal stent

(BMS) or DES with paclitaxel. Primary endpoint was 6-month primary binary patency of treated lesions, defined as <= 50% stenosis on Computed Tomography Angiography. Stenosis > 50%, re-treatment, major amputation and CLI related death were regarded as treatment failure. Severity of failure was assessed with an ordinal score, ranging from vessel stenosis through occlusion to the clinical failures.

RESULTS

Seventy-four limbs (73 patients) were treated with DES and 66 limbs (64 patients) received PTA±BMS. Six-month patency rates were 48.0% for DES and 35.1% for PTA±BMS (p=0.096) in the modified-intention-to-treat and 51.9% and 35.1% (p=0.037) in the per-protocol analysis. The ordinal score showed significantly worse treatment failure for PTA±BMS vs. DES (p=0.041). The observed major amputation rate remained lower in the DES group until 2 years post-treatment (p=0.066). Less minor amputations occurred after DES until 6 months post-treatment (p=0.03).

CONCLUSION

In CLI with infrapopliteal lesions, DES provide better 6-month patency rates compared with PTA with bail out BMS. The major amputation rate of DES remains lower until two years post-treatment, with a trend towards significance. Therefore, a treatment strategy with DES should be considered in CLI patients with infrapopliteal lesions.

CLINICAL RELEVANCE/APPLICATION

Drug-eluting stents achieve better morphological and clinical results in patients with critical limb ischemia and infrapopliteal lesions in comparison with the current standard endovascular treatment.

VI231-SD-TUB3 The Utility of Four-dimensional CT Angiography (4D-CTA) in the Pre-embolization Planning of Extracranial Arteriovenous Malformations

Station #3

Participants
Satomi Mine, Omura, Japan (*Presenter*) Nothing to Disclose
Hideki Ishimaru, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Minoru Morikawa, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Ichiro Sakamoto, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Masataka Uetani, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

For successful embolization of arteriovenous malformation (AVM), it is critical to comprehend the angioarchitecture, such as feeding arteries, draining veins, and shunting point; however, catheter angiography is too invasive for the purpose of the planning of intervention. 4D-CTA using a 320-detector row CT has sufficient time resolution and higher spatial resolution, and may replace catheter angiography. We aimed to evaluate the efficacy of 4D-CTA in the planning of intervention of extracranial AVMs.

METHOD AND MATERIALS

Fifteen exams (eleven patients) with AVM (face 10, toe 1, chest wall 2, mesentery 1, and spinal cord 1) who underwent 4D-CTA using a 320-detector row CT scanner before embolization were included. Time-resolved (arterial to venous phase) maximum intensity projection images were produced on a workstation. Two interventional radiologists prospectively analyzed and compared with the results of the embolization procedure about the following; 1) Detection of feeding arteries, 2) AVM type classification by Houdart and Cho, 3)Whether the embolization was performed as planned on 4D-CTA.

RESULTS

4D-CTA detected all AVMs. 4D-CTA could not demonstrate very small feeding artery that was demonstrated on catheter angiography in four exams. Except for one case in which very small feeding arteries were not visualized, the type classification proposed by Houdart and Cho based on 4D-CTA matched completely with the results of DSA. Except for three exams which were complicated by subtraction artifact, it was possible to formulate the strategy for the embolization by 4D-CTA. Embolization was performed as planned on 4D-CTA in these 12 exams. 4D-CTA also allowed visualization of draining veins and the anatomical structure around AVM using source images, which facilitated the embolization of shunting pouch by direct puncture (n =3) or transvenous approach (n =2).

CONCLUSION

4D-CTA is an effective method to understand the angioarchitecture of AVM before embolization procedures. Diagnostic catheter angiography might be omitted in many cases.

CLINICAL RELEVANCE/APPLICATION

4D-CTA is useful to plan for the embolization of extracranial arteriovenous malformations.

VI169-ED-TUB5 Upper Extremity Angiography: A Review of Anatomy, Pathology, and Interventions

Station #5

Awards
Cum Laude

Participants
Eric J. Monroe, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Christopher R. Ingraham, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Guy E. Johnson, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Matthew J. Kogut, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The learner will develop an understanding of the modern role of catheter angiography of the upper extremity and utility before or in addition to cross sectional imaging The learner will review patient preparation and angiographic technique for obtaining high quality

images of the upper extremity arterial vasculature The learner will review normal and variant anatomy of the upper extremity arterial vasculature The learner will recognize classic appearances of conditions for which catheter angiography remains the gold standard imaging modality The learner will review indications and basic concepts for interventions in the upper extremity

TABLE OF CONTENTS/OUTLINE

Historical Perspective Modern Utilization Trauma Preoperative Planning Hemodialysis and Flow Phenomena Small Vessel Vasculitides Optimizing Technique Interpretation Normal Anatomy and Variants Classic Angiographic Diagnoses Endovascular Interventions Indications Pharmacology Patient Management

RC412

Advanced Vascular Imaging Techniques and Applications

Tuesday, Dec. 1 4:30PM - 6:00PM Location: S504AB

VA CT MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC412A Cardiovascular 3D Printing

Participants
Frank J. Rybicki III, MD, PhD, Ottawa, ON (*Presenter*) Research Grant, Toshiba Corporation;

LEARNING OBJECTIVES

1) To understand the difference between 3D visualization and 3D printing as related to cardiovascular diagnoses. 2) To review the different 3D printing technologies that have impacted and will impact cardiovascular care. 3) To review the clinical impact of current 3D modelling in both cardiovascular diagnoses and intervention.

ABSTRACT

While advanced visualization in cardiovascular imaging is instrumental for diagnoses and communication with referring clinicians, there is an unmet need to render DICOM images as 3D printed models capable of providing both tactile feedback and tangible depth information of both anatomic and pathologic states. 3D printed models are being rapidly embraced in cardiovascular diagnoses. The purpose of this this lecture is to review and summarize the numerous studies to date that support such benefits from cardiovascular 3D printing, as it is expected that the number of 3D printed models generated from DICOM images for planning intervention and fabricating implants will grow exponentially. 3D printing has closed the gap on the unmet need for true 3D visualization in cardiovascular surgical planning. Source image data is primarily contrast-enhanced MRI and CT. Various approaches have been used to develop a hollow STL model, including segmenting the blood pool and printing vessels with a high-resolution technology to achieve a smooth lumen. Growing data supports the use of models to capture complex anatomy including congenital heart disease requiring surgery. Applications have included acquired cardiac abnormalities such as ventricular aneurysms and cardiac tumors. Models have been useful to plan high-risk valve cases and for intra-operative navigation. Electrocardiographic (ECG) gated CT studies for Trans-catheter Aortic Valve Replacement (TAVR) planning enable 3D printed models of the aortic annulus and surrounding structures for potentially safer valve deployment. Incorporation of patient-specific elasticity of the normal versus calcified aorta will likely be an important area of future research. Models of the aorta and other smaller vessels, including the coronary arteries, enable studies of blood flow dynamics that otherwise would not be possible in vivo.

RC412B Renal MRA and Functional MRI

Participants
Ulrike I. Attenberger, MD, Mannheim, Germany (*Presenter*) Research Consultant, Bayer AG

LEARNING OBJECTIVES

1) To describe the technical pre-requisites for successful contrast and non-contrast-enhanced renal MRA (i.e. signal-to-noise-ratio, scan time, spatial resolution, voxel size). 2) To review contrast-agent dose optimization strategies. 3) To understand the basics of functional renal MR imaging techniques and to illustrate their potential implications on patient care.

RC412C Functional CTA in Athletes

Participants
Richard L. Hallett II, MD, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify anatomic and functional lesions that predispose to vascular entrapment and fibrotic syndromes in athletes. 2) Describe methods to assess vascular entrapment and fibrotic syndromes in athletes using dynamic, functionally challenged CTA and MRA. 3) Describe the imaging findings for diagnosis and follow-up of affected athletes.

ABSTRACT

While exercise is a mainstay in preventing and treating atherosclerotic peripheral vascular disease, some vascular disorders manifest primarily in athletes. Both recreational and competitive athletes are at risk for development of non-atherosclerotic vascular diseases. These disease entities range from iliac endofibrosis in cyclists, popliteal entrapment syndrome in running sports, and thoracic inlet / outlet syndromes in "overhead" athletes. Recently, computed tomography angiography (CTA) and magnetic resonance angiography (MRA) have become valuable diagnostic options for many vascular diseases that can occur in the athlete. Optimum imaging in these disorders requires the ability to tailor the exam protocol to the specific disease entity and vascular territory in question. By combining rapid CT image acquisition with functional, physiologic provocative maneuvers, diagnostic information can be maximized. Newer blood-pool MR contrast agents also allow functional assessment without ionizing radiation exposure.This session will review the pathophysiology, risk factors, diagnosis, and classification of vascular diseases seen in the athlete. Logical protocol development utilizing (when necessary) provocative maneuvers will be reviewed. Interpretation strategies for interacting with these resulting large, dynamic datasets will also be reviewed.

Active Handout:Richard Lee Hallett

http://abstract.rsna.org/uploads/2015/15003230/ACTIVE RC412C.pdf

RC412D Aortic Imaging - Beyond Diameters

Participants
Michael D. Hope, MD, San Francisco, CA, (michael.hope@ucsf.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain why imaging approaches beyond assessment of vessel diameter are needed for improved risk stratitifcation of aortic disease. 2) List potential aortic imaging targets for improved evaluation of disease progression. 3) Appraise the merits of advanced aortic imaging techniques including the use of MRI and PET for the evaluation of aortic hemodynamics and vessel wall inflammation.

RC512

Vascular Series: CT Angiography: New Techniques and Their Application

Wednesday, Dec. 2 8:30AM - 12:00PM Location: E352

VA CT

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Dominik Fleischmann, MD, Palo Alto, CA (*Moderator*) Research support, Siemens AG;

Handout:Dominik Fleischmann

http://abstract.rsna.org/uploads/2015/15003239/Fleischmann_RSNA2015_Contrast.pdf

Sub-Events

RC512-01 Iterative Image Reconstruction

Wednesday, Dec. 2 8:30AM - 8:55AM Location: E352

Participants
Norbert J. Pelc, ScD, Stanford, CA (*Presenter*) Research support, General Electric Company; Research support, Koninklijke Philips NV; Consultant, Varian Medical Systems, Inc; Consultant, NanoX; Scientific Advisory Board, RefleXion Medical Inc; Scientific Advisory Board, Prismatic Sensors AB; Medical Advisory Board, OurCrowd, LP ;

LEARNING OBJECTIVES

1) Understand the basic concepts behind iterative reconstruction algorithms. 2) Understand the differences between these methods and conventional reconstruction. 3) Appreciate the potential advantages and disadvantages of iterative methods.

ABSTRACT

For many decades, essentially all CT images have been reconstructed using an "analytic" algorithm, such as filtered backprojection. These methods are computationally efficient, allowing fast image reconstruction, and if the raw data are of high quality the images can be exact. As the dose is reduced or if there are deterministic errors in the data, analytic reconstruction may produce lower image quality than may be possible. Iterative reconstruction methods can build in knowledge of measurement noise and other errors and yield higher image quality. They can produce lower noise images in low dose settings and in some cases higher spatial resolution. Iterative methods are generally nonlinear, meaning that the image quality depends on the object being scanned. They also produce images whose properties are "non-stationary", meaning that the image quality can vary significantly across the image. Understanding these allows the user to best evaluate their performance and appropriately use them in clinical settings.

RC512-02 Impact of Iterative Reconstruction and Improved Spatial Resolution in CT Angiography (CTA) of Fenestrated Stent Grafts

Wednesday, Dec. 2 8:55AM - 9:05AM Location: E352

Participants
Terri J. Vrtiska, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Juan Montoya, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Thanila A. Macedo, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Thomas A. Foley, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Ying Huang, MD,PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Nikkole Weber, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Cynthia H. McCollough, PhD, Rochester, MN (*Abstract Co-Author*) Research Grant, Siemens AG
Joel G. Fletcher, MD, Rochester, MN (*Abstract Co-Author*) Grant, Siemens AG; ;

PURPOSE

To determine if improved spatial resolution and advanced model iterative reconstruction (IR) could improve confidence or reduce artifacts at CTA in patients with fenestrated stent grafts (FSGs).

METHOD AND MATERIALS

Patients with FSGs underwent 2 CTA exams, one using a CT system with IR and improved spatial resolution (System A: Somatom Force, Siemens), and the other without IR (System B: Somatom Definition Flash or Sensation 64, Siemens). A kV selection/chart and identical slice thickness were used for both exams. Anonymized images from each system were reviewed by a 2 radiologists in side-by-side comparison, with readers specifying preference and rationale. In a separate session, readers evaluated each artery with a stent for stenosis (0=none to 3=>80%) and intraluminal artifacts (0=none to 4=non-diagnostic). Occlusion, in-stent neointimal hyperplasia, and kinks were also noted (present vs. not). Confidence for each parameter was recorded (0=uncertain to 9=completely confident). Slice-specific CTDIvol at the proximal portion of each artery was recorded from the DICOM header.

RESULTS

21 pts with FSGs having 73 vessels with stents (14 Celiac, 18 SMA, 41 renal) underwent CTA on both CT systems. System A used lower tube potentials across the study cohort. The slice-specific CTDIvol with System A was lower (mean diff -13%). In 86% (36/42) of side by side comparisons, System A was preferred due to better in-stent visualization (n=8), less noise (n=22), and fewer artifacts (n=14). System B was preferred in 5 cases with increased metal artifacts but lower slice-specific radiation dose. When in-slice radiation dose of System A was ≥ 10% lower than System B, mean intraluminal artifacts scores were lower for System A (1.8 vs. 2.1, $p<0.01$) and confidence for in-stent stenosis was higher (7.2 vs. 6.5, $p<0.002$). Otherwise, there was no

difference in artifact score, stenosis, occlusion, kink or artifact (p>0.34), except that System B had a higher confidence for neointimal hyperplasia (7.6 vs. 6.8, p=0.02).

CONCLUSION

Improved spatial resolution and IR were visually preferred in unblinded comparisons, and resulted in higher confidence for in-stent visualization at lower relative doses.

CLINICAL RELEVANCE/APPLICATION

Improved spatial resolution and IR can improve confidence and reduce stent-related artifacts at lower dose levels, which facilitates surveillance in patients with fenestrated endografts.

RC512-03 Assessment of Adamkiewicz Artery Using Low Dose Multi-detector Computed Tomography with Novel Iterative Model-based Reconstruction Technique

Wednesday, Dec. 2 9:05AM - 9:15AM Location: E352

Participants
Tae Hyun Nam, Seongnam-Si, Korea, Republic Of (*Presenter*) Nothing to Disclose
Eun Ju Chun, MD, PhD, Seongnam-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyo Jin Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Bon Seoung Gu, Seongnam, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Soon Ahn Kwon, Seongnam-si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Gwan Hong Min, Seongnam-si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the visualization of the Adamkiewicz artery (AKA) on multi-detector computed tomography (MDCT) with novel iterative model-based reconstruction (IMR) in comparison to the iterative reconstruction (iDOSE) and filtered back projection (FBP) when the low dose CT protocol was applied.

METHOD AND MATERIALS

Forty patients (male 65.0%, mean age 65±16 years) with aortic aneurysm or dissection who underwent 256-slice MDCT with low dose CT protocol (100 kVp and 20 mA) were enrolled. Acquired raw data were reconstructed by using FBP, median level of iDOSE (iDOSE4) and IMR, and analyzed blindly by two observers. In the quantitative analysis, the signal-to-noise ratio (SNR) of the aorta and contrast-to-noise ratio (CNR) of the anterior spinal artery relative to the spinal cord were measured on multi-planar reformatted images. In qualitative analysis, the visualization of the AKA and its continuity with the intercostal or the lumbar artery were evaluated by using a four-point scale (1, poor to 4, excellent). The visualization scale of 3 or 4 was considered assessable. The one-way analysis of variance was used to evaluate the image quality of three reconstruction algorithm.

RESULTS

The interobserver agreement was good for SNR (k=0.94) and fair for CNR (k=0.73). In qualitative analysis, both SNR and CNR of IMR (SNR, 29.4±7.3; CNR, 4.8±1.7) were significantly higher than iDOSE (SNR, 20.3±6.2; CNR, 3.7±1.4) and FBP (SNR, 14.3±3.1, CNR, 3.2±1.2) (P<.05 for all comparisons). The visualization of AKA was also significantly better in IMR (3.7±0.5) from than iDOSE (3.0±0.9) and FBP (2.5±0.7) (p-value <.05). The prevalence of the assessable AKA was highest in IMR (87.5%) followed by iDOSE (70.0%) and FBP (42.5%) (p<0.05).

CONCLUSION

IMR algorithm led to improving the visualization of the AKA compared to the use of iDOSE and FBP when the low dose CT protocol was applied.

CLINICAL RELEVANCE/APPLICATION

Presurgical localization of the AKA is very important for protecting the spinal cord injury. As compared to iDOSE and FBP, novel IMR algorithm is helpful for evaluation of the AKA.

RC512-04 CT-angiography (CTA) with Low kV and Low Contrast Medium Volume Using a 256 Multi Detector CT Scanner (MDCT) in the Evaluation of Abdominal Aorta Disease: Diagnostic Efficacy and Radiation Dose Reduct

Wednesday, Dec. 2 9:15AM - 9:25AM Location: E352

Participants
Cammillo R. Talei Franzesi, Milan, Italy (*Presenter*) Nothing to Disclose
Davide Ippolito, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Davide Fior, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Pietro A. Bonaffini, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Maria V. Schiavone, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose
Sandro Sironi, MD, Monza, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To reduce the radiation dose exposure and the contrast medium volume by using low-kV setting CT-angiography (CTA) protocol, in the evaluation of abdominal aorta disease.

METHOD AND MATERIALS

From January 2013 to December 2014, 60 patients (23 women and 37 men; mean age 64.2 years; range, 34-83 years) with abdominal aorta disease were prospectively enrolled in our study. All patients underwent 256 MDCT scan examination of abdominal aorta (Brilliance-iCT, Philips, NL). Thirty-four patients were evaluated using low-dose radiation protocol (100 kV; automated tube current modulation) and low-contrast volume (30 mL; 4 mL/s; 350 mgI/mL). Twenty-six patients, as control group, underwent standard CTA protocol (120 kV; automated tube current modulation), with 80 mL of contrast medium volume. Intravessels density

measurements (HU) were performed manually drawing a region of interest (ROI) in the lumen of abdominal aorta, renal arteries and common iliac arteries. The radiation dose exposure (dose-length product, DLP; CT dose index, CTDIvol) and the signal-to-noise-ratio (SNR) were calculated. The obtained data were then compared between the two groups and statistically analysed.

RESULTS

All exams reached high diagnostic quality, permitting to correctly visualize and evaluate the lumen and wall of the main aortic branches. In the study group higher density measurements were observed as compared to control group, in abdominal aorta (mean attenuation value 332 HU vs 318 HU), renal arteries (341 HU vs 305 HU) and common iliac arteries (324 HU vs 311 HU). No significant noise increase was observed in the study group (mean signal to noise ratio, SNR 14.3) in comparison to control group (SNR 18.2). A significant ($p<0.05$) reduction in radiation dose exposure was achieved using low-kV protocol (DLP 335 mGy*cm, CTDIvol 5.8 mGy), as compared to control group (DLP 973 mGy*cm; CTDIvol 19.4 mGy), with an overall radiation dose reduction of 65%.

CONCLUSION

Low kV protocol with low contrast medium volume allows reducing the radiation dose exposure, preserving the renal function, in the evaluation of patients with abdominal vascular disease.

CLINICAL RELEVANCE/APPLICATION

Low-kV protocol with low contrast media volume reduces the radiation exposure, preserving renal function and providing an effective tool for the evaluation of patients with abdominal vascular disease.

RC512-05 Impact of Noise-Optimized Virtual Monochromatic Imaging at Third-Generation Dual-Source Dual-Energy CT Angiography of the Lower Extremity Run-off

Wednesday, Dec. 2 9:25AM - 9:35AM Location: E352

Participants
Julian L. Wichmann, MD, Charleston, SC (*Presenter*) Nothing to Disclose
Matthew R. Gillott, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Carlo N. De Cecco, MD,PhD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Akos Varga-Szemes, MD, PhD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
U. Joseph Schoepf, MD, Charleston, SC (*Abstract Co-Author*) Research Grant, Bracco Group; Research Grant, Bayer AG; Research Grant, General Electric Company; Research Grant, Siemens AG; Research support, Bayer AG; ; ;
Ricardo Yamada, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Marcelo Guimaraes, Charleston, SC (*Abstract Co-Author*) Consultant, Cook Group Incorporated ; Consultant, Baylis Medical Company; Consultant, Terumo Corporation; Patent holder, Cook Group Incorporated
Stefanie Mangold, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Giuseppe Muscogiuri, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Stephen R. Fuller, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Christian Canstein, Charleston, SC (*Abstract Co-Author*) Employee, Siemens AG

PURPOSE

To assess the impact of a noise-optimized image-based virtual monochromatic imaging algorithm (VMI+) on objective and subjective image quality at third-generation dual-source dual-energy CT angiography (CTA) of the lower extremity run-off.

METHOD AND MATERIALS

We retrospectively evaluated dual-energy CTA studies of the lower extremity run-off in 48 patients (32 male, 16 female; mean age 63.3 ± 13.8 years) performed on a third-generation dual-source CT system. Images were reconstructed with standard linear blending (F_0.5) representing 120-kVp polychromatic acquisition, VMI+ and traditional monochromatic (VMI) algorithms at 40-120 keV energy levels in 10-keV increments. Vascular attenuation and image noise in 18 run-off artery segments were measured; signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) were calculated. Two observers used five-point scales to subjectively evaluate vascular attenuation and image noise.

RESULTS

Objective image quality metrics peaked in the 40 and 50 keV VMI+ series (SNR: 20.2 ± 10.7 and 19.0 ± 9.5, respectively; CNR: 18.5 ± 10.3 and 16.8 ± 9.1, respectively) and were significantly (all $P<0.0001$) higher compared to the corresponding 40 and 50 keV VMI series (SNR: 8.7 ± 4.1 and 10.8 ± 5.0; CNR: 8.0 ± 4.0 and 9.6 ± 4.9) and the standard linearly-blended F_0.5 datasets (SNR: 10.7 ± 4.4; CNR: 8.3 ± 4.1). Subjective assessment of attenuation was highest for the 40 and 50 keV VMI and VMI+ image series (range, 4.84-4.91), both superior to F_0.5 (4.07; $P<0.0001$). Corresponding subjective noise assessment was superior for 50 keV VMI+ (4.71; all $P<0.0001$) compared to corresponding VMI (2.60) and F_0.5 (4.11).

CONCLUSION

Image reconstruction with VMI+ at low keV levels (40-50 keV) improves objective and subjective image quality compared to traditional VMI and standard linear blending reconstructions at dual-energy CTA of the lower extremity run-off.

CLINICAL RELEVANCE/APPLICATION

Improved image quality using VMI+ may improve evaluation and diagnosis in lower extremity run-off dual-energy CTA cases with suboptimal vascular opacification and potentially facilitate reduction of iodine load.

RC512-06 Salvage of Suboptimal CT Angiographic Studies Using Virtual Monoenergetic Images from Novel Spectral Detector CT Scanner

Wednesday, Dec. 2 9:35AM - 9:45AM Location: E352

Participants
Hamid Chalian, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Bahar Mansoori, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose

Majid Chalian, MD, Cleveland Heights, OH (*Abstract Co-Author*) Nothing to Disclose
Mojgan Hojjati, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Amar Dhanantwari, PhD, Highland Heights, OH (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Prabhakar Rajiah, MD, FRCR, Cleveland, OH (*Abstract Co-Author*) Institutional Research Grant, Koninklijke Philips NV

PURPOSE

To evaluate the ability of spectral detector CT (SDCT), a novel dual-layer technology to salvage suboptimal CT angiographic studies utilizing retrospectively generated virtual monoenergetic images.

METHOD AND MATERIALS

This study included 17 patients who had CTA on SDCT prototype (Philips Healthcare, Cleveland, OH, USA) and had a suboptimal study, defined as aortic attenuation < 200 HU. Monochromatic image sets were generated at 40, 50, 60, 70, 80 kev. Attenuation, noise, SNR and CNR were measured at ascending aorta (AA), descending aorta (DA), aortic root (AR), LAD, and left ventricle (LV). Subjective evaluation of vascular enhancement, image noise and overall image quality were graded on a 5-point scale (1- Non diagnostic, 5- excellent) by cardiac imager. From the monoenergetic reconstructions, an ideal set was chosen, defined as the highest energy that provided a mean attenuation value of > 200 HU, while maintaining good image quality. At this ideal energy level, attenuation, noise, SNR and subjective image quality were compared to standard 120 kVp polyenergetic study. Paired t-test was used for analysis of quantitative variables. Qualitative analysis was done using Chi-square test.

RESULTS

Mean attenuation in the conventional images was 175.9+/-55.9 HU, 188.9+/-70.4 HU, 178.2+/-67.1 HU, 164.6+/-60.1 HU, and 153.3+/-86.1 HU in the AA, DA, AR, LV, and LAD, respectively. With monochromatic images, there was improved attenuation at 40, 50, 60, 70, 80 keV levels (p value < 0.001 for all) in all pateints. 50 keV image provided the best subjective image quality (4.1 vs. 1.5 on conventional images, p=0.017). Attenuation (175.9+/-55.9 vs. 334.7+/-126.8 HU, p<0.001), SNR (10.5+/-9.0 vs. 18.2+/-14.2, p<0.001) and CNR (16.0+/-13.9 vs. 25.4+/-20.2, p=0.001) of AA was significantly higher at 50 keV as compared to the conventional polychromatic images. Similar trends were seen in other structures. Attenuation, CNR, and SNR increased for 46.5%, 37.5%, and 41.5% at 50 keV compared to conventional 120 keV.

CONCLUSION

All suboptimal CTAs were salvaged using low monoenergetic reconstruction. At the optimal monoenergetic level, the attenuation, SNR, CNR and image quality were significantly higher than that of conventional polychromatic image.

CLINICAL RELEVANCE/APPLICATION

Suboptimal angiographic studies can be salvaged using SDCT, thus obviating the need for additional contrast and radiation.

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/

Prabhakar Rajiah, MD, FRCR - 2014 Honored Educator

RC512-07 Dual-energy and Low kVp CTA

Wednesday, Dec. 2 9:45AM - 10:10AM Location: E352

Participants
Thomas Henzler, MD, Mannheim, Germany, (thomas.henzler@medma.uni-heidelberg.de) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The lecture will review the technical background behind dual-energy CT and primarily acquired low kVp single energy CT angiography. 2) Advantages and disadvantages between dual energy CT angiography and low kVp CT angiography are discussed. 3) Practical advices for different CTA protocols are given. 4) The clinical impact of the techniques regarding radiation dose reduction as well as contrast medium reduction will be discussed.

RC512-08 Implications for Contrast Medium Delivery

Wednesday, Dec. 2 10:20AM - 10:45AM Location: E352

Participants
Dominik Fleischmann, MD, Palo Alto, CA (*Presenter*) Research support, Siemens AG;

LEARNING OBJECTIVES

1) Physics of kVp dependent attenuation of x-rays (see previous lecture). 2) Physiologic principles (rules) of early artrial enhancement following intravenous contrast medium injection. 3) Potential limitations and disadvantages of low-contrast protocols in clinical practice .

ABSTRACT

Advances x-ray tubes technology allow the routine use of lower kVp settings for CT data acquisition. Lower kVp increases the x-ray attenuation of iodine relative to soft tissues, with the potential to either increase vascular opacification for the same contrast medium volume, or decrease the total contrast medium volume while maintaining image contrast.Judicious selection and modification of contrast medium injection parameters requires not only a basic understanding of the physics of kVp-dependent x-ray attenuation of x-rays (see previos presentation in this course), but also a fundamental understanding or early arterial contrast dynamics, and the potential limitations of reducing contrast medium volume for a given cardiovascular CT exam.CONTRAST PHYSIOLOGY: early arterial contrast medium dynamics can be summarized by four basic rules describing arterial opacification as a function of intravenous contrast administration:(1) Arterial enhancement is proportional to the contrast medium injection rate (iodine / second)

(2) Arterial enhancement also increases in a cumulative fashion with a longer injection duration(3) The main physiologic parameter controlling the strength of arterial enhancement is cardiac output(4) For large (runoff) or diseased (aneurysms) vasular territories, the contrast medium transit time within a vascular territory has to be accounted for.LIMITATIONS OF REDUCING CONTRAST MEDIUM VOLUME: While theoretically the contrast/noise ratio may be unchanged when a low kVp / low contrast medium volume protocol is used, such calculations are based on well opacified large vessels, where the high vascular attenuation suggests that an increase in image noise can be tolerated. However, relevant vascular features are often displayed in less attenuated small vessels or vascular borders which are affected by partial volume, and both, 3D visualization and quantitative measurements may in fact be less accurate.Any study-design aimed at assessing a low-contrast medium volume protocol thus requires a rigorous design that proves equal or better image quality. Furthermore - since low-contrast medium volume protcols are inherently justified by the perceived harm of intravenous contrast use - a study design also needs to demonstrate that a new low-dose protocol in fact reduces harm in the population of interest.

RC512-09 Low Contrast Media Volume for CTA of the Aorta: Individualized Protocols Adapted to the Tube Voltage

Wednesday, Dec. 2 10:45AM - 10:55AM Location: E352

Participants
Kai Higashigaito, Zurich, Switzerland (*Presenter*) Nothing to Disclose
Tabea Schmid-Rueegger, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Gilbert Puippe, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Fabian Morsbach, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Thomas Pfamatter, MD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Hatem Alkadhi, MD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Daniela B. Husarik, MD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate into tube voltage-adapted contrast media (CM) volume reduction protocols for CT-angiography (CTA) of the aorta using automated attenuation-based tube voltage selection (ATVS).

METHOD AND MATERIALS

In this prospective, IRB approved study, 190 patients (69.6±11.3 years) undergoing thoracoabdominal CTA with ATVS (ref.kVp=110, ref.mAs=130) on a 192-slice dual-source CT were included. Intravenous contrast media (CM) volume was adapted based on iodine attenuation curves derived from a phantom study and depending on automatically selected tube voltages (range: 80-110kVp at 10kVp intervals). CM volume and injection rate decreased at a maintained bolus length from 110kVp (68 ml@3.6 ml/s) to 80kVp (33 ml@1.8 ml/s). Subjective image quality was assessed by three blinded, independent readers. Objective image quality (aortic attenuation and contrast-to-noise ratio [CNR]) was determined. Volume CT-dose-index (CTDIvol) and size-specific dose estimates (SSDE) were recorded. Cohen's kappa was calculated to evaluate inter-reader agreements. Linear regression was used to assess relationships between selected tube voltage and aortic attenuation/CNR.

RESULTS

62 Patients were imaged at 80kVp, 84 at 90kVp, 33 at 100kVp and 11 at 110kVp. Agreements between the three readers were good for subjective image quality (κ = 0.691). Diagnostic image quality was achieved in 96.9% of scans. Scans at 80kVp showed mean aortic attenuation of 330±54HU, at 90 kVp 325±54HU, at 100kVp 336±74HU and at 110kVp 387±62HU. CNR values were as follows: 80kVp 15±3, 90kVp 15±4, 100kVp 14±4 and 110kVp 15±4. Linear regression analysis showed no significant correlation between selected tube voltage and mean aortic attenuation (p= 0.108) and between selected tube voltage and CNR (p=0.795). Mean CTDI was 3.50±0.83mGy and mean SSDE was 4.08±0.72mGy.

CONCLUSION

Individualized adaptation of the CM volume and injection rate to automatically selected tube voltages using ATVS allows for a reduction of CM in CTA of the aorta, while maintaining a constant and diagnostic image quality.

CLINICAL RELEVANCE/APPLICATION

Contrast media can be reduced in an individualized fashion according to the automatically selected tube voltage for CTA of the aorta.

RC512-10 Low Iodine-dose Abdominal CT Angiography Using Low Energy (keV) Images from ssDECT

Wednesday, Dec. 2 10:55AM - 11:05AM Location: E352

Participants
Manuel Patino, MD, Boston, MA (*Presenter*) Nothing to Disclose
Andrea Prochowski Iamurri, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Diana Murcia, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Yasir Andrabi, MD, MPH, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Farhad Mehrkhani, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Rodrigo Canellas, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Mukta D. Agrawal, MBBS, MD, Arlington, MA (*Abstract Co-Author*) Nothing to Disclose
Dushyant V. Sahani, MD, Boston, MA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Consultant, Allena Pharmaceuticals, Inc

PURPOSE

To assess the performance of abdominal angiography with ssDECT using standard- (33 to 35g), low- (21 to 24g) and ultra-low- (16g) iodine dose, compared to SECT angiography with standard-iodine dose. Second, to determine the energy level (keV) for optimal assessment of vascular structures.

METHOD AND MATERIALS

This IRB approved clinical trial was designed in three phases. A total of 105 patients with AAA, scheduled for a follow-up CTA were

enrolled. Each subject had a standard-iodine dose CTA. The follow-up CTA was performed on a ssDECT scanner (Discovery CT750 HD; GE Healthcare), with DECT mode and Iodixanol (GE Healthcare) as follows: Phase 1) 35 patients were scanned with standard-iodine dose (33 to 35g). Phase 2) 64 patients were scanned with 30%-reduced iodine dose (21-24g). Phase 3: 10 patients were scanned with 55%-reduced iodine dose (16g). Virtual monochromatic images (VMC) (40, 50, 60 and 70keV) were generated from arterial-phase DECT images. Two experienced-radiologists evaluated the VMC images for image quality, diagnostic keV-range, optimal keV for vascular assessment, and vascular evaluation. Aortic attenuation was measured and contrast-to-noise-ratio (CNR) was calculated from SECT and VMC images. CTDIvol and DLP were measured and recorded. Statistical analysis was conducted with pair student t-test.

RESULTS

Standard, low and ultra-low-dose DE-CTA exams were rated as high diagnostic quality by the readers (IQ=4.5, 4.2 and 4, respectively). VMC (40 to 70 keV) images were rated diagnostic, and 40 to 50keV were rated optimal for vascular evaluation for all 3 groups. Compared to SE-CTA images, intravascular attenuation and CNR on 40-50keV DECT images were higher at standard (3X/35%), low (2X/30%) and ultra-low (2X/20%) iodine dose ($p<0.001$). Both readers detected 18/18 endoleaks on the DECT scans. Radiation dose was 20-30% lower on DE-CTA, compared to SE-CTA ($p<0.05$).

CONCLUSION

DECT increases intravascular attenuation and CNR enabling substantial iodine dose reduction, compared to SECT. Ultra-low iodine dose DE-CTA is feasible without reduction in diagnostic quality.

CLINICAL RELEVANCE/APPLICATION

DECT allows substantial reduction of iodine dose for CT angiography while rendering high quality images, providing an opportunity to decrease contrast media related renal risks, especially in older patients. These results can be applied to other vascular regions.

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

RC512-11 Diagnostic Value of 70 kVp Time-resolved 4D Bone Subtracted CT Angiography with 80 cm -z-axis Coverage in Addition to Static High-pitch CT Angiography: Diagnostic Confidence and Impact on Patient Management

Wednesday, Dec. 2 11:05AM - 11:15AM Location: E352

Participants
Holger Haubenreisser, Mannheim, Germany (*Presenter*) Speaker, Siemens AG; Speaker, Bayer AG
Amir Bigdeli, Ludwigshafen, Germany (*Abstract Co-Author*) Nothing to Disclose
Mathias Meyer, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Riffel, MD, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Stefan O. Schoenberg, MD, PhD, Mannheim , Germany (*Abstract Co-Author*) Institutional research agreement, Siemens AG
Thomas Henzler, MD, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To prospectively investigate the diagnostic value of time-resolved CT angiography 4D bone subtracted datasets with 80 cm z-axis coverage in addition to static CT angiography in patients with lower limb peripheral arterial occlusive disease (PAOD).

METHOD AND MATERIALS

40 (mean age:71.7yrs;24men) patients with suspected lower limb PAOD underwent a combined CTA protocol consisting of a high-pitch-CTA run-off study starting from the abdominal aorta as well as a time-resolved-CTA of the lower limbs over 80cm (60s total scan time (8x3s, 6x6s); 70kV; 20ml iomeprol400). In addition to the time-resolved series, time-resolved bone subtracted maximum-intensity-projections were generated for each examination. Each of seven lower leg artery segments was rated with regard to contrast and diagnostic confidence (3-point scale) for stenosis assessment. In addition, two radiologists and one vascular surgeon assessed the time-resolved examination regarding additional information leading to changes in patient management.

RESULTS

Compared to the static high-pitch-CTA, time-resolved-CTA datasets with peak contrast enhancement showed significantly higher contrast and CNR in all lower limb vessel segments ($p<0.05$). Diagnostic confidence was rated higher for time-resolved studies when compared to the standard static high-pitch CTA studies (median: time-resolved-CTA: 3[range 2-3]; high-pitch: 2[1-3]). Clinically relevant findings with subsequent impact on patient management that were only visible in the time-resolved-CTA studies were found in 7 of 40 patients, including complete vessel occlusion that was mimicked by extensive calcification.

CONCLUSION

Compared to static high-pitch-CTA, time-resolved-CTA improves arterial contrast enhancement and provides higher diagnostic confidence in patients with suspected lower limb PAOD. Compared to static high-pitch run-off studies, time-resolved studies CTA acquisitions lead to a higher number of clinically important findings that directly influenced patient management.

CLINICAL RELEVANCE/APPLICATION

Adding 70 kVp dynamic CTA examinations to standard static run-off CTA improves diagnostic confidence while retaining low iodine loads, potentially influencing patient management.

RC512-12 Perfusion-based Assessment of Disease Activity in Untreated and Treated Patients with Aortitis and Chronic Periaortitis: Correlation with CT-morphological, Clinical and Serological Data

Wednesday, Dec. 2 11:15AM - 11:25AM Location: E352

Participants
Georg Bier, MD, Tubingen, Germany (*Presenter*) Nothing to Disclose
Jorg Henes, MD, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Carolin Eulenbruch, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Theodoros Xenitidis, 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 evaluate the role of CT perfusion-based assessment of inflammatory activity in patients with treated and untreated aortitis and chronic periaortitis (A/CP) and to compare results with those of clinical and serological markers.

METHOD AND MATERIALS

35 patients (20 female, 15 male) with aortitis/chronic periaortitis (A/CP) and clinical symptoms were examined by whole-body contrast-enhanced computed tomography (CECT) and subsequently by segmental volume perfusion-CT (VPCT) for assessment of the degree of vascularization of A/CP as surrogate marker for inflammatoric activity. Blood flow (BF), blood volume (BV), volume transfer constant (k-trans), time to peak (TTP) and mean transit time (MTT) were determined and the thickness of the increased connective tissue formation was measured. Imaging data was subsequently correlated with clinical symptoms as well as with acute phase inflammatory parameters (C-reactive protein/CRP, erythrocyte sedimentation rate/ESR and leukocyte number).

RESULTS

21/35 patients were untreated, 14/35 had previous of ongoing immunosuppression. The interobserver agreement was good (0.78) for all VPCT parameters. Average values of perfusion parameters were higher in untreated patients, but remained also abnormally elevated in treated patients. Good agreement was found between perfusion data and CRP as well as ESR in aortitis (treated and untreated; $p < 0.05$) and in untreated patients with periaortitis ($p<0.05$).

CONCLUSION

Perfusion-CT parameters in untreated aortitis and periaortitis show good correlation with serological markers with respect to disease activity assessment. In treated periaortitis, however, correlations with serological markers were week or inexistent suggesting an increased rolve for (perfusion-based) imaging.

CLINICAL RELEVANCE/APPLICATION

For the first time the use of a new imaging technique for diagnosis and assessment of disease activity in patients with treated and untreated aortitis and periaortitis is reported. The weak correlation of VPCT with serological parameters in treated periaortitis patients suggests a potentially increased role for VPCT displaying serologically 'occult' disease activity.

RC512-13 Regional Mapping of Aortic Wall Stress Employing Deformable, Motion-Coherent Modeling based on ECG-gated CT Angiography: Exploratory Investigation with Pathodynamic Correlation in a TAVR Population

Wednesday, Dec. 2 11:25AM - 11:35AM Location: E352

Participants
Achille Mileto, MD, Durham, NC (*Presenter*) Nothing to Disclose
Tobias Heye, MD, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Daniele Marin, MD, Cary, NC (*Abstract Co-Author*) Nothing to Disclose
Daniel Boll, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the clinical feasibility of employing deformable, motion-coherent modeling for regional mapping of aortic wall stress in a transaortic valve replacement (TAVR) population undergoing ECG-gated MDCT angiography.

METHOD AND MATERIALS

For this IRB-approved, HIPAA-compliant prospective study we employed thoracic ECG-gated dual-source MDCT angiography (CTA) datasets from 250 consecutive patients (150 men,100 women;mean age, 79.0 ± 9.1 years), who prospectively underwent CTA and echocardiography on the same day. Deformable, motion coherent modeling of aortic wall stress was performed using the PhyZiodynamic framework. The complex aortic motion was dissected into three types of aortic wall translocation, namely longitudinal strain, axial strain, and axial deformation by utilizing exported four-dimensional coordinates for seven anatomic locations, using the Matlab environment.

RESULTS

One hundred fifty-four patients were categorized as having severe aortic stenosis with a mean flow rate of 4.7 ± 0.6 mL/s; 96 patients were categorized with mild to moderate aortic stenosis with a mean flow rate of 3.5 ± 0.6 mL/s. Inverse correlation between heart rate and longitudinal strain ($R2= 0.79$), as well as longitudinal ($R2= 0.95$) and axial strain ($R2= 0.31$) was noted. In contrast, a significant trend towards an increase in axial deformation was observed with progressive increase in heart rate ($P<.001$). These findings indicated that shorter R-R interval may limit aortic motion in the longitudinal and axial planes due to inherent aortic wall rigidity. Increased aortic blood flow in the ascending aorta led to significantly greater longitudinal strain throughout the cardiac contraction cycle ($P<.001$), whereas increasing aortic valve areas led to significantly increased magnitudes in axial deformation ($P<.001$). Longitudinal strain propagating through the aortic wall was predominantly dependent upon the pressure gradients within the aorta. Axial deformation was dependent on the magnitude of passing blood volume.

CONCLUSION

Our study demonstrates the clinical feasibility of deformable, motion-coherent modeling based on ECG-gated MDCT angiography

acquisition for regional mapping aortic wall stress.

CLINICAL RELEVANCE/APPLICATION

Regional mapping of aortic wall stress may provide more objective information on quiescent landing zones suitable for deploying aortic prosthetic grafts, as well as providing insights on atherosclerotic changes of aortic wall.

RC512-14 Post Processing, Workflow and Interpretation

Wednesday, Dec. 2 11:35AM - 12:00PM Location: E352

Participants
Karin E. Dill, MD, Evanston, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the newest post processing techniques currently available for CT angiography. 2) Describe patient-centric imaging and workflow tools which optimize patient care.

ABSTRACT

Rapid evolution of imaging post-processing tools allows for continued advancement in the ability to manipulate data for image interpretation. The newest CTA post processing software will be demonstrated, leading to improved diagnostic capability. Efficient workflow algorithms will be reviewed which center around the patient, bringing multidisciplinary teams together in the workup, diagnosis and treatment of those seeking care. An emphasis will be placed on imaging guidelines which will ultimately be linked to decision support for reimbursement.

RC514

Interventional Series: Peripheral and Visceral Occlusive Disease

Wednesday, Dec. 2 8:30AM - 12:00PM Location: E353A

VA IR

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 4.00

FDA Discussions may include off-label uses.

Participants
Parag J. Patel, MD, Milwaukee, WI (*Moderator*) Consultant, Medtronic, Inc; Consultant, C. R. Bard, Inc; Consultant, Penumbra, Inc; Jonathan M. Lorenz, MD, Chicago, IL (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe pros and cons of intervention for median arcuate ligament compression on the celiac axis. 2) Explain the use of radial artery access. 3) Outline 3 recommendations for endovascular treatment of peripheral vascular disease. 4) Describe current status of true percutaneous endovascular repair of abdominal aortic aneurysms. 5) Describe 2 vascular compression syndromes.

Sub-Events

RC514-01 Radial Artery Access. Why? When? How?

Wednesday, Dec. 2 8:30AM - 9:00AM Location: E353A

Participants
Marcelo Guimaraes, Charleston, SC (*Presenter*) Consultant, Cook Group Incorporated ; Consultant, Baylis Medical Company; Consultant, Terumo Corporation; Patent holder, Cook Group Incorporated

LEARNING OBJECTIVES

View learning objectives under main course title.

RC514-03 Morphological Predictors of Optimal Recanalization Strategy for Long-segment Chronic Total Occlusions of the Femoropopliteal Arteries

Wednesday, Dec. 2 9:10AM - 9:20AM Location: E353A

Participants
Jungong Zhao, MD, Shanghai, China (*Presenter*) Nothing to Disclose

PURPOSE

To investigate the morphological characteristics of long-segment chronic total occlusions of the femoropopliteal arteries (LFP-CTOs) as predictors of the optimal recanalization strategy.

METHOD AND MATERIALS

We retrospectively evaluated the morphological characteristics of 102 CTOs (74 patients) treated with antegrade and/or retrograde recanalization using contrast enhanced-magnetic resonance / computed tomography angiography and digital subtraction angiography imaging results. Proximal morphology, lesion length, calcification, proximal branching, collateral circulation, runoff vessels, and concomitant arterial occlusion were used as predictors for univariate analysis. Multivariate logistic regression analysis was performed to identify independent predictors of successful angioplasty and recanalization.

RESULTS

Antegrade and retrograde recanalization were successful in 82 and 10 CTOs, respectively (total success rate, 90.2%). The antegrade approach was frequently used for wire crossing and had a shorter mean procedure time than the retrograde approach (90.7 ± 35.3 min vs. 185.5 ± 41.2 min, $P < 0.001$). Multivariate analysis revealed that concomitant artery occlusion [odds ratio (OR): 0.299; 95% confidence interval (CI): 0.103-0.868; P=0.026) was a lower likelihood technical success; flush occlusion (OR: 41.795; 95% CI: 4.567-382.517; P<0.001) and large collateral (OR: 14.829; 95% CI: 1.350-162.898; P=0.027) were predictors of retrograde recanalization. During follow-up, sustained ABI improvement was founded in 79.3% limbs, and the binary restenosis rate was 40.2% in antegrade group and 50.0% in retrograde group ($P > 0.05$), but the flush occlusion (OR: 3.736; 95% CI: 1.152 - 12.119; P=0.028) was associated with a significantly higher likelihood of binary restenosis.

CONCLUSION

We recommend that LFP-CTOs with concomitant occlusion should be treated with bypass surgery, whereas flush occlusions and those with large collateral circulation should be managed with retrograde recanalization earlier if antegrade approach fails.

CLINICAL RELEVANCE/APPLICATION

Morphological characteristics of long-segment chronic total occlusions of femoropopliteal arteries can help predict the optimal strategy for endovascular recanalization.

RC514-04 Trends in Use of Vascular Ultrasound and Noninvasive Physiologic Testing for Peripheral Arterial Disease: Are These Tests Being Overused?

Wednesday, Dec. 2 9:20AM - 9:30AM Location: E353A

Participants
David C. Levin, MD, Philadelphia, PA (*Presenter*) Consultant, HealthHelp, LLC; Board of Directors, Outpatient Imaging Affiliates, LLC

Laurence Parker, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Geoffrey A. Gardiner JR, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Vijay M. Rao, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The U.S Preventive Services Task force has never supported routine screening for peripheral arterial disease (PAD). There is no need to treat asymptomatic (or even many symptomatic) patients and studies suggest only very modest recent growth in PAD incidence. For these reasons, our goal was to assess recent trends in the use of ultrasound (US) and noninvasive physiologic tests (NPTs), the most common tests used to screen for and initially diagnose PAD.

METHOD AND MATERIALS

The nationwide Medicare Part B databases for 2001 through 2013 were used. The 2 CPT codes for extremity arterial US and the 3 codes for extremity NPTs were selected. Procedure volume trends were evaluated. Medicare's physician specialty codes were used to determine which specialists were doing the studies. Utilization rates per 1000 were calculated.

RESULTS

Total Medicare volume of extremity arterial US was 396,734 in 2001, increasing every year thereafter to 818,272 in 2013 (+106%). The US utilization rate per 1000 was 11.7 in 2001, rising to 21.9 in 2013 (+87%). NPT volume increased from 716,005 in 2001 to a peak of 1,362,789 in 2010, then dropped to 1,278,145 in 2013 (+79% vs 2001)). The NPT rate per 1000 increased from 21.0 to a peak of 38.7 in 2010, then dropped to 34.3 in 2013 (+63% vs 2001). The 3 highest volume specialties in arterial US in 2013 were surgery (258,104 - up 108% vs 2001), radiology (210,477 - up 93% vs 2001) and cardiology (187,275 - up 267% vs 2001). The 3 highest volume specialties in NPTs in 2013 were surgery (444,623 - up 35% vs 2001), cardiology (267,005 - up 206% vs 2001), and primary care (229,215 - up 208% vs 2001). The overall rate of use of these 2 major kinds of tests for PAD increased from 32.7 per 1000 in 2001 to 56.2 in 2013 (+72%).

CONCLUSION

Use of both US and NPTs for possible PAD grew rapidly from 2001 to 2013. Growth was especially high among surgeons and cardiologists. There is no apparent medical rationale for the increasing utilization of these tests for PAD. The rapid growth in use of both US and NPTs raises concern about overuse, especially given the fact that surgeons and cardiologists are in a position to self-refer.

CLINICAL RELEVANCE/APPLICATION

n/a

RC514-05 Update on Recommendations for Endovascular Treatment of PVD in 2015-This Is What to Do and Why to Do It

Wednesday, Dec. 2 9:30AM - 10:00AM Location: E353A

Participants
Martin A. Funovics, MD, Vienna, Austria (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC514-06 EVAR: True Percutaneous Devices? When?

Wednesday, Dec. 2 10:00AM - 10:30AM Location: E353A

Participants
Parag J. Patel, MD, Milwaukee, WI (*Presenter*) Consultant, Medtronic, Inc; Consultant, C. R. Bard, Inc; Consultant, Penumbra, Inc;

LEARNING OBJECTIVES

View learning objectives under main course title.

RC514-07 Automated Quantification of Muscle Perfusion Using contrast Enhanced Ultrasound: Initial in Vitro and in Vivo Evaluation of Lower Limb Perfusion

Wednesday, Dec. 2 10:30AM - 10:40AM Location: E353A

Participants
Wing Keung t. Cheung, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Katherine t. Williams, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Kirsten t. Chrstensen-Jeffries, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Brahman Dharmarajah, MBBS, MRCS, London, United Kingdom (*Presenter*) Nothing to Disclose
Robert J. Eckersley, PhD, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Alun Davies, FRCR, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Mengxing Tang, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

An accurate and automated technique for quantification of tissue microperfusion is desirable for a wide-range of clinical applications including atherosclerotic and diabetic peripheral vascular disease. Existing studies evaluating peripheral vascular disease still use qualitative visual assessment and studies quantifying contrast ultrasound signals have limited outcomes.In this study, we develop a pixel-based automated bubble detection algorithm capable of separating contrast signals from both tissue signal and noise thus generating a quantitative surrogate measure of muscle blood flow.

METHOD AND MATERIALS

Quantification of contrast signal at varying dilutions of microbubble was performed within an in-vitro phantom to develop the

automated bubble detection algorithm. After ethical approval and informed consent, the in-vivo study evaluated muscle perfusion of the right calf before and after physical exercise in 5 healthy volunteers. Imaging was acquired using a Phillips iU-22 ultrasound platform with a L9-3 linear probe. Offline blinded image analysis was performed using an average of 5 regions of interest placed over the muscle bulk. Surface area ratio of bubble pixel intensity to background signal was calculated as a surrogate of muscle microperfusion which was compared before and after exercise.

RESULTS

The In vitro study demonstrated a good agreement between known bubble concentrations and quantification measures generated by the algorithm (R=0.94). For in vivo data the quantification results were calculated usng the algorithm and compared before and after subject exercise. Initial analysis showed that the average blood volume in the calf muscle increased by 48% after exercise (P<0.004).

CONCLUSION

The automated bubble detection algoritm has shown to be a promising tool for detecting and quantifying microbubble signals representing muscle microperfusion both in vitro and in vivo.

CLINICAL RELEVANCE/APPLICATION

Contrast enhanced ultrsound may provide a novel imaging technique for assessment of lower limb muscle microperfusion. This novel imaging biomarker may provide valuable information in diagnosis and treatment response in lower limb peripheral vascular disease.

RC514-08 Twins Study: Role of Femoral Ultrasound Examination in Predicting Cardiovascular Risk

Wednesday, Dec. 2 10:40AM - 10:50AM Location: E353A

Participants
Pierleone Lucatelli, MD, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Cirelli, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Renato Argiro, Rome, Italy (*Presenter*) Nothing to Disclose
Beatrice Sacconi, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Riccardo Rosati, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Fabrizio Fanelli, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Compare Common-Femoral-Artery (CFA) and Common-Carotid-Artery (CCA) Echo-Color-Doppler examination in predicting the cardiovascular risk in a sample of apparently healthy twins recruited from the Italian Twin Registry.

METHOD AND MATERIALS

The multicenter study included 322 twins (59.9% female) aged 20-78 years (52.1±15.3). Subjects underwent Echo-Color-Doppler examination of CCA and CFA. Mean IMT in both right and left sides of the CCA or CFA was recorded. Mean values were compared by Student's t test for paired data and by robust regression model to take account of the dependence of twin data within pairs and of confounders (age and gender). Plaques (thickening ≥1.5 mm over IMT) prevalence and composition (calcific, fibro-lipidic, mixed) in the two regions were estimated and compared by chi-squared test or logistic regression for clustered observation.

RESULTS

A significant difference (P<0.01) between mean CCA-IMT and mean CFA-IMT was detected (0.70±0.20 vs 0.73±0.24mm), although mean difference between the two traits was relatively small (0.03±0.17mm). Plaque prevalence was significantly higher in CFA compared to CCA (40.7% vs 30.4%). This result was confirmed even when only lipid plaque(33.6% in CCA and 24.5% in CFA) was considered and when age and gender were incorporated in the analysis. Isolated plaque prevalence was 18.3% for CCA and 8.1% for CFA. 51.2% of the sample had at least a plaque in both traits.

CONCLUSION

Echo-Color-Doppler identifies more plaques in CFA than in CCA, with prevalent fibro-lipidid composition. Femoral Echo-Color-Doppler should be introduced as part of screening protocols in order to assess the cardiovascular risk.

CLINICAL RELEVANCE/APPLICATION

Echo-Color-Doppler identifies more plaques in CFA than in CCA therefore Femoral Echo-Color-Doppler should be introduced as part of screening protocols in order to assess the cardiovascular risk.

RC514-09 Ultrasound Assessment of the Posterior Circumflex Humeral Artery in Elite Volleyball Players: Aneurysm Prevalence, Anatomy, Branching Pattern and Vessel Characteristics

Wednesday, Dec. 2 10:50AM - 11:00AM Location: E353A

Participants
Daan van de Pol, MD, Amsterdam, Netherlands (*Presenter*) Nothing to Disclose
Mario Maas, MD, PhD, Utrecht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Aart Terpstra, Amsterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Marja Pannekoek-Hekman, Amsterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Paul Kuijer, PhD, Amsterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
R. Nils Planken, MD,PhD, Amsterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Elite overhead athletes, like volleyball players, are at risk of finger ischemia due to arterial emboli originating from an injured and degenerated proximal posterior circumflex humeral artery (PCHA) in the dominant shoulder. Ultrasound (US) is the first line imaging modality for assessment of the PCHA in symptomatic athletes. However, identification and assessment of the PCHA is cumbersome in the hands of inexperienced ultrasonographists, partially due to anatomical variations and the nearby originating and resembling

deep brachial artery (DBA). The purpose of this study is (1) to determine the prevalence of PCHA aneurysms in elite volleyball players and (2) to describe PCHA and DBA characteristics that can be used for accurate identification and assessment of the PCHA.

METHOD AND MATERIALS

From January 2014 until July 2014, two experienced ultrasonographists completed the standardized PCHA US-protocol in 286 elite volleyball players. Assessment included determination of PCHA aneurysms (defined as segmental vessel dilatation ≥150%), anatomy/branching pattern, and PCHA and DBA vessel characteristics: course and diameter.

RESULTS

The PCHA was identified in 100% of volleyball players (n=286) and the DBA in 96% (n=276). An aneurysm of the PCHA was detected in 4.1% of the volleyball players (n=12) with a mean diameter of 5.9mm ±1.7 and was significantly larger compared to non-dilated PCHA vessel segments ($p<0.01$). The mean non-dilated PCHA and DBA diameters were 3.8mm ±0.5 (95%CI 3.7-3.8) and 2.3mm ±0.5 (95%CI 2.2-2.3), respectively. The PCHA originated directly from the axillary artery in 82% (n=235) and the DBA in 70% (n=200). PCHA anatomical variations included a common trunk with the DBA (n=24), common trunk with a different artery than the DBA (n=21) and a common trunk with two other arteries (n=3). The PCHA showed a tortuous course towards the humerus in 100% of the cases. The DBA showed a straight course parallel to the axillary artery in 100% of the cases.

CONCLUSION

The prevalence of PCHA aneurysms was 4.1% in our study cohort of 286 elite volleyball players. The reported PCHA and DBA vessel characteristics provide clear guidance for identification and assessment of the PCHA.

CLINICAL RELEVANCE/APPLICATION

One in twenty-five elite volleyball players showed a PCHA aneurysm on ultrasound. We provide PCHA characteristics and diameters that can be used as reference values (normal vs. aneurysmatic) for clinical assessment and research.

RC514-10 Compressive Vascular Syndromes

Wednesday, Dec. 2 11:00AM - 11:30AM Location: E353A

Participants
Lindsay S. Machan, MD, Vancouver, BC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC514-11 Median Arcuate Ligament Syndrome

Wednesday, Dec. 2 11:30AM - 12:00PM Location: E353A

Participants
Jonathan M. Lorenz, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objecitves under main course title.

VIS-WEA

Vascular Interventional Wednesday Poster Discussions

Wednesday, Dec. 2 12:15PM - 12:45PM Location: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
Sarah B. White, MD,MS, Milwaukee, WI (*Moderator*) Nothing to Disclose

Sub-Events

VI233-SD-WEA1 Reverse Attenuation Gradient Sign at CT angiography- A Potentially Useful Sign for Differentiating Type II Endoleak from Other Types of Endoleak

Station #1

Participants
Yosuke Horii, Niigata, Japan (*Presenter*) Nothing to Disclose
Toshihiko Hayashi, Niigatasi, Japan (*Abstract Co-Author*) Nothing to Disclose
Norihiko Yoshimura, MD, PhD, Niigata, Japan (*Abstract Co-Author*) Nothing to Disclose
Hidefumi Aoyama, MD, PhD, Niigata, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study was to examine the clinical importance of the reverse attenuation gradient (RAG) sign in patients with endoleaks after endovascular aortic aneurysm repair (EVAR) observed with computed tomographic angiography.

METHOD AND MATERIALS

Our institutional review board approved this retrospective study, and informed consent was waived. Fifteen consecutive patients (12 male and 3 female patients; mean age, 77.5 years±7.6[standard deviation]; range 62-90 years) with endoleaks confirmed at invasive angiography after either thoracic (n=8) or abdominal (n=7) EVAR were enrolled in this study. The RAG sign was defined as the reverse intraluminal opacification gradients of vessels distal to the proximal lesions, which has lower attenuation in the proximal segment and gradually increased attenuation along the vessel. Two experienced radiologists (with 12 and 8 years of experience in vascular imaging, respectively) were reviewed the images of CT angiography and invasive angiography. We compared the blood flow direction at invasive angiography and the frequency of RAG sign. Fisher's exact probability test was used for comparison.

RESULTS

There were 15 patients with EVAR endoleaks confirmed at invasive angiography. Invasive angiography was used to confirm 6 anterograde flows (AFs) and 9 retrograde flows (RFs). The RFs group had the RAG sign significantly more frequently than did the AFs group (89% [8 of 9] vs 17% [1 of 6]; P< .05).

CONCLUSION

The RAG sign in CT angiography might represent the flow direction from proximal to distal. The RAG sign might be a help to differentiate type2 endoleak from other types of endoleak.

CLINICAL RELEVANCE/APPLICATION

To accurately differentiate type 2 endoleak from other types of EVAR endoleak is very important to plan for additional treatment, because it is different depending on the types of endoleak.

VI234-SD-WEA2 Comparative Study of Doxorubicin-loaded Drug Eluting Microspheres: An In Vitro Evaluation

Station #2

Participants
Hsiang-Jer Tseng, MA, MD, Atlanta, GA (*Presenter*) Recipient of RSNA medical student research grant in 2012.
Lihui Weng, PhD, Minneapolis, MN (*Abstract Co-Author*) Chief Scientific Officer, EmboMedics Inc
Parinez Rostamzadeh, Minneapolis, MN (*Abstract Co-Author*) Nothing to Disclose
Jafar Golzarian, MD, Minneapolis, MN (*Abstract Co-Author*) Chief Medical Officer, EmboMedics Inc

PURPOSE

To compare the in vitro loading and post-injection drug recovery rates of two drug eluting microspheres(DEMs), DC Beads (DCBs) and bioresorbable microspheres (BRMS).

METHOD AND MATERIALS

DCBs (Biocompatibles, UK) and BRMS in the size range of 100-300 µm were compared. For the drug loading process, DEMs were immersed in a doxorubicin hydrochloride aqueous solution (2 mL, 25 mg/mL) at 5°C. At predetermined time points, the concentration of the loading solution was monitored with a UV spectrophotometer (by measuring the absorbance (at 482 nm) with the aid of a calibration curve. DEMs were suspended in a mixture (20 mL) of normal saline and contrast at a ratio between 4:6 and 6:4. The suspension was injected into a beaker using a 2.8 F Progreat microcathether (ID=0.027", Terumo, NJ). The following data were recorded: (1) Weight of DEMs delivered. (2) Dosage remained on the delivered DEMs. This dosage was obtained with a complete elution of the recovered DEMs after injection. (3) Dosage loss during injection. This was calculated by measuring the concentration of the injection medium after removing the post-injection DEBs. Each experiment was performed in triplicate.

RESULTS

Both DEMs can load >98% of doxorubicin after 2 hours. 75.92% and 83.33% of the DEMs by weight were recovered post-injection

for DCBs and BRMS, respectively (p=0.0779). 80.58% of doxorubicin remained on post-injection DCBs while 82.24% remained on BRMS (p=0.3804). 3.57% of drug was eluted in the contrast/normal saline medium for DCBs while 8.2% of drug was eluted for BRMS (p=0.0171).

CONCLUSION

Both DEMs exhibited similar loading efficacies for doxorubicin. Even though more drug was lost by elution for the BRMS when compared with the DCBs, this was made up for by a higher fraction of the beads recovered during injection from the BRMS. Overall, both DEMs perform similarly in terms of drug dosage delivery.

CLINICAL RELEVANCE/APPLICATION

BRMS has been shown to be non-cytotoxic, degradable, injectable and loadable with doxorubicin, showing great promise as a vehicle for transarterial chemoembolization.

VI235-SD-WEA3 Magnetic Resonance Image-guided Cryoablation of Recurrent Prostate Cancer: 3 Year Follow up

Station #3

Participants
Kristin A. Kinsman, MD, Rochester, MN (*Presenter*) Nothing to Disclose
David A. Woodrum, MD, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Akira Kawashima, MD, PhD, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
Krzysztof Gorny, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Joel P. Felmlee, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
R. Jeffrey Karnes, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Eugene D. Kwon, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Lance A. Mynderse, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the intermediate-term(3 year follow up) effectiveness of MRI-guided percutaneous cryotherapy for biopsy proven locally recurrent prostate cancer, after radical prostatectomy, with curative intent.

METHOD AND MATERIALS

IRB approved single arm study to examine the effectiveness of MR guided cryoablation for locally recurrent prostate cancer. Eight patients, of a 31 patient cohort, treated for curative intent had a 3 year follow up. Each patient was treated with MRI-guided cryoablation for locally recurrent prostatic carcinoma. All patients(mean 63,57-73years old) had visible nodules on multiparametric MRI(mpMRI) with TRUS, biopsy proving recurrent prostate cancer. All eight patients had primary prostectomy for prostate cancer with 3 of 8 receiving subsequent radiation therapy for recurrent cancer afterwards. After careful confirmation of locally recurrent disease using PET choline and MRI, MR guided cryoablation was discussed. MR guided cryotherapies were performed with 1.5T MRI(Siemens Espree,Erlangen,Germany). Cryoprobes(2-4) were placed using transperineal guidance grid(Biotex, Houston TX). MR-guided cryoablation(Galil Inc., Minneaopolis, MN) was performed using 3 freeze-thaw cycles with continuous MRI monitoring during the freezing. Follow up was performed with serial PSA(1,3,6,12,18,24,30,and 36 months), mpMRI(6,12,24,and 36 months), and clinic visit(6,12,24,and 36 months). If there was a rise in PSA to >1ng/mL then a PET choline is performed.

RESULTS

The mean pre-ablation PSA was 0.67ng/mL(0.29-2.2) All 8 patients had a PSA<0.2ng/mL at 1 month status post ablation. The mean 3 year PSA was 0.21ng/mL(0.0-0.95). Five of 8 patient's PSA remained <0.2 ng/mL throughout the 3 year follow-up without subsequent therapy. One patient with a bladder neck lesion recurred at 6 months, and went on to radiation therapy. Two patients have had a slow rise in PSA but no definite recurrence in the prostate bed by imaging or biopsy. Treatment related complications include worsening erectile dysfunction(1/8), minor incontinence(2/8), and worsening of moderate urinary incontinence(1/8). No patient developed rectal injury or ureteral injury.

CONCLUSION

MRI-guided cryoablation for patients with locally confined prostate bed recurrences can be an effective treatment option.

CLINICAL RELEVANCE/APPLICATION

MRI-guided cryoablation offers patients with recurrent prostate cancer another possible option for treatment beyond surgery and radiation.

VI254-SD-WEA4 The Safety and Efficacy Profile of TACE for Treating Hepatocellular Carcinoma in Patients Co-infected with HIV and HCV: A Propensity Score Matching Study

Station #4

Participants
Jae Ho Sohn, MD,MS, New Haven, CT (*Presenter*) Nothing to Disclose
Reham R. Haroun, Salt Lake City, UT (*Abstract Co-Author*) Nothing to Disclose
Julius Chapiro, MD, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Sonia P. Sahu, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Yan Zhao, MS, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Rafael Duran, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Florian N. Fleckenstein, MS, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Ruediger E. Schernthaner, MD, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Li Zhao, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Susanne Smolka, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Ming De Lin, PhD, Cambridge, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Researcher, BTG International Ltd; Consultant, BTG International Ltd; Researcher, Koninklijke Philips NV; Consultant, Koninklijke Philips NV; Researcher, Guerbet SA; Consultant, Guerbet SA; Consultant, Terumo Corporation; Consultant, Threshold Pharmaceuticals, Inc; Consultant, PreScience Labs, LLC; Researcher,

Boston Scientific Corporation; Consultant, Boston Scientific Corporation

PURPOSE

Hepatocellular carcinoma (HCC) is becoming an increasing cause of morbidity and mortality in patients co-infected with HIV and HCV. TACE is an important treatment option for unresectable HCC, but to date, there is paucity of data on the safety and efficacy profile of TACE in this specific cohort. The purpose of this study is to compare HCC patients with HIV/HCV co-infection treated with TACE against HCC patients with HCV mono-infection treated with TACE through survival analysis and recording of major complications.

METHOD AND MATERIALS

This single institution and retrospective study included 456 patients. 35 HIV/HCV co-infected HCC patients with CD4 > 100 (group EXP) and 421 HCV-only HCC patients (group CTRL) who received TACE from 2001 - 2014 were included. Propensity score matching (PSM) with the nearest-neighbor method was performed, adjusting for sex, ethnicity, and BCLC/HKLC, which take into account Child-Pugh Class, ECOG performance score, and tumor characteristics. Covariate balance was confirmed. Kaplan-Meier (KM) estimates with median overall survival (MOS) and log-rank statistic were calculated. Cox regression was performed on EXP group to identify infectious disease parameters of potential significance on survival, such as detectable HIV viral load, CD4 count, and anti-retroviral therapy (ART). Significant complications were recorded.

RESULTS

Of the 456 patients, 35 patients in EXP group were successfully matched to 75 patients in CTRL group. 15 (42.9%) patients had detectable HIV viral load. Median CD4 count was 406 x 106 cells/mm3 (range 121 to 1086). 31 (88.5%) patients were on ART. The cohort spanned all BCLC/HKLC stages. KM revealed MOS of 20.0 months for the EXP group and MOS of 21.3 months for the CTRL group (p = 0.907). Cox model on EXP group did not identify any infectious disease variables of significance on survival. No significant complication, such as death, ICU stay, or fulminant liver failure within 30 days of TACE, was observed in the EXP group.

CONCLUSION

In HCC patients with HIV/HCV co-infection and CD4 > 100, TACE demonstrated comparable safety and efficacy profile as in HCC patients with HCV only.

CLINICAL RELEVANCE/APPLICATION

Interventional oncologists should feel comfortable offering TACE as a treatment option to HCC patients with HIV/HCV co-infection.

VI232-SD-WEA5 Percutaneous Ablation of Oligometastatic Prostate Cancer: Oncologic Outcomes and Safety

Station #5

Participants
Andrew Erie, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Jonathan M. Morris, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Brian T. Welch, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Anil N. Kurup, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Adam J. Weisbrod, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Thomas D. Atwell, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Grant D. Schmit, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Eugene D. Kwon, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Matthew R. Callstrom, MD, PhD, Rochester, MN (*Abstract Co-Author*) Research Grant, Thermedical, Inc Research Grant, General Electric Company Research Grant, Siemens AG Research Grant, Galil Medical Ltd

PURPOSE

To determine the oncologic outcomes and safety of percutaneous ablation in the treatment of oligometastatic prostate cancer.

METHOD AND MATERIALS

This is a retrospective, single-institution review of 31 patients with oligometastatic prostate cancer who underwent 43 percutaneous ablations of their limited (≤5) metastatic sites. Eight patients (26%) were antigen deprivation therapy-naïve (ADT-naïve) and received ablation with the purpose of delaying ADT. Twenty-three patients (74%) underwent ablation either because of resistance to systemic therapies or a more aggressive multimodal treatment approach was preferred. Study endpoints included procedural complications, local control, progression free survival (PFS), and androgen deprivation therapy-free survival (ADT-FS). ADT-FS was defined as the time between percutaneous ablation and the initiation of ADT.

RESULTS

Local control was achieved in 35 (81.4%) of 43 tumors with a median follow-up of 8 months (range, 3-60 mo) after ablation. Tumor recurrence was found in 8 (18.6%) of 43 tumors at a median follow-up of 6 months (range, 2-38 mo). Median prostate-specific antigen (PSA) measurements were significantly lower approximately 2 months after ablation compared to before ablation (0.27 ng/dl [range <0.01 to 7.7] and 1.5 ng/dl [range <0.01 to 72.0], respectively (p=0.02)). Estimated PFS rates for all patients at 6 and 12 months after ablation were 65% (95% CI, 44-80) and 45% (95% CI, 24-64), respectively. Of the 8 ADT-naïve patients who underwent ablation with purpose to delay ADT, all (100%) achieved local control and the ADT-FS at 12 months was approximately 70%. None of the ablations were associated with major complications.

CONCLUSION

Percutaneous ablation of oligometastatic prostate cancer appears safe, achieves acceptable local control rates, and can delay disease progression when used in combination with other therapies. Percutaneous ablation may be particularly valuable in ADT-naïve patients who do not tolerate or prefer to delay ADT.

CLINICAL RELEVANCE/APPLICATION

Percutaneous ablation can be used as part of a multimodal treatment approach for oligometastatic prostate cancer and can delay hormone therapy in ADT-naïve patients.

Participants

Novel Uses of Cone-Beam CT in the Interventional Radiology Suite

WEA6

Station #6

Prakhar K. Agarwal, MD, Bronx, NY (*Presenter*) Nothing to Disclose
Cyrus Shabrang, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Amit Daftari, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Oren T. Herman, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Yosef Golowa, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Marcy B. Jagust, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Jacob Cynamon, MD, Suffern, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the set-up and acquisition of cone-beam CT. Discuss the pros and cons of using cone-beam CT. To review the utility of cone-beam CT in pre-procedural planning, immediate procedure outcome, and detection of post-procedural complications.

TABLE OF CONTENTS/OUTLINE

Physics and acquistion of cone-beam CT Cone-beam CT setup in the IR suite Pros and cons of cone-beam CT Pre-procedure evaluation Immediate post-procedure assessment Detecting post-procedural complications Summary and conclusions

VIS-WEB

Vascular Interventional Wednesday Poster Discussions

Wednesday, Dec. 2 12:45PM - 1:15PM Location: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
Sarah B. White, MD,MS, Philadelphia, PA (*Moderator*) Nothing to Disclose

Sub-Events

VI237-SD-WEB1 Clinical and Imaging Predictors for Positive Angiographic Findings in Blunt Splenic Trauma

Station #1

Participants
Aaron Ashton, MD, Houston, TX (*Presenter*) Nothing to Disclose
Derek L. West, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Dhivya Srinivasa, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Salman Eraj, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Joseph J. Love, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Alan M. Cohen, MD, West University, TX (*Abstract Co-Author*) Research Consultant, Medical Components, Inc Chief Medical Officer, Itomography Corp

PURPOSE

To determine the likelihood of positive findings on splenic angiography (SA) for blunt spleen trauma (BST) based on American Associate for Surgery of Trauma (AAST) grading and clinical indicators.

METHOD AND MATERIALS

Medical charts from 990 patients with BST at a level 1 trauma center, between January 1, 2008 and December 31, 2013, were retrospectively reviewed. Eighty-five received SA (mean age: 36.7 +/- 16.0 years, range 8-82) and 22 were female (25.9%). Grade of injury (AAST scale), angiography findings, hemodynamic status, ACT, and outcomes were analyzed.

RESULTS

All seventy patients (82.4%) with positive angiographic findings received embolization using gelfoam and/or coils. A logistic regression to compare high versus low grade injuries demonstrated an odds ratio (OR) of 4.35 (95% CI= 1.24 to 15.23, p=0.0215) that high grade injuries will have positive angiography. Of the patients who underwent angiography, a total of 10 (11.7%) had complications requiring further procedure. Five (5.9%) underwent splenectomy after angiography, two (2.4%) required repeat embolization, and one (1.2%) each developed a pseudoanerysm, underwent splenorrhaphy, or required a drain placement. No statistically significant association was found between positive angiographic findings and the clinical indicators.

CONCLUSION

Traditionally, a patient's clinical status is a significant motivator for urgency of angioembolization. Our data suggests that there is no predictive value, and therefore no indication for angiography based on clinical parameters alone. A statistically significant correlation between AAST grading and positive angiography suggests high grade injuries may benefit from angiography in order to prevent failure in non-operative management. Our data would support the use of CT findings as the key decision point in indication for angiography, as opposed to the traditional use of a patient's clinical status.

CLINICAL RELEVANCE/APPLICATION

AAST grading of traumatic splenic injury using CT should be used in addition to hemodynamic and clinical parameters when determining whether a patient should undergo conventional angiography.

VI238-SD-WEB2 Patient-specific Prostate Deformation Modelling via Shear Wave Elastography for TRUS-guided Interventions

Station #2

Participants
Yi Wang, Hong Kong, Hong Kong (*Presenter*) Nothing to Disclose
Dong Ni, BEng, MPH, Hongkong, China (*Abstract Co-Author*) Nothing to Disclose
Jing Qin, Shenzhen, China (*Abstract Co-Author*) Nothing to Disclose
Ming Xu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Xiaoyan Xie, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Pheng Ann Heng, PhD, Shatin, Hong Kong (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Shear wave elastography (SWE) shows promise as a technological achievement that provides quantitative information about tissue elasticity. The purpose of this study was to take advantage of the patient-specific biomechanical properties obtained from SWE to reliably predict the prostate deformation during transrectal ultrasound (TRUS)-guided interventions.

METHOD AND MATERIALS

A 3D patient-specific prostate deformation model was generated with the finite element analysis and the quantitative tissue parameters measured from the SWE. With the incorporation of personalized prostate elasticity parameters into the finite element modelling, our deformation model can precisely estimate the complicated volumetric deformation within the prostate during the

TRUS-guided interventions. The patient-specific deformation model was applied to register the preoperative MR images with the TRUS images for boosting the efficacy and accuracy of TRUS-guided interventions.

RESULTS

Experiments were carried out on the datasets obtained from ten patients with suspected prostate cancer. A set of SWE, MR, and TRUS images were acquired from each patient. The patient-specific deformation model generated with personalized biomechanical properties was used to predict the prostate deformation and register MR-TRUS images. The target registration error (TRE) of manually identified corresponding landmarks in MR and TRUS images was measured to evaluate the accuracy of deformation estimation. 6 fiducial pairs were selected for each patient. The averaged TRE before registration is 6.80±1.59 mm, and 1.56±0.65 mm after proposed method, compensated for nearly 77%, which indicates the efficacy of employing SWE to predict the deformation and guide MR-TRUS registration. Furthermore, the averaged TRE of 1.56 mm completely meets the clinically accurate tumor detection requirement of less than 1.9 mm. Fig. 1 visualizes one target TRUS slice and the corresponding registered MR slice.

CONCLUSION

The use of true tissue elasticity measured from SWE shows promise for patient-specific deformation modelling and thus benefits the MR-TRUS registration for image-guided interventions.

CLINICAL RELEVANCE/APPLICATION

The true tissue stiffness obtained from SWE benefits the patient-specific biomechanical modelling and shows promise for providing precise treatments in applications that use TRUS-guided interventions.

VI239-SD-WEB3 Slow Blood Flow in Lower Extremity Deep Veins on Doppler Ultrasound Examination: Does It Predict Subsequent Development of DVT?

Station #3

Participants
Veral D. Amin, MD, Pearland, TX (*Presenter*) Nothing to Disclose
Corey T. Jensen, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Khaled M. Elsayes, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Nicolaus A. Wagner-Bartak, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Tharakeswara K. Bathala, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Shouhao Zhou, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Deepak G. Bedi, MBBCh, Houston, TX (*Abstract Co-Author*) Consultant, Koninklijke Philips NV

PURPOSE

To determine whether the qualitative sonographic appearance of slow venous flow in the lower extremities correlates with an increased risk of subsequent deep venous thrombosis (DVT) in oncology patients.

METHOD AND MATERIALS

In this institutional review board approved, retrospective study, 975 lower extremity venous Doppler ultrasound examinations were reviewed by two radiologists: 482 consecutive patients with reported slow venous flow and 493 consecutive patients without reported slow venous flow were identified for retrospective analysis. The presence or absence of subjective slow venous flow and absence of initial DVT was confirmed by consensus reevalaution. Peak venous flow velocities were recorded at the common femoral, femoral and popliteal levels. Each patient had at least one year clinical and/or sonographic follow-up to determine the possible presence of subsequent DVT.The associations between DVT and the presence of slow venous flow were examined using Fisher's exact test. 2-sample t-test was employed for peak velocity comparison of the slow flow versus normal flow groups and DVT vs non-DVT groups. The optimal cut off peak velocity to correlate with radiologist perceived slow flow was determined by Youden's index.

RESULTS

There was a significant, small increased rate of subsequent DVT development in the slow venous flow group (21/482) compared to patients with normal flow (11/493) (P=0.0456). Additionally, measured peak venous velocities were significantly lower in the slow venous flow group at each assessed venous level (P<0.001) by an average of 9, 5 and 6 cm/sec at the common femoral, femoral and popliteal levels, respectively. The patients with subsequent DVT did not have a significant difference in venous velocities compared with their respective group. An average of three venous level velocities resulted in the best cutoff to dichotomize groups into normal versus slow venous flow with a sensitivity and specificity of 0.757 and 0.746, respectively, using a value of 14.5 cm/sec.

CONCLUSION

Subjective identification of slow venous flow in the lower extremities on Doppler ultrasound correlates with a mild, but significant increased rate of subsequent DVT development in oncology patients.

CLINICAL RELEVANCE/APPLICATION

These results suggest that patients identified to have slow venous flow should be followed to closer degree clinically, perhaps with a lower threshold for follow-up Doppler ultrasound evaluation.

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/

Khaled M. Elsayes, MD - 2014 Honored Educator

VI255-SD-WEB4 Three Dimensional Quantitative Tumor Response to Repetitive Transarterial Chemoembolization Predicts Survival for Hepatocellular Carcinoma

Station #4

Participants
Yan Zhao, MS, Baltimore, MD (*Presenter*) Nothing to Disclose
Reham R. Haroun, Salt Lake City, UT (*Abstract Co-Author*) Nothing to Disclose
Sonia P. Sahu, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Ruediger E. Schernthaner, MD, Vienna, Austria (*Abstract Co-Author*) Nothing to Disclose
Rafael Duran, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jae Ho Sohn, MD,MS, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Florian N. Fleckenstein, MS, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Susanne Smolka, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
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Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Researcher, BTG International Ltd; Consultant, BTG International Ltd; Researcher, Koninklijke Philips NV; Consultant, Koninklijke Philips NV; Researcher, Guerbet SA; Consultant, Guerbet SA; Consultant, Terumo Corporation; Consultant, Threshold Pharmaceuticals, Inc; Consultant, PreScience Labs, LLC; Researcher, Boston Scientific Corporation; Consultant, Boston Scientific Corporation

PURPOSE

To evaluate survival and 3D tumor response in hepatocellular carcinoma (HCC) patients who were treated with a second transarterial chemoembolization (TACE) after initial nonresponse to the first TACE.

METHOD AND MATERIALS

A total of 94 consecutive patients (87.2% men; mean age, 62 years) with Barcelona Clinic Liver Cancer stage B (intermediate-stage) HCC were retrospectively included. Tumor response was assessed on contrast-enhanced multiphasic magnetic resonance imaging using quantitative EASL (qEASL), a volumetric enhancement criterion. qEASL defines response as a ≥65% decrease in enhancing tumor volume. The Kaplan-Meier method with the log-rank test was used to compare overall survival (OS) for responders and nonresponders.

RESULTS

Median follow-up period was 25 months (range 2.1-106.2). 81 (86.2%) patients were nonresponders after the first TACE and OS was similar for responders and nonresponders [24.3 months (95%CI 15.5-33.1) vs. 23 months (95%CI 18.8-27.2), P=0.82, respectively]. 51 nonresponders underwent a second TACE within 3 months. Of those, 47 (92.6%) patients had follow-up imaging. After the second TACE, 14 (29.8%) patients achieved response and their median OS was significantly longer than nonresponders [63.5 months (95%CI 31.0-96.0) vs. 18 months (95%CI 12.6-23.4), P=0.014, respectively]. Furthermore, these patients showed a clear trend towards a longer OS, than those who did not undergo a second TACE [63.5 months (95%CI 31.0-96.0) vs. 28.7 months (95%CI 18.7-38.7), P=0.07, respectively].

CONCLUSION

Patients who initially showed 3D nonresponse to the first TACE treatment could have a prolonged survival from a second TACE treatment.

CLINICAL RELEVANCE/APPLICATION

Repeated TACE can be beneficial for patients even if they show initial nonresponse as assessed by qEASL criteria on MR imaging.

VI197-ED-WEB6 Inferior Vena Cava Filters for Diagnostic Radiologists: What you Should Look for and Tell Your Referring Physicians

Station #6

Participants
Amanda L. Steinberger, DO, Darby, PA (*Presenter*) Nothing to Disclose
Salmi Simmons, MD, Darby, PA (*Abstract Co-Author*) Nothing to Disclose
Oleg Teytelboym, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Review current guidelines for indications and contraindications for IVC filter placement, including for retrievable versus non retrievable filters;2. Illustrate proper filter placement on angiography and CT;3. Demonstrate improper filter placement and its clinical implications, including complications on multiple modalities (radiography, CT and angiography)

TABLE OF CONTENTS/OUTLINE

Our exhibit will review common appearances of properly and improperly placed IVC filters across multiple modalities, as encountered by radiologists on a daily basis. After a brief discussion and imaging review of historically used filters, we will present current guidelines regarding filters from Society of Interventional Radiology and American College of Chest Physicians.Angiographic images demonstrating routine filter placement will be presented.Demonstration of anatomic variants (e.g. duplicated vena cava, circumaortic renal veins, megacavas) and complex conditions (e.g. extensive proximal thrombus) requiring special filter placement considerations will be presented.Complications of filters we be reviewed, including IVC penetration, filter migration, filter fracture, and IVC thrombosis.Review of current controversies, including filter longevity.Finally, key points for evaluating filters seen on routine diagnostic imaging will be summarized.

MSCU41

Case-based Review of US (An Interactive Session)

Wednesday, Dec. 2 1:30PM - 3:00PM Location: S406A

VA IR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Deborah J. Rubens, MD, Rochester, NY (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the diverse applications of ultrasound throughout the body and when it provides the optimal diagnostic imaging choice. 2) Understand the fundamental interpretive parameters of ultrasound contrast enhancement and its applications in the abdomen. 3) Know the important factors to consider when choosing ultrasound vs CT for image guided procedures and how to optimize ultrasound for technical success.

ABSTRACT

Ultrasound is a rapidly evolving imaging modality which has achieved widespread application throughout the body. In this course we will address the major anatomic areas of ultrasound use, including the abdominal and pelvic organs, superficial structures and the vascular system. Challenging imaging and clinical scenarios will be emphasized to include the participant in the decision-making process. Advanced cases and evolving technology will be highlighted, including the use of ultrasound contrast media as a problem solving tool, and the appropriate selection of procedures for US-guided intervention.

Sub-Events

MSCU41A Problem Solving with Contrast Enhanced Ultrasound

Participants
Stephanie R. Wilson, MD, Calgary, AB (*Presenter*) Research Grant, Lantheus Medical Imaging, Inc; Equipment support, Siemens AG; Equipment support, Koninklijke Philips NV

LEARNING OBJECTIVES

1) Attendees will appreciate the multiple varied applications for CEUS in the abdomen. 2) They will recognize the value of CEUS as a real time procedure with exquisite sensitivy to its contrast agent allowing for superior detection of arterial phase vascularity. 3) They will realize the safety of CEUS with no requirement for ionizing radiation, and no nephrotoxicity for evaluation of any problems requiring contrast enhancement in those with renal failure. 4) They will understand the fundamentals for interpretation of contrast enhancement patterns for the noninvasive diagnosis of focal liver masses and other pathology.

ABSTRACT

MSCU41B Image Guided Intervention: When Is Ultrasound Best?

Participants
Michael D. Beland, MD, Providence, RI (*Presenter*) Consultant, Hitachi, Ltd

LEARNING OBJECTIVES

1) Understand factors to consider when choosing ultrasound versus CT as a modality for image guidance. 2) Review the potential challenges and advantages of ultrasound for procedure guidance. 3) Demonstrate the variety of cases for which ultrasound can be used to perform image guided procedures and learn some techniques for maximizing success.

ABSTRACT

Image-guided procedures are commonly performed. There are several important considerations when selecting an appropriate imaging modality to guide the procedure. Ultrasound has several advantages over CT but there are also limitations. These advantages and disadvantages will be reviewed, including various factors to consider when evaluating a case for a potential procedure. When ultrasound is used, there are techniques which may offer increased likelihood of success or decreased procedural time. Through multiple case presentations, this session will review the considerations and techniques for successful ultrasound guided interventions.

MSCU41C Vascular Ultrasound Update

Participants
Laurence Needleman, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

MSRT45

ASRT@RSNA 2015: Interventional Cardiovascular MRI (iCMR): Clinical and Pre-Clinical Applications

Wednesday, Dec. 2 2:20PM - 3:20PM Location: N230

VA IR MR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Jonathan Mazal, MS, RRA, Bethesda, MD (*Presenter*) Nothing to Disclose
Toby Rogers, BA, MRCP, Bethesda, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define interventional cardiovascular magnetic resonance (iCMR). 2) Compare advantages and disadvantages of MRI versus other imaging modalities to guide cardiovascular interventions. 3) Describe personnel and infrastructure requirements to start an iCMR program. 4) Identify current clinical applications of iCMR. 5) Review pre-clinical applications of iCMR to inform future clinical directions.

RC612

Peripheral Artery Disease (PAD)

Thursday, Dec. 3 8:30AM - 10:00AM Location: N229

VA CT MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Stephen T. Kee, MD, Stanford, CA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the basic pathology of peripheral artery disease. 2) Describe the risk factors associated with the development of peripheral artery disease. 3) Outline the benefits of providing a comprehensive clinical service in the management of PVD. 4) Discuss how to build a PVD practice. 5) Describe the basic techniques employed in the treatment of PVD.

ABSTRACT

Sub-Events

RC612A Clinical Overview of PAD

Participants
Stephen T. Kee, MD, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC612B Lower Extremity CTA

Participants
Richard L. Hallett II, MD, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe techniques for patient selection, acquisition, reconstruction, and interpretation of lower extremity CTA. 2) Describe evidence-based results for lower extremity CTA, and expected impact on patient care. 3) Describe a coherent plan that integrates lower extremity CTA into cost-effective clinical care.

ABSTRACT

Peripheral arterial disease (PAD) is a common cause of morbidity and mortality in developed countries. Traditionally, imaging for risk stratification and therapeutic planning involved catheter angiography. In recent years, cross-sectional imaging by CTA and MRA has proven a robust technique for non-invasive PAD assessment. Given ubiquity of CT scanning technology, CTA is widely available. High resolution datasets can be acquired rapidly, which facilitates assessment of clinically labile or trauma patients. To be optimally effective, CTA techniques require particular attention to contrast medium and scan protocol. With appropriate protocol design, data acquisition requires limited operator dependence. The acquired 3D dataset is rich with information, but requires careful scrutiny by the interpreting physician. Volumetric review of these datasets produces the most accurate results. Extensive small vessel calcification remains a potential barrier to full assessment of pedal vessels by CTA. Recent published data validates the clinical effectiveness of CTA for diagnosis of PAD and for the direction of treatment planning. Ongoing research aims to exploit the newest generation of CT scanners to acquire additional information, including dual energy data, time-resolved information, and radiation dose savings.

URL

Active Handout:Richard Lee Hallett

http://abstract.rsna.org/uploads/2015/13012018/Active RC612B.pdf

RC612C Lower Extremity MRA

Participants
Harald Kramer, MD, Munich, Germany (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the appropriate technique for peripheral MRA depending on the available hardware and the clinical question and condition of the patient. 2) Differentiate between different contrast agents and their specific characteristics. 3) Chose between different contrast agent application schemes depending on the technique used and the clinical question. 4) Compare the pros and cons of contrast-enhanced and non contrast-enhanced techniques for peripheral MRA.

ABSTRACT

The prevalence of symptomatic peripheral artery disease (PAD) ranges around 3% in patients aged 40 and 6% at an age of 60 years. Additionally, the prevalence of asymptomatic PAD lies between 3% and 10% in the general population increasing to 15% to 20% in persons older than 70 years of age. However, these data still might underestimate the total prevalence of PAD since

screening studies showed that between 10% and 50% of all patients with intermittent claudication (IC) never consult a doctor about their symptoms.These data prove the need for an accurate and reliable method for assessment of the peripheral vasculature. Digital subtraction angiography (DSA) still serves as the reference standard for all vascular imaging techniques. However, because of the absence of ionizing radiation, the use of non-nephrotoxic contrast agents or even non contrast-enhanced sequences and the large toolbox of available techniques for high-resolution static and dynamic imaging Magnetic Resonance Angiography (MRA) constitute an excellent non-invasive alternative. Different acquisition schemes and contrast agent application protocols as well as different types of data sampling for static, dynamic, contrast- and non contrast-enhanced imaging enable to tailor each exam to a specific question and patient respectively.

RC612D Endovascular Treatment of PAD

Participants
Stephen T. Kee, MD, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

SSQ22

Vascular/Interventional (Concepts in Aortic Aneurysm Interventions)

Thursday, Dec. 3 10:30AM - 12:00PM Location: N227

VA IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Parag J. Patel, MD, Milwaukee, WI (*Moderator*) Consultant, Medtronic, Inc; Consultant, C. R. Bard, Inc; Consultant, Penumbra, Inc; Anisha S. Martin, MD, Chicago, IL (*Moderator*) Nothing to Disclose

Sub-Events

SSQ22-01 Is Contrast Enhanced Ultrasound the Endograft Imaging Modality of the Future?

Thursday, Dec. 3 10:30AM - 10:40AM Location: N227

Participants
Rayshelle Finch, Orange, Australia (*Presenter*) Nothing to Disclose
Steven Dubenec, Camperdown, Australia (*Abstract Co-Author*) Nothing to Disclose
Sharyn Pussell, MBBS, Orange, Australia (*Abstract Co-Author*) Nothing to Disclose
Bryan Khoury, FRANZCR, Orange, Australia (*Abstract Co-Author*) Nothing to Disclose
Karen Pollard, Wagga Wagga, Australia (*Abstract Co-Author*) Nothing to Disclose
Kenneth Russell, BA, Wagga Wagga, Australia (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of this study was to evaluate the clinical effectiveness of Contrast Enhanced Ultrasound (CEUS) in detecting the presence of endoleaks after Endovascular Aortic Aneurysm Repair (EVAR) and to compare the diagnostic accuracy with other imaging modalities.

METHOD AND MATERIALS

One hundred and seven patients, all post EVAR, underwent surveillance utilising CEUS, CDU and CTA. Each modality assessed for the presence of an endoleak. The presence of contrast within the stent graft established patency and contrast within the residual aneurysm sac indicated the presence of an endoleak. Endoleaks were classified by type, origin and size. Quantitative comparison was made between each modality.

RESULTS

There is a statistically significant increased rate of endoleak detection, especially for low amplitude, slow flowing endoleaks using CEUS in comparison to CDU and CTA. Two-tailed P value was calculated with McNemar's Test and continuity correction at<.0001. CDU identified thirty-six endoleaks, CTA identified thirty-nine endoleaks and CEUS identified sixty-three endoleaks.Statistical analysis has also highlighted that CDU in comparison to CTA in the detection of Endoleaks is not statistically significant. The two-tailed P Value equals 0.6625. These two imaging modalities were considered to be equivalent.

CONCLUSION

In this prospective study, CEUS has proven to be an extremely effective imaging modality in the detection, visualisation and classification of endoleaks in comparison to CDU and CTA. CEUS is a sensitive adjunct to unenhanced ultrasound and is an extremely useful imaging modality in patients where CTA is contraindicated. CEUS is an accurate and minimally invasive way to interrogate these endografts and has in this study, demonstrated statistically significant improvements in the detection of endoleaks. If the advances in ultrasound imaging technology, with the use of contrast agents, continue to demonstrate its dominance, we believe CEUS will become a routine part of EVAR surveillance.

CLINICAL RELEVANCE/APPLICATION

CEUS has a significant role to play in EVAR surveillance. It is an accurate and minimally invasive way to interrogate endografts and has demonstrated statistically significant improvements in endoleak detection.

SSQ22-02 Endoleak and Thrombus Characterization with Dynamic Elastography after Endoleak Embolization Following Aneurysm Endovascular Repair

Thursday, Dec. 3 10:40AM - 10:50AM Location: N227

Awards
Trainee Research Prize - Medical Student

Participants
Antony Bertrand-Grenier, Montreal, QC (*Presenter*) Nothing to Disclose
Fatemeh Zehtabi, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Helene Heon, DVM, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Guy Cloutier, PhD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Sophie Lerouge, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Gilles P. Soulez, MD, Montreal, QC (*Abstract Co-Author*) 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

PURPOSE

SuperSonic Imagine (SSI) measure the tissue elasticity in real-time. The goal of this study was to characterize in a canine model

SuperSonic Imagine (SSI) measure the tissue elasticity in real time. The goal of this study was to characterize in a canine model of aneurysm endovascular repair (EVAR) residual endoleak and thrombus organization with SSI after endoleak embolization and correlate results with CT-Scan, Doppler Ultrasound (DUS) and pathologic findings.

METHOD AND MATERIALS

EVAR was done with creation of type I endoleak in eighteen aneurysms created in nine dogs (common iliacs arteries). Two embolization gels (Chitosan (Chi) or Chitosan-Sodium-Tetradecyl-Sulfate (Chi-STS)) were injected in the sac to seal the endoleak and promote healing. SSI and DUS were performed at baseline (implantation, 1-week, 1-month, 3-months) whereas angiography and CT-scan were performed at sacrifice. Macroscopic and histopathological analyses were processed to identify and segment five different regions of interest (ROIs) (endoleak, fresh or organized thrombus, Chi or Chi-STS). Elasticity modulus values were compared.

RESULTS

At sacrifice, 10 aneurysms had endoleaks, 9 had fresh thrombus, 15 had organized thrombus and 3 were completely sealed. At 3 months, elasticity modulus (in kPa) of 0.1±0.2, 9.4±3.3, 47.6±28.1, 51.7±24.1 and 49.1±33.5 were respectively found in endoleak, fresh and organized thrombus, Chi and Chi-STS regions. Elasticity values of endoleak and fresh thrombus areas were significantly lower than organized thrombus, Chi and Chi-STS areas ($p<0.001$). Elasticity values of fresh thrombus ranged between 3 and 19 kPa (8.7±3.6 kPa) at 1-week and 30.2±13.8 kPa at 3-months indicating that SSI can evaluate thrombus maturation. It can also characterize embolization agents degradation (39.3±21.1 and 30.5±13.8 kPa at 6-months for Chi and Chi-STS regions). SSI was able to detect endoleak where DUS failed and distinguish fresh thrombus (possibly endotension) which cannot be detected on CT-scan.

CONCLUSION

The results confirm that SSI was able to evaluate thrombus organization and embolization agents over time after endoleak embolization following EVAR. A lower elastic modulus value corresponds to fresh thrombus wheres a higher value corresponds to organized thrombus.

CLINICAL RELEVANCE/APPLICATION

The SSI can complement conventional DUS in post-EVAR surveillance. It could reduce the cost, the exposition to ionizing radiation and nephrotoxic contrast agents of surveillance CT-scan follow-up.

SSQ22-03 Incidence and Clinical Significance of Renal Infarct after Fenestrated Endovascular Aortic Repair

Thursday, Dec. 3 10:50AM - 11:00AM Location: N227

Participants
Lauren M. Burke, MD, Chapel Hill, NC (*Abstract Co-Author*) Consultant, Amgen Inc
Jesse M. Conyers, BS, Carrboro, NC (*Abstract Co-Author*) Nothing to Disclose
Charles T. Burke, MD, Chapel Hill, NC (*Abstract Co-Author*) Nothing to Disclose
Hyeon Yu, MD, Chapel Hill, NC (*Abstract Co-Author*) Nothing to Disclose
Mark Farber, MD, Chapel Hill, NC (*Abstract Co-Author*) Nothing to Disclose
Raghu Vallabhaneni, Chapel Hill, NC (*Abstract Co-Author*) Nothing to Disclose
Ari J. Isaacson, MD, Chapel Hill, NC (*Abstract Co-Author*) Advisory Board, BTG International Ltd
Robert G. Dixon, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose

PURPOSE

Renal infarcts are occasionally seen on post-fenestrated endovascular aortic repair (FEVAR) imaging. They can occur as a result of intentional exclusion of an accessory renal artery or after inadvertent embolism during the procedure. While the incidence of renal infarct following FEVAR is variable, the clinical significance of these renal infarcts is undocumented. The purpose of this study is to determine the incidence of renal infarcts on post-FEVAR imaging and what percentage of this subset of patients developed a subsequent increase in serum creatinine.

METHOD AND MATERIALS

All patients who underwent FEVAR at our institution between April 1, 2010 and April 1, 2014 and had pre- and post- contrast-enhanced CT were retrospectively identified and included for analysis. Two staff radiologists reviewed pre- and post-FEVAR CTs for the presence of renal infarcts. All post-FEVAR scans were obtained at least one month following FEVAR. The electronic medical record was used to record serum creatinine (Cr) values obtained concurrently with the pre- and post- scans as well as the need for hemodialysis following FEVAR. Incidence of renal infarct was calculated as well as the percentage of patients with post-FEVAR renal infarcts who had a significant rise in serum Cr (defined as a 0.3 mg/dl increase).

RESULTS

100 patients were included for analysis. 24 of these patients (24%) had a renal infarct identified on post-FEVAR CT. Of these, 10 (42%) were a result of purposeful covering of an accessory renal artery and 14 (58%) were embolic. Of the 14, only 3 (21%) had an increase in serum Cr of greater than 0.3 mg/dl during the post-FEVAR period (range 0.72-2.62, average 1.42). Of the 10 patients with renal infarct following covering of an accessory renal artery, only 1 (10%) demonstrated an increase in serum Cr (0.82). No patients in either group required temporary or permanent hemodialysis.

CONCLUSION

The presence of renal infarcts after FEVAR is not uncommon and often secondary to intentional exclusion of accessory renal vessels. The clinical relevance of these events appears relatively benign with only 17% of patients with renal infarcts demonstrating any significant decline in renal function, none of which required temporary or permanent dialysis in the short-term.

CLINICAL RELEVANCE/APPLICATION

Understanding the incidence and significance of renal infarct after FEVAR will improve communication between the radiologist and surgeon.

SSQ22-04 eGFR Changes after Endovascular Treatment of Complex Aortic Aneurysms

Thursday, Dec. 3 11:00AM - 11:10AM Location: N227

Participants
Anna M. Sailer, MD, MBA, Maastricht, Netherlands (*Presenter*) Nothing to Disclose
Patty Nelemans, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Camille van Berlo, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Michiel W. De Haan, MD, PhD, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Dominik Fleischmann, MD, Palo Alto, CA (*Abstract Co-Author*) Research support, Siemens AG;
Geert Willem H. Schurink, MD, PhD, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Endovascular repair of aortic aneurysms (EVAR) with complex anatomy (juxta-, suprarenal and thoracoabdominal aneurysms) has become feasible with novel fenestrated and branched devices. The risk of procedure related acute kidney injury (AKI), and subsequent permanent decrease of renal function is unknown. The aim of this study was to evaluate predictors for estimated glomerular filtration rate (eGFR) changes after fenestrated and branched EVAR with special interest in effect of intra-arterial iodinated contrast volume on risk of AKI and effect of AKI on long-term eGFR decrease.

METHOD AND MATERIALS

157 consecutive patients who underwent fenestrated and branched EVAR were included. Procedural intra-arterial iodinated contrast volume (iaIC; low-osmolar, 300 mg iodine/mL), serum creatinine levels at baseline, during 48 hours following EVAR, at discharge and latest follow-up (lFU) were recorded. eGFR was calculated using the Modification of Diet in Renal Disease formula. Development of post-EVAR AKI (according to AKIN criteria), coverage of accessory renal arteries during EVAR, patients' age, presence of diabetes and other risk factors were documented. Multivariate Cox proportional hazard models were used to identify independent risk factors for eGFR decrease during follow-up.

RESULTS

Forty-three patients (27%) developed post-EVAR AKI. Mean procedural iaIC volume in patients who developed AKI was 195 ±88 ml versus 149 ±69 ml in patients without AKI (p= 0.001). Median stay until discharge was 6 days (interquartile range (IQR) 3-9 days) and median time until latest FU was 380 days (IQR 117-925 days). Occlusion of accessory renal arteries and development of AKI were associated with a significantly increased risk for eGFR decrease at discharge (Hazard Ratio (HR) 3.19, 95%CI: 1.36 - 7.51; p= 0.008 and HR 2.87, 95%CI: 1.34 - 6.14; p< 0.007).There was also a significant association between AKI and eGFR decrease at lFU (HR 2.79, 95%CI: 1.44 - 5.39, p= 0.002). Iodinated contrast volume was not associated with eGFR decrease neither at discharge nor at lFU (HR 0.998; p= 0.463 and HR 1.000; p= 0.857, respectively).

CONCLUSION

Post-EVAR AKI is significantly associated with short- and long-term eGFR decrease.

CLINICAL RELEVANCE/APPLICATION

Higher intra-arterial iodinated contrast volume is associated with higher probability of AKI, but the data provide no evidence that iodinated contrast volume is an independent risk factor for long-term eGFR decrease.

SSQ22-05 Type II Endoleak Proposed New Sub-Categorisation

Thursday, Dec. 3 11:10AM - 11:20AM Location: N227

Participants
Rayshelle Finch, Orange, Australia (*Presenter*) Nothing to Disclose
Steven Dubenec, Camperdown, Australia (*Abstract Co-Author*) Nothing to Disclose
Bryan Khoury, FRANZCR, Orange, Australia (*Abstract Co-Author*) Nothing to Disclose
Sharyn Pussell, MBBS, Orange, Australia (*Abstract Co-Author*) Nothing to Disclose
Karen Pollard, Wagga Wagga, Australia (*Abstract Co-Author*) Nothing to Disclose
Ian Garbett, BS,MSc, Wagga Wagga, Australia (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of this study was to evaluate the behaviour of Type II endoleaks utilising CEUS to aid visualisation and to determine the endoleak origin and communication with branch vessels.

METHOD AND MATERIALS

This observational study enrolled one hundred and seven patients who had undergone EVAR as treatment for their AAA. All patients underwent surveillance utilising CDUS, CEUS and CTA to assess for presence/absence of an endoleak. Contrast enhancement within the residual aneurysm sac indicated the presence of an endoleak. Endoleaks were classified by type, origin and size. Type II endoleaks were further subcategorised according to vessel behaviour, origin, communications and duplex Doppler characteristics.

RESULTS

Type II endoleaks were identified and subcategorised based on vessel origin, behaviour, channel connection and spectral Doppler characterization. We added Doppler information to Type II subcategories A and B. We distinguished two variants in subcategory IIB (i) and (ii) based on their communications and devised two further Type II subcategories C and D. Type IIC endoleaks were identified as the endoleak that may cause potential pressurisation to the residual aneurysm and were thought to be the most likely to cause risk to the patient, requiring intervention. All patients with this new endoleak subcategory were noted to have had an increase in sac size of >=5mm over a 6month period. The haemodynamic effect of this endoleak subtype was thought to be significant.

CONCLUSION

CEUS has a significant role to play in EVAR routine surveillance and is a sensitive adjunct to unenhanced ultrasound in the detection of endoleaks. The type and size of an endoleak and the residual sac size are the most important factors that influence the need for secondary intervention. Our additional sub-categorisations of Type II B (i) and (ii), C and D has shown initial benefit in determining an'at risk' Type II endoleak. An enhanced understanding of Type II endoleaks will aid in future interventional and implementation

strategies, which will ultimately lead to EVAR success.

CLINICAL RELEVANCE/APPLICATION

This study identifies and subcategorises Type II-endoleak behaviour. Additional subcategorisation has shown initial benefit, extrapolating 'benign' and 'at risk' endoleaks. CEUS is a sensitive adjunct to CDU and CTA.

SSQ22-06 Integrated Stent-graft for Wireless 4-dimensional Aneurysm Sac Pressure Monitoring after Endovascular Aortic Aneurysm Repair (EVAR): First in Vitro Results

Thursday, Dec. 3 11:20AM - 11:30AM Location: N227

Participants
Clemens Spink, Hamburg, Germany (*Presenter*) Nothing to Disclose
Bibin John, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Wolfgang H. Krautschneider, PhD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Dietmar Schroeder, PhD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Robert Fischbach, Dresden, Germany (*Abstract Co-Author*) Nothing to Disclose
Markus Braunschweig, Dresden, Germany (*Abstract Co-Author*) Nothing to Disclose
Jan-Hendrik Buhk, MD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Gerhard B. Adam, MD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Andreas Koops, MD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

In vitro testing of prototype stent-grafts with an integrated array of nano-electronic pressure sensors within the stent-covering, capable of wireless digital data transmission for non-invasive 4-dimensional aneurysm sac pressure monitoring following EVAR.

METHOD AND MATERIALS

30 prototype stent-grafts were designed (85 mm x 16 mm), each containing 16 pressure sensors (1.5 mm x 1 mm x 1 mm) within the covering membrane of polytetraflourethylen (PTFE). The prototypes were mounted on a 26 F delivery sheath and mono-iliacal placed into an aortic bifurcation model. Measurements were continuously taken from the sensors while inducing invasive reference pressure from the contralateral iliacal side. Digital data conversion was performed by an integrated microcontroller. Customised antenna technology was designed providing energy and data transfer by inductive coupling.

RESULTS

After successful placement of the stent-graft all 16 sensors delivered reliable pressure measurements continuously and could detect pressure-changes accurately up to ± 1.2 mmHg. Wireless energy and data transmission could be successfully demonstrated.

CONCLUSION

The non-invasive acquisition of pressure profiles along a stent-graft's membrane after EVAR can deliver information on regional pressure elevation, indicating early endoleak development. Our trials show practical and efficient ways of continuous aneurysm sac pressure monitoring in patients after EVAR. Further in vivo tests are required, developing an implementation into a product.

CLINICAL RELEVANCE/APPLICATION

Novel integrated 4-dimensional pressure monitoring may allow precise and early endoleak detection in patients after EVAR providing opportunities of telemetric data transmission.

SSQ22-07 Long Term Results after Endovascular Repair of Abdominal Aneurysm (EVAR): Impact of Hostile Neck Anatomy in Early and Long-term Complications and Aneurysm Related Death

Thursday, Dec. 3 11:30AM - 11:40AM Location: N227

Participants
Alvaro M. Morales Vargas, MD, Madrid, Spain (*Presenter*) Nothing to Disclose
Gonzalo Garzon Moll, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose
Milagros Marti De Gracia, MD, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose
Alvaro Fernandez Heredero, MD, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose
Luis Riera del Moral, MD, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose
Marta Gutierrez Mistal, MD, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose
Rosario Madero Jarabo, MD, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To describe the impact of aneurysm neck morphology on complications and aneurysm-related death after EVAR.

METHOD AND MATERIALS

A cohort study of patients underwent elective EVAR in a tertiary institution between January 2002 and December 2013, prospectively collected and evaluated retrospectively. An angio-CT follow-up was performed before surgery and according to standards follow-up thereafter. Patients were classified as having hostile aortic necks (length of <10 mm, angle of >50°, diameter of >28 mm, circumferential thrombus, calcified neck, and reverse taper), or favorable aortic necks. CT scans were reviewed by an experienced vascular radiologist. Outcomes are described according to reporting standards for endovascular aortic aneurysm repair EVAR.Statistical analysis. Time to event was estimated by the Kaplan-Meier method. 95% Confidence intervals were estimated. Risk Proportional Cox Models were used.

RESULTS

378 patients underwent EVAR. Demographics and co-morbidities were similar in hostile and favorable necks. 101 patients (26.7%) had hostile necks (34.7% angulated, 47.5% measured more than 28mm, 5% had circumferential thrombus, 16.8% had calcified neck and 9.9% had reversed taper) and 277 (73.3%) had favorable neck anatomy. Aorto-monoiliac grafts were used in 79 hostile necks and bifurcated grafts in 22 of them.Overall technical success was 96.5%. Postoperative type-I endoleak occurred in 2.2% of hostile

necks, and was not present in favorable necks. Perioperative aneurysm-related mortality was 5% in hostile necks and 2.9% in favorable necks.Freedom of proximal type I endoleaks was 99.6% at 3 years and 99.4% at 12 years for favorable necks, compared to 92.1% at 3 years and 87.7% at 12 years in hostile neck anatomy. Primary clinical success rates were 97.1% at 1 year, and 85.4% at 12 years for favorable necks and 88.7% at 1 year and 65% at 12 years for hostile necks. 12-year overall mortality was 65.9% for favorable necks and 52 % for hostile necks.Cox Proportional-Hazards Model revealed that hostile necks and aorto-monoiliac grafts increase significantly the risk of death or complications.

CONCLUSION

Hostile aortic neck is associated with unfavorable early and long term results after endovascular repair of abdominal aneurysm, increasing the risk of complications and aneurysm-related death.

CLINICAL RELEVANCE/APPLICATION

Hostile aortic neck increases long-term complications and aneurysm-related death after EVAR.

SSQ22-08 Risk Factors of Stent Graft-Induced New Entry(SINE) after Thoracic Endovascular Aortic Repair(TEVAR) for Stanford Type B Aortic Dissection

Thursday, Dec. 3 11:40AM - 11:50AM Location: N227

Participants
Hyunsik Jang, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Do Yun Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Man Deuk Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jong Yun Won, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung Il Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Gyoung Min Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Stent graft-induced new entry (SINE) has been increasingly observed after thoracic endovascular aortic repair (TEVAR) for Stanford type B aortic dissection. SINE is often life threatening and re-intervention is required. The current study aims to investigate risk factors of SINE after TEVAR.

METHOD AND MATERIALS

From July 2001 to June 2013, 79 patients who underwent TEVAR for Stanford type B aortic dissection were retrospectively analyzed. Mean age was 55.7 years (range, 25-84 years) and mean follow-up period was 53.5 months (range, 3days-130.2 months). 17 patients underwent TEVAR within 2 weeks (acute) after diagnosis of aortic dissection and the other 62 patients underwent TEVAR after 2 weeks (chronic). 42 patients underwent TEVAR with modified stent graft with 'inward bended' margin and the others used conventional stent graft. The longitudinal diameter, transverse diameter, mean diameter, area and circumference of true lumen were measured. Then taper ratio, prestent grafting oversizing ratio, poststent grafting oversizing ratio, and expansion mismatch ratio of distal true lumen were calculated and compared between SINE group and non-SINE group.

RESULTS

SINE occurred in 21 patients (26.5%). SINE occurred more frequently in chronic dissection group than acute dissection group (32.3% vs 5.9%, P = 0.032). SINE event was not significantly different between modified and non-modified stent group (53.2% vs 46.8%, P = 0.615). Taper ratio, prestent oversizing ratio and poststent oversizing ratio were not significantly different in SINE and non-SINE group. Expansion mismatch ratio is significantly higher in SINE group than non-SINE groups in terms of longitudinal diameter (117.47 vs 104.44, P =0.0041), transverse diameter (147.00 vs 106.86, P <0.0001), mean diameter (137.46 vs 106.52, P <0.0001), area and circumference (136.72 vs 105.35, P =0.0004). 10 patients (47.6%) required re-intervention with surgery (n=4) or stent-graft (n=6).

CONCLUSION

SINE after TEVAR was more frequent in chronic aortic dissection than acute dissection. Expansion mismatch ratio was significantly higher in SINE group than non-SINE group.

CLINICAL RELEVANCE/APPLICATION

The time inverval between diagnosis of aortic dissection and TEVAR is a factor predictive of late SINE event. SINE after TEVAR was more frequent in chronic aortic dissection than acute dissection.

SSQ22-09 Diagnostic Accuracy of Axial Diameter Measurements for the Detection of Aneurysm Sac Enlargement after Endovascular Repair (EVAR) of Abdominal Aortic Aneurysms (AAA) by Computed Tomography (CT)

Thursday, Dec. 3 11:50AM - 12:00PM Location: N227

Participants
Michael Schnitzbauer, MSc, Berlin, Germany (*Presenter*) Nothing to Disclose
Oliver Guntner, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Walter A. Wohlgemuth, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Haimerl, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Florian Zeman, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas Herold, MD, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Christian R. Stroszczynski, MD, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Rene Muller-Wille, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic accuracy of diameter measurements for the detection of aneurysm volume increase during follow-up after endovascular aneurysm repair (EVAR) of abdominal aortic aneurysms (AAA).

METHOD AND MATERIALS

We retrospectively analyzed 100 pairs of follow-up CT scans randomly picked from our EVAR database. The maximum aneurysm diameter was measured on axial planes (Dmax axial). The aneurysm sac volume was separately measured by manual segmentation (standard of reference).

RESULTS

Using a cut-off level of > 0 mm for diameter Dmax axial increased in 35 patients (mean 3.9 mm; range 1.0 to 31.0 mm). The aneurysm sac volume increased in 39 patients (mean, 25.7 cm^3; range, 0.2 to 241 cm^3). Dmax axial had a sensitivity/specificity of 74%/90%.

CONCLUSION

Overall dependent on the chosen cut-off, diameter measurements showed a low to moderate diagnostic accuracy for the detection of aneurysm sac enlargement after EVAR.

CLINICAL RELEVANCE/APPLICATION

Although broadly used in clinical practice diameter measurements seem to fail to detect size increase of the aneurysm sac during follow-up after EVAR.

VIS-THA

Vascular Interventional Thursday Poster Discussions

Thursday, Dec. 3 12:15PM - 12:45PM Location: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
Charles T. Burke, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose

Sub-Events

VI241-SD-THA1 Adrenal Venous Sampling in Patients with Primary Aldosteronism; Which is the Best Method for Evaluating an Indication for Surgery?

Station #1

Participants
Kimei Azama, Nishihara City, Japan (*Presenter*) Nothing to Disclose
Masahiro Okada, MD, Nishihara-Cho, Japan (*Abstract Co-Author*) Nothing to Disclose
Tomomi Koga, Okinawa City, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuko Iraha, Nishihara-Cho, Japan (*Abstract Co-Author*) Nothing to Disclose
Joichi Heianna, Nakagami-Gun, Japan (*Abstract Co-Author*) Nothing to Disclose
Keita Yamashiro, Nishihara City, Japan (*Abstract Co-Author*) Nothing to Disclose
Sadayuki Murayama, MD, PhD, Nishihara-Cho, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the most accurate method of adrenal venous sampling (AVS) for the detection of primary aldosteronism, which can be evaluated as an indication for surgery.

METHOD AND MATERIALS

A total of 64 consecutive patients who were diagnosed as primary aldosteronism underwent AVS to find an indication for surgery in four years. The catheter was placed at two locations, such as common trunk below the confluence of inferior phrenic vein (CTV) and central adrenal vein (CAV) of the left adrenal vein, at one location in the right adrenal vein (RAV) and at one location in inferior vena cava (IVC). Adrenocorticotropic hormone (ACTH) was intravenously administrated in all cases. Blood sampling was performed at same positions in both pre- and post-ACTH stimulations. Evaluating methods of AVS were lateralized ratio [LR; aldosterone/cortisol ratio (ACR) on the high-value side / ACR on the low-value side], contralateral ratio (CR; ACR on the low-value side / ACR on the IVC ratio) and plasma aldosterone concentration (PAC). Forty-nine bilateral lesions and 15 unilateral lesions (right 5, left 10) were diagnosed by comprehensive results of AVS and other imaging modalities. Adrenalectomy was performed in these 15 patients with unilateral lesions, and they were histologically confirmed to be adenomas or adrenal hyperplasias. When making decisions for surgical resection of unilateral adrenal involvement, the diagnostic accuracy for each method of AVS alone, such as LR, CR and PAC obtained by blood sampling placed in CTV/CAV/RAV at both pre- and post-ACTH stimulations, was compared by the receiver operating characteristic (ROC) analysis.

RESULTS

LR-CAV post-ACTH showed the highest detection rate for unilateral adrenal lesions (93.3%) with sensitivity (0.93) and specificity (0.84) at 2.5 of cut-off value. The area under the ROC curve (Az value) of LR-CTV post-ACTH (0.86), LR-CAV post-ACTH (0.87), CR pre-ACTH (0.85) and CR post-ACTH (0.89) were higher than those of other methods (0.510-0.794) of AVS. CR post-ACTH in particular had best Az value, with the detection rate (86.7%), sensitivity (0.98) and specificity (0.88) at 0.8 of cut-off value.

CONCLUSION

CR post-ACTH and LR-CAV post-ACTH allow the sensitive evaluation and high detection rate for AVS.

CLINICAL RELEVANCE/APPLICATION

In patients with primary aldosteronism, LR-CAV post-ACTH and CR post-ACTH lead to appropriate treatment, such as a surgical resection of unilateral adrenal involvement.

VI242-SD-THA2 Which CTA Measurement of Abdominal Aortic Aneurysm Should We Use For Follow Up?

Station #2

Participants
Johannes Boos, MD, Boston, MA (*Presenter*) Nothing to Disclose
Nathaniel Temin, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Olga R. Brook, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Vassilios D. Raptopoulos, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the correlation between various measurements of abdominal aortic aneurysms in order to produce a reliable but concise protocol for 3D imaging lab Abdominal Aortic Aneurysm (AAA) CTA reconstructions.

METHOD AND MATERIALS

In this HIPAA-compliant, IRB-approved study, consecutive CTA studies performed for evaluation and follow up of AAA performed between 01/2006 to 03/2015 were included. All CTA studies in our institution undergo routine evaluation in a 3D Imaging lab by advanced CT technologists with the following measurements: single conventional axial measurement, bidimensional centerline

measurements and volumes of: abdominal aneurysm sac; lowest renal artery to aortic bifurcation (Abd Aorta); and lowest renal artery to common iliac artery bifurcation (Abd Aorta to iliacs). Correlation coefficients between various measurements were calculated. The abdominal aortic volume (from lowest renal artery to aortic bifurcation) was used as reference standard due to consistent availability of the defining structures (renal artery and aortic bifurcation).

RESULTS

161 patients with 830 exams were included in the study. AAA axial diameter was 5.7±1.8cm with AAA volume of 164±150cc. There was excellent correlation between Abd Aorta and Abd Aorta and iliac volumes with correlation coefficient of 0.99. Similarly, very good correlation was seen between Abd Aorta and Aneurysm sac volume with correlation coefficient of 0.98. Good correlation was seen between Abd Aorta volume and AAA diameters, centerline and conventional axial with correlation coefficient of 0.89 and 0.88. There was excellent correlation between centerline aortic diameter and conventional axial diameter with correlation coefficient of 0.97.

CONCLUSION

Excellent correlation is seen between abdominal aortic volume and aneurysmal sac volume, between abdominal aorta and iliac volumes and between conventional axial and centerline AAA measurements. Good correlation was demonstrated between 2D axial measurements and volume. Thus, a single axial and single volume measurement is likely sufficient for follow up of abdominal aortic aneurysm.

CLINICAL RELEVANCE/APPLICATION

Single conventional axial diameter and abdominal aortic volume are sufficient for accurate follow up of AAA, as these measurements show excellent correlation with other available measurements of AAA.

VI243-SD-THA3 The Effects of Aspirin Therapy on Renal Transplant Biopsy Bleeding Complications

Station #3

Participants
Francis Baffour, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Grant D. Schmit, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Anil N. Kurup, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
John J. Schmitz, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
LaTonya Hickson, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Thomas D. Atwell, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Rickey Carter, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Tina Gunderson, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine if aspirin therapy increases the risk of bleeding complications after renal transplant biopsy.

METHOD AND MATERIALS

Renal transplant biopsy cases were obtained from our prospectively acquired database on percutaneous image-guided biopsies. Potential risk factors for bleeding (including aspirin (ASA) use, platelet count, INR), and bleeding complications within 24 hrs (acute) and within 3 months (delayed) of biopsy were reviewed. Complications were graded based on the Society of Interventional Radiology criteria (Fig. 1).

RESULTS

46 (0.69%) bleeding complications occurred in 44 of the 6700 patients who underwent ultrasound-guided renal transplant biopsy between 9/2005 and 8/2014. This included 11 acute major, 29 acute minor and 6 delayed major complications. There were no permanent adverse sequelae or deaths. 70.2% of patients were not on ASA therapy or had taken their last dose of ASA >10 days prior to biopsy, 9.9% between 8-10 days, 12.8% between 4-7 days and 7.1% between 0-3 days prior to biopsy. For the outcome of 'any complication' (major or minor), the final regression model included ASA use, INR, and platelet count (AUC 0.677), with p-values of <0.05, 0.10 and 0.066 respectively. These variables did not show any collinearity. For the outcome of 'major complication', ASA category and platelet count were included in the final model, but neither was statistically significant. ASA categories were then dichotomized by exposure time: '0-3 days group' vs. >3 days group'. For 'any complication', ASA use had a p-value <0.01 and platelet count had a p-value <0.05 (AUC 0.634). For 'major complications', both the ASA category and platelet count were also found to be significant (p-values <0.01, <0.05; AUC 0.714). 'Any complication' rate in the >3 days group was 0.58% (95% CI 0.42-0.80%), and in the 0-3 days group it was 1.68% (95% CI 0.86-3.29%). 'Major complication' rate in the >3 days group was 0.19% (95% CI 0.11-0.34%), and in the 0-3 days group it was 0.84% (95% CI 0.33-2.14%).

CONCLUSION

There is a significant increase in bleeding complications when ASA therapy is continued within 3 days of renal transplant biopsy, but even in this group, the bleeding complication rate is extremely low.

CLINICAL RELEVANCE/APPLICATION

Determination of risk factors associated with post-procedure bleeding risk at time of renal allograft biopsy can help inform decisions to delay or pursue biopsy for the purpose of obtaining important diagnostic information

VI240-SD-THA4 Dual-Energy CT Angiography of the Abdominal Aorta using an Advanced Monoenergetic Algorithm: Impact on Selection of Optimal Energy Level and Image Quality

Station #4

Participants
Daniele Marin, MD, Cary, NC (*Presenter*) Nothing to Disclose
Juan Carlos Ramirez-Giraldo, PhD, Malvern, PA (*Abstract Co-Author*) Employee, Siemens AG
Cole Denton, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Sonia Gupta, MD, Newark, DE (*Abstract Co-Author*) Nothing to Disclose

Achille Mileto, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Rendon C. Nelson, MD, Durham, NC (*Abstract Co-Author*) Consultant, General Electric Company Consultant, Nemoto Kyorindo Co, Ltd Consultant, VoxelMetrix, LLC Research support, Bracco Group Research support, Becton, Dickinson and Company Speakers Bureau, Siemens AG Royalties, Wolters Kluwer nv

PURPOSE

To investigate the impact of an advanced monoenergetic reconstruction algorithm on the selection of the optimal energy level and image quality during dual-energy CT (DECT) angiography of the abdominal aorta.

METHOD AND MATERIALS

This retrospective, single-center HIPAA-compliant study was IRB-approved and informed patient consent was waived. Fifty patients (35 men, 15 women) underwent DECT (80/Sn140 kVp) in the arterial phase, with a dual-source CT system (Siemen Definition Flash). Datasets at energy levels ranging from 40 to 100 keV, 10 keV increments, were reconstructed using conventional and advanced monoenergetic algorithms (Syngo DE Monoenergetic and Monoenergetic Plus, respectively). The advanced monoenergetic algorithm applies energy domain filtering to improve the image noise at low keV reconstructions. Noise, aortic contrast, and and aortic contrast-to-noise ratio (CNR) were calculated and compared. Generalized estimating equation was used to identify optimal monoenergetic-energy level to maximize the aortic CNR. The effect on CNR of the patient's body size was also assessed. Subjective assessment of image quality was performed on transverse and volume rendered reconstructed images.

RESULTS

Compared to the conventional algorithm, the advanced monoenergetic algorithm yielded significantly reduced noise at 40, 50, 60, 90 and 100 keV ($P < .001$, for all energies). Aortic CNR increased significantly with the advanced monoenergetic algorithm, for all reconstructed energies ($P < 0.001$, for all energies). For all patient sizes, the highest aortic CNR was achieved at 40 keV with the advanced algorithm, but ranged from 60 to 80 keV with the conventional algorithm. Aortic CNR improved by approximately 70% with the advanced compared to conventional algorithm (Mean [SD] = 23.6 [12.7] at 40 keV vs. 16.5 [8.7] at 70 keV, respectively; $P < .001$). Qualitative image quality scores were consistently higher at 40 keV using the advanced monoenergetic algorithm.

CONCLUSION

The 40 keV images reconstructed using an advanced monoenergetic algorithm significantly improve image quality of DECT angiography of the aorta, while simultaneously decreasing the variability introduced by patient's body weight in selecting the optimal energy level.

CLINICAL RELEVANCE/APPLICATION

An advanced monoenergetic algorithm can improve the image quality of aortic DECT angiography examinations and concomitantly streamline the utilization of DECT postprocessing techniques.

VI204-ED-THA5 Segmental Arterial Mediolysis: Imaging, Clinical Findings, and the Role of Endovascular Therapy in the Acute and Chronic Settings

Station #5

Participants
Ansar Z. Vance, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Assaf Graif, MD, Newark, DE (*Abstract Co-Author*) Nothing to Disclose
Christopher J. Grilli, DO, Wilmington, DE (*Abstract Co-Author*) Nothing to Disclose
Mark J. Garcia, MD, Chadds Ford, PA (*Abstract Co-Author*) Nothing to Disclose
Kevin Lie, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Daniel A. Leung, MD, Newark, DE (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1.) Review the background and pathophysiology of segmental arterial mediolysis. 2.) Discuss the various clinical presentations of segmental arterial mediolysis. 3.) Discuss the role of interventional radiology in the endovascular management of segmental arterial mediolysis in the acute and chronic settings. 4.) Pictorial description of the endovascular management options available to treat the different manifestations of segmental arterial mediolysis.

TABLE OF CONTENTS/OUTLINE

A. History and Background of Segmental Arterial Mediolysis (SAM) Epidemiology PathophysiologyB. Key Imaging findings CT / CTA / MR AngiographyC. Clinical presentation of SAM Acute Chronic Incidental FindingD. Clinical Examples Common hepatic artery aneurysm Celiac artery aneurysm Celiac artery dissection Superior mesenteric artery dissection Celiac artery aneurysm with common hepatic artery aneurysmE. Current Treatment Indications and Recommendations Conservative/Medical Therapy Surgical Therapy Endovascular Therapy a. Embolization b. Stent placementF. Follow-up Protocols

VIS-THB

Vascular Interventional Thursday Poster Discussions

Thursday, Dec. 3 12:45PM - 1:15PM Location: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
Charles T. Burke, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose

Sub-Events

VI247-SD-THB3 Types of Chemoagnts May Affect the Degree of Vascular Damage of the Liver after Transarterial Chemoembolization for Hepatocellular Carcinoma

Station #3

Participants
Toshimichi Mitsufuji, Fukuoka, Japan (*Presenter*) Nothing to Disclose
Shinichi Kora, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Akinobu Osame, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Kengo Yoshimitsu, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the relationship between the types of chemoagents and degree of vascular damage of the liver after transarterial chemoembolization (TACE) in patients with hepatocellular carcinoma (HCC), we retrospectively evaluated the serum level of thrombomodulin (sTM), which has been known to be a marker of systemic vascular damage, in 51 patients (Part 1), and also evaluated chronological angiographic findings in other 46 patients who underwent repetitive TACE (Part 2).

METHOD AND MATERIALS

Part 1: Between 2012 and 2013, 51 patients who underwent TACE for HCC (n<6) were retrospectively recruited. The ratio of sTM (rTM = post-TACE/pre-TACE) were correlated to various clinicoradiological factors using univariate and multivariate analyses. Part 2: Between 2000 and 2013, 46 patients who underwent TACE more than 5 times were retrospectively recruited. Degree of vascular damage was assessed at the level of the 2nd order branches of hepatic artery on the angiography performed at the next TACE using 4-point score. Scores were assigned for each chemoagents, the sum of which were compared among them.

RESULTS

Part 1: rTM peaked at day1, and returned to the pre-TACE level at day 7. rTM were large in the descending order of Cisplatinum (CIS, n=17), Epirubicin (EPI, n=15), and Miriplatin (MPT, n=19) (p=0.02). Among various factors assessed, number of the tumors, pre-TACE sTM, size of HCC, the types of chemoagents, and the embolized liver volume were related to rTM. Stepwise regression analysis revealed the latter three factors were independently significant (p<0.05).Part 2: In 46 patients, 23, 126, and 26 TACE sessions were performed with EPI, CIS, and MPT, with their scores being 1.18 ± 0.14, 0.94 ± 0.06, and 0.58 ± 0.13, respectively. There were significant difference in the scores between MPT vs both EPI (p<0.01) and CIS (p<0.05, Steel-Dwass test). Short term therapeutic effects were not significantly different among three chemoagents in both Part 1 and Part 2 studies.

CONCLUSION

MPT was suggested to cause less vascular damage after TACE than EPI and CIS.

CLINICAL RELEVANCE/APPLICATION

MPT causes less vascular damage in the liver as compared to EPI and CIS, which should be taken into account when selecting chemoagents for TACE, to preserve liver function for the future procedures.

VI212-ED-THB5 NC-MRA: Techniques and Applications

Station #5

Participants
Brian Trinh, Chicago, IL (*Presenter*) Nothing to Disclose
Bradley D. Allen, MD, Chicago, IL (*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
James C. Carr, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Astellas Group Research support, Siemens AG Speaker, Siemens AG Advisory Board, Guerbet SA
Jeremy D. Collins, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

With recent advances in MR hardware and software in the setting of rising precautions regarding use of contrast agents, non-contrast enhanced MR angiography (NCE-MRA) has become an attractive alternative to contrast enhanced MR angiography (CE-MRA) in patients with renal insufficiency. This educational exhibit will review established and recently developed NCE-MRA techniques and compare and contrast the advantages and disadvantages of each technique to CE-MRA.

TABLE OF CONTENTS/OUTLINE

This educational exhibit will begin with reviewing principles behind distinct NCE-MRA techniques. In particular, the exhibit will discuss in detail inflow-based techniques, ECG-optimized techniques, flow encoding techniques, arterial spin-labeling applications, and relaxation based techniques. Each technique will be reviewed in the context of patient care scenarios with clinical MR images

highlighting advantages and disadvantages in comparison to CE-MRA, US, and where applicable, DSA. The exhibit will conclude with a recommended strategy to optimize clinical NC-MRA protocols in the chest, abdomen/pelvis, and extremities.

RC712

Thoracic Aorta: The Essentials (An Interactive Session)

Thursday, Dec. 3 4:30PM - 6:00PM Location: S103CD

CH VA

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Dominik Fleischmann, MD, Palo Alto, CA (*Moderator*) Research support, Siemens AG;

Sub-Events

RC712A The Spectrum of Type A Dissections

Participants
Anne S. Chin, MD, Palo Alto, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the pathology, epidemiology, and natural history of acute type A aortic dissection. 2) Describe the imaging strategies and diagnostic information sought in patients with acute aortic syndromes. 3) Review the recent classification of acute aortic dissection. 4) Illustrate imaging findings of the spectrum of acute type A aortic dissection, with a focus on recognizing subtle CT angiographic findings related to the lesser known 'Class 3' aortic limited intimal tear or limited dissection.

ABSTRACT

The traditional Stanford classification distinguishes between dissections involving the ascending aorta (Type A) from those that do not involve the ascending aorta (Type B). Type A aortic dissection is rare, but remains the most lethal of aortic disorders requiring prompt surgical intervention. The common pathologic denominator in patients with acute dissection is an abnormal aortic media ('cystic medial necrosis') which can be found in genetic/inherited diseases (e.g. Marfan's) but also in patients with severe hypertension. The CT imaging strategy of suspected acute aortic syndrome should always include (i) non-enhanced images to assess for intramural hematoma (IMH); when the index of suspicion for aortic dissection is high, also consider (ii) EKG-gating for motion-free evaluation of the aortic root/ascending aorta, and (iii) including common femoral arteries in the CTA scan range to assess lesion extent and identify a percutaneous access route. The spectrum of aortic dissection has recently been classified as the following: Class 1 classic dissection with true and false lumen separated by an intimal flap; Class 2 IMH; Class 3 discrete or limited dissection; Class 4 penetrating atherosclerotic ulcer (PAU); and Class 5 iatrogenic/traumatic. A clarification and modified conceptual classification of aortic dissection will be provided, along with illustrative examples of these aortic lesions. Particular focus will be given to the lesser known Class 3 'limited intimal tear' which is described as a subtle and eccentric bulge of the aortic wall. While it has been reported to elude current imaging techniques, emphasis will be made on recognizing subtle CTA imaging findings characteristic of this uncommon but important dissection variant.

RC712B Surgical Procedures and Complications

Participants
Terri J. Vrtiska, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe common indications for surgical intervention in thoracoabdominal aortic disease including aneurysm, vasculitis, infection, trauma and connective tissue disorders. 2) Identify key CTA features of the normal postoperative thoracoabdominal aorta. 3) Present the characteristic CTA findings for complications of postoperative aortic repair including disease progression, thrombosis, stenosis, infection, pseudoaneurysm, aorto-enteric fistula and aortic rupture.

ABSTRACT

Surgical procedures and complications of the thoracoabdominal aorta

RC712C Traumatic Aortic Injuries

Participants
Savvas Nicolaou, MD, Vancouver, BC (*Presenter*) Institutional research agreement, Siemens AG

LEARNING OBJECTIVES

1) Discuss the different mechanisms of injuries, pathophysiology, and types of traumatic aortic injuries including aortic dissection, laceration, transection, pseudoaneurysm and intramural hematoma. 2) Review techniques and advances in imaging including DECT/Spectral and ultra-high-pitch imaging to optimize imaging of traumatic aortic injuries and the role of gating, MRI, and TEE. 3) Discuss and demonstrate examples of the grading scheme for traumatic aortic injuries. 4) Demonstrate imaging pitfalls which can cause misinterpretation of traumatic aortic injuries. 5) Review the appropriate management and treatment options, including open surgical repair and percutaneous endovascular repair, for the traumatic aortic injuries.

ABSTRACT

RC810

Vascular Doppler (An Interactive Session)

Friday, Dec. 4 8:30AM - 10:00AM Location: S402AB

VA US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC810A Beyond Peak Velocities: Waveform Interpretation in Carotid Doppler

Participants
Mark A. Kliewer, MD, Madison, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be familiar with how carotid waveforms change with systemic, regional and local vascular disease. 2) Be able to recognize common waveform variants and their attendant clinical significance.

Active Handout:Mark A. Kliewer

http://abstract.rsna.org/uploads/2015/15002014/RC810A.pdf

RC810B Upper and Lower Extremity Veins

Participants
Leslie M. Scoutt, MD, New Haven, CT, (leslie.scoutt@yale.edu) (*Presenter*) Consultant, Koninklijke Philips NV

LEARNING OBJECTIVES

1) This course will review the US criteria for the diagnosis of acute and chronic DVT, including a discussion of pitfalls in the US diagnosis of DVT. 2) Current controversies in the US evaluation of DVT will be reviewed. 3) The role of US in the diagnosis of alternative causes of leg pain and swelling will be described. 4) US diagnosis of DVT in the upper extremity will also be discussed.

ABSTRACT

This session will discuss the clinical presentation and epidemiology of deep venous thrombosis in the upper and lower extremities. The criteria for and pitfalls in the US the diagnosis of DVT will be discussed with an emphasis on current controversies in the role of US in the work up of patients with clinically suspected DVT. In addition, the role of US in idenitfying alternative causes of extremity pain and swelling will be presented.

Honored Educators

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Leslie M. Scoutt, MD - 2014 Honored Educator

RC810C Upper and Lower Extremity Arteries

Participants
Michelle L. Robbin, MD, Birmingham, AL, (mrobbin@uabmc.edu) (*Presenter*) Consultant, Koninklijke Philips NV;

LEARNING OBJECTIVES

1) Describe normal anatomy and normal anatomic variants. 2) Demonstrate normal and abnormal waveform patterns. 3) Discuss methods to evaluate stenoses and occlusions, noting pitfalls.

ABSTRACT

Upper and lower extremity arterial ultrasounds are becoming more commonly requested because of concerns regarding expense and toxicity of CT/MRI contrast agents, as well as radiation associated with CT. Indications and standard US evaluation of the upper and lower extremity arteries will be detailed, including high brachial artery bifurcation (a normal variant), palmar arch evaluation prior to radial artery harvesting for CABG, and lower extremity arterial waveform analysis.

RC812

Acute Abdominal Vascular Diseases (An Interactive Session)

Friday, Dec. 4 8:30AM - 10:00AM Location: E353B

GI VA CT ER

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants

Sub-Events

RC812A 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.

RC812B 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.

RC812C 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.

RC812D Gastrointestinal Bleeding

Participants
Jorge A. Soto, MD, Boston, MA (*Presenter*) Nothing to Disclose

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.

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

RC814

Interventional Series: Complications in Interventional Oncology-Avoidance and Damage Control

Friday, Dec. 4 8:30AM - 12:00PM Location: N228

GI VA IR OI RO

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants
Charles E. Ray JR, MD, PhD, Chicago, IL, (chary@uic.edu) (*Moderator*) Advisory Board, Novate Medical Ltd; Editor, Thieme Medical Publishers, Inc; ; ; ; ;
Robert J. Lewandowski, MD, Chicago, IL (*Moderator*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc

LEARNING OBJECTIVES

1) List 2 important recent publications in interventional oncology. 2) Explain the mechanism of one complication related to thermal ablation. 3) Describe 1 pitfall of radioembolization. 4) Outline 3 complications in combination therapy for hepatocellular carcinoma. 5) List three complications of chemo-embolization.

ABSTRACT

Sub-Events

RC814-01 Chemoembolization Complications

Friday, Dec. 4 8:30AM - 8:45AM Location: N228

Participants
Charles E. Ray JR, MD, PhD, Chicago, IL (*Presenter*) Advisory Board, Novate Medical Ltd; Editor, Thieme Medical Publishers, Inc; ; ; ; ;

LEARNING OBJECTIVES

View learning objectives under main course title.

RC814-02 DNA ChemoFilter: Novel Method to Prevent Toxicity from Intra-Arterial Administration of Chemotherapeutic

Friday, Dec. 4 8:45AM - 8:55AM Location: N228

Participants
Mariam S. Aboian, MD, PhD, San Francisco, CA (*Presenter*) Nothing to Disclose
Chia-Hung Sze, MS, San Francisco, CA (*Abstract Co-Author*) Researcher, ChemoFilter Inc
Jay F. Yu, MS, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Ayushi Gautam, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Prasheel Lillaney, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
David M. Wilson, MD, PhD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Anand S. Patel, MD, San Francisco, CA (*Abstract Co-Author*) Stockholder, ChemoFilter, Inc Officer, ChemoFilter, Inc
Mark W. Wilson, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Steven W. Hetts, MD, San Francisco, CA (*Abstract Co-Author*) Consultant, Silk Road Medical Inc Consultant, Medina Medical Inc Research Grant, Stryker Corporation Data Safety Monitoring Board, Stryker Corporation

PURPOSE

ChemoFilter is a novel medical device that limits systemic toxicity of chemotherapeutics by filtering non-target drug from blood that could be described as intra-vascular dialysis. This method has a potential to prevent toxicity associated with treatment of head and neck cancer, such as renal failure associated with cisplatin. We report a novel method to bind chemotherapeutics in blood that uses immobilized DNA as a platform for binding chemotherapeutics with intrinsic DNA binding activity.

METHOD AND MATERIALS

DNA binding experiments were carried out in vitro with doxorubicin in PBS solution. Genomic DNA was used to determine the concentration of DNA that shows optimum binding kinetics. Binding kinetics in nylon mesh of different pore size was evaluated.

RESULTS

DNA binding kinetics by doxorubicin is dose dependent and is very rapid with 94% decrease in drug concentration from solution within 1 minute of reaction time. DNA demonstrates faster binding kinetics by doxorubicin as compared to previously published polystyrene resin that uses ion exchange to filter doxorubicin out of the solution. DNA sequestered within the Nylon mesh demonstrates approximately 70% decrease in doxorubicin concentration from solution within 5 minutes.

CONCLUSION

DNA ChemoFilter demonstrates rapid binding of doxorubicin and is a model for filtration of DNA binding chemotherapeutics from the bloodstream.

CLINICAL RELEVANCE/APPLICATION

DNA ChemoFilter is optimized for DNA intercalating chemotherapeutics and minimizes their systemic toxicity after intra-arterial administration for treatment of liver and head and neck malignancies.

RC814-03 Repeated Transarterial Chemoocclusion with Degradable Starch Microspheres (DSMs-TACO) of Unresecable Hepatocellular Carcinoma: A Single Center Experience

Friday, Dec. 4 8:55AM - 9:05AM Location: N228

Participants
Fabrizio Chegai, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Antonio Orlacchio, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Stefano Merolla, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Laura Greco, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Elisa Costanzo, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Giovanni Simonetti, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the efficacy and safety of trans-arterialchemo-occlusion (TACO) using Degradable-Starch-Microspheres (DSMs) for unresectable hepatocellular carcinoma (HCC) treatment.

METHOD AND MATERIALS

We prospectively enrolled 28 HCC cirrhotic patients (23/5 M/F, mean age 66.3±10.5 years), to be treated with three repeated DSMs-TACO procedures (225 mg of DSMs, Embocept®S, PharmaCept and Doxorubicin Cloridrate, 50 mg/m2), performed at 4-6 week intervals. Patients were clinically evaluated before and after each procedure and disease severity scored according to Child Pugh and MELD scores. Treatment response was assessed by CT-scan 4 weeks after each procedure, according to mRECIST criteria.

RESULTS

Complete response (CR) was observed in 6 (20.8%), 11 (37.5%) and 14 (58.3%) patients after the first, second and third procedure, respectively. At the end of the treatment course all patients experienced at least a partial response. Patients with monolobar disease (16/28: 57.1%) showed higher CR rates after the first procedure compared to those with bilobar HCC (6 vs 0, p=0.017). No differences between mono or bi-lobar disease were observed in CR (64.2% vs 50%; p=ns). Eight patients (33.3%) did not complete the planned repeated procedures. In most cases treatment discontinuation was due to worsening liver function, mainly in patients with more advanced liver disease.

CONCLUSION

DSMs-TACO offers a valid therapeutic option in patients with unresecable HCC. A careful patients selection is required in order to avoid worsening liver function in patients with border-line liver compensation. Further investigations to establish the best treatment schedule and to define the effect of DSMs-TACO on survival are required.

CLINICAL RELEVANCE/APPLICATION

Temporary embolization of the hepatic artery using DSMs is feasible and safe in patients with HCC and an impaired liver function

RC814-04 Locoregional Treatment of Advanced HCC with Complete Portal Vein Thrombosis: The Impact of Radioembolization Using 90Y

Friday, Dec. 4 9:05AM - 9:15AM Location: N228

Participants
Francesco Somma, MD, Napoli, Italy (*Presenter*) Nothing to Disclose
Roberto D'Angelo, MD, Naples, Italy (*Abstract Co-Author*) Nothing to Disclose
Gianluca Gatta, Naples, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesco Fiore, MD, Naples, Italy (*Abstract Co-Author*) Nothing to Disclose
Giovanni Pecoraro, Napoli, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Our purpose is to assess effectiveness and safety of Trans-arterial Radioembolization (TARE) using microspheres containing 90Y in case of advanced HCC with thrombosis of both portal branches.

METHOD AND MATERIALS

Between March 2010 and March 2013, 41 TARE were performed in 33 patients with unresectable HCC and bilirubine values up to 2.8 mg/dl. Among these, 23 had one portal branch thrombosis and 11 had thrombosis of both portal branches. Multislice Computed Tomography (MSCT) scans and angiography were used to assess the baseline burden and the follow-up studies according to the modified RECIST guideline. Some patients underwent the embolization of the Gastro-duodenal artery, using micro-coils. In these cases, a previous study was performed with the injection of TC-99MAA through a 3F microcatheter. Proton-Pump Inhibitors (PPI) were administered to prevent gastritis and ulcers.

RESULTS

The average dose administered was 1.8GBq. After the treatment, a post-embolization syndrome was found in 31/41 patients with no statistically significant difference between patients with portal thrombosis and those without. According to the RECIST guideline at least a partial response was found in 33/41 (79%) of cases three months after the procedure and in 35/41 (88%) at nine months. At two-year follow-up, patients with thrombosis of two portal branches presented survival rates similar to patients with one portal branch thrombosis, and only slightly inferior if compared to patients without thrombosis. Moreover, a retraction of portal vein thrombosis was registered in more than 60% of patients with thrombosis (21/34).

CONCLUSION

TARE showed to be a safe and effective locoregional treatment of locally advanced HCC, even in case of patients with portal vein thrombosis. Indeed, it does not worsen the post-embolization symptoms, while helping retracting portal vein thrombosis if present. Therefore, this condition not only has no impact on TARE, but represents an indication, even in case of thrombosis of both portal branches.

CLINICAL RELEVANCE/APPLICATION

If compared to patients without thrombosis, TARE in patients with HCC and portal thrombosis does not reduce the post-treatment quality of life,Thrombosis of both portal branches does not interfere with TARE, and represents one of its major indication in case of locally advanced unresectable HCC, even in case of recurrence after other locoregional treatments.

RC814-05 Irreversible Electroporation (IRE) of Malignant Liver Tumors Close to Major Portal or Hepatic Veins Does not Influence Perfusion of Hepatic or Portal Veins but Can Result in Bile Duct Strictures

Friday, Dec. 4 9:15AM - 9:25AM Location: N228

Participants
Martina Distelmaier, Aachen, Germany (*Presenter*) Nothing to Disclose
Alexandra Barabasch, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Nils A. Kraemer, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Heil, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Christiane K. Kuhl, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Bruners, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

IRE has been proposed as a non-thermal ablation method that offers specific advantages over thermal ablation, notably absence of heat sink effect and preservation of both, blood vessels and bile ducts. The purpose of our study was to verify the theoretical advantages of IRE by systematically investigating clinical efficacy and complications of percutaneous IRE for hepatic malignancies located immediately adjacent to major portal and bile ducts or hepatic veins. We were specifically interested in the long-term patency of adjacent venous and biliary vessels.

METHOD AND MATERIALS

CT-guided percutaneous IRE of 37 primary or secondary liver malignancies (mean size 17 mm; range 7-44 mm) was performed in 27 patients (mean age 59 y; 13 men). All lesions were located immediately adjacent to major hepatic veins (n=16), portal vein branches or both (n=21) and therefore not suitable for RFA or MWA. Per standard IRE protocol, 3 to 5 probes (active tip length 1.5-2.5 cm) were placed strictly parallel under CT-guidance. All patients underwent systematic follow-up by CT or MRI.

RESULTS

No major procedure-related complications were observed. All adjacent major portal or hepatic veins remained perfused even at long term follow-up. Complete ablation of the target was achieved in 34/37 (92%) cases with a safety margin of 5-10 mm, confirmed by CT and MRI. In 9 cases (24%) local recurrences within or adjacent to the ablation zone were observed between 1-12 months after treatment. 5 patients with tumors located next to portal veins/ bile ducts (5/21=24%) developed mild to moderate segmental/lobar cholestasis, not requiring treatment. In one patient a clinically asymptomatic arterio-portal fistula developed.

CONCLUSION

IRE for primary and secondary liver malignancies located adjacent to large portal or hepatic veins proved to be safe and effective with regards to local control, and will leave venous blood vessels unaffected. Bile duct strictures may, however, occur, in up to 25% of lesions located close to portal structures.

CLINICAL RELEVANCE/APPLICATION

CT-guided IRE is a useful ablation method for primary and secondary liver tumors that are not amenable to thermal ablation (RFA, MWA). While blood vessels are preserved, bile duct stricutes do occur.

RC814-06 Y-90 Complications

Friday, Dec. 4 9:25AM - 9:40AM Location: N228

Participants
Robert J. Lewandowski, MD, Chicago, IL (*Presenter*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

RC814-07 Thermal Ablation Complications

Friday, Dec. 4 9:55AM - 10:10AM Location: N228

Participants
Ron C. Gaba, MD, Chicago, IL, (rgaba@uic.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

Not applicable.

RC814-08 Debate: IO: More than Radiologists?

Friday, Dec. 4 10:10AM - 10:25AM Location: N228

Participants
Ron C. Gaba, MD, Chicago, IL, (rgaba@uic.edu) (*Presenter*) Nothing to Disclose
Robert J. Lewandowski, MD, Chicago, IL (*Presenter*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific

Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

Not applicable.

RC814-09 Incidence of Tumor Seeding after Percutaneous Radiofrequency Ablation of Hepatocellular Carcinoma: A Six Year Experience in 581 Nodules in 305 Consecutive Patients

Friday, Dec. 4 10:25AM - 10:35AM Location: N228

Participants
Somrach Thamtorawat, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Steven S. Raman, MD, Santa Monica, CA (*Abstract Co-Author*) Nothing to Disclose
Justin P. McWilliams, MD, Santa Monica, CA (*Abstract Co-Author*) Nothing to Disclose
Michael L. Douek, MD, MBA, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Simin Bahrami, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
David Y. Lu, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Tumor seeding along the needle tract or peritoneum is dreaded complication of percutaneous liver ablation, especially in potential liver transplant patients with a reported incidence up to 4.4%. Therefore, the objective of our study was to determine the incidence of tumor seeding after percutaneous RF ablation of hepatocellular carcinoma (HCC).

METHOD AND MATERIALS

With IRB approval and HIPAA compliance, our institutional clinical database was queried to access all patients who had development of one or more extrahepatic recurrences in the skin, subcutaneous tissues, or peritoneum from March 2006 to December 2012. The study cohort consisted of 305 consecutive patients (217 men and 88 women) and a total of 498 RFA sessions. All lesions were treated with single, double or cluster internally cooled straight electrodes mated to a 200W generator and switching controller (Covidien, Boulder Co) by one of four experienced interventionalists. Tract ablation was used in almost all cases. Six patients were treated by using combined ethanol injection.

RESULTS

Over a 6 year period, 581 HCC nodules were treated by RF ablation with a mean follow up of 28±16 months (range from 3-66 months). Tumor seeding was evaluated by pathological report of explant liver in 96 patients and by imaging follow up in 209 patients. During this time in two patients, single chest wall nodules were detected in or near the needle tract (0.3% per nodule, 0.6% per patient) in the setting of extrahepatic metastases. One nodule was detected at 5.3 months post ablation concurrent with lymph node metastasis. The other nodule was detected at 18.3 month after liver transplantation in a patient with concurrent lung metastases. In both cases, the ablated nodules were subcapsular, poorly differentiated on concurrent biopsy with direct electrode insertion into the nodule. There was no further lesion treatment due to advanced metastatic disease.

CONCLUSION

In this series, no needle tract seeding was detected in patients without concurrent extrahepatic metastases. However, with two solitary chest wall nodules at or near the needle tract, the possible risk of tumor seeding after RF Ablation of HCC was 0.3% per nodule and 0.6% per patient. Both nodules were poorly differentiated and subcapsular.

CLINICAL RELEVANCE/APPLICATION

Using optimal technique, there is very low risk of possible tumor seeding after percutaneous radiofrequency ablation of hepatocellular carcinoma.

RC814-10 Utility and Safety of Radiofrequency Ablation for Focal Hepatic Lesions Adjacent to Gallbladder in Ablating between GB Fossa and Contralateral Safety Margin

Friday, Dec. 4 10:35AM - 10:45AM Location: N228

Participants
In Young Choi, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Pyo Nyun Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyung Jin Won, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
So Yeon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yong Moon Shin, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate safety and therapeutic efficacy of radiofrequency (RF) ablation for treatment of focal hepatic lesions (FHL) adjacent to gallbladder (GB) with reduction of ablation time and rearrangement of electrode.

METHOD AND MATERIALS

We restrospectively evaluated 36 patients who underwent RF ablation of FHL adjacent to GB(less than 10mm) from January 2011 to March 2014. Follow-up period was ranged from 9 to 50 months (mean, 25 months). The electrode was inserted parallel direction to GB. Patients were divided into two subgroups based on whether the lesion was abutting GB (less than 5mm, n=19) or not (more than 5mm, n=17). In abutting group, the electrode was inserted eccentrically after mesuring the diameter between GB fossa and contralateral safety margin and ablation time was decreased for reducing the diameter of ablated zone in horizontal axis to GB. Fourteen of abutting group were performed with artificial ascites (5% dextrose aqueous solution) and 8 of non-abutting group were performed with artificial ascites. A panel of radiologists blinded to the patients' clinical histories reviewed immediate follow up CT for complication and late follow up CT for local tumor progression. Statistical evaluation was performed with Chi-square test and

Fisher's exact test.

RESULTS

There were no major complications in both groups. Enhancing wall thickening of GB adjacent to RFA zone was noted in 19.4% (7/36, abutting group; 5, non-abutting group; 2) and it disappeared on subsequent follow-up imaging. There is no statistically significant difference between abutting group and non-abutting group ($p > 0.05$). The technical success rate based on immediate follow-up and one-month follow-up CT was 94.4% (34/36) and two patients remained enhancing foci on immediate follow up (1 abutting group, 1 non-abutting group) and they were retreated sucessfully. Local tumor progression of completely ablated tumors during follow-up period less than 6 months was noted in two patients (2/34, 1 abutting group, 1 non-abutting group). Except these two patients, there was no local tumor progression during follow-up periods.

CONCLUSION

RF ablation can be a safe and effective treatment for FHL adjacent to GB with rearrangement of electrode and reduction of ablation time.

CLINICAL RELEVANCE/APPLICATION

The treatment of FHL adjacent to GB is challenging issue. RF ablation may be a safe and effective treatment option even though the lesion is located right beside GB.

RC814-11 Combination Therapy Complications

Friday, Dec. 4 10:45AM - 11:00AM Location: N228

Participants
Thuong G. Van Ha, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC814-12 Complications due to Imaging Errors

Friday, Dec. 4 11:00AM - 11:15AM Location: N228

Participants
Aradhana M. Venkatesan, MD, Houston, TX, (avenkatesan@mdanderson.org) (*Presenter*) Institutional research agreement, Koninklijke Philips NV

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

RC814-13 Tumor Board-Ask the Experts

Friday, Dec. 4 11:15AM - 11:30AM Location: N228

Participants
Charles T. Burke, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC814-14 Literature Review: The Most Important IO Papers from the Past 5 Years that Everyone Should Know

Friday, Dec. 4 11:30AM - 11:45AM Location: N228

Participants
Ryan Hickey, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

Handout:Ryan Hickey

http://abstract.rsna.org/uploads/2015/15002217/The Most Important IO Papers from the Past 5 years that Everyone Should Know.docx

RC814-15 Questions and Wrap-up

Friday, Dec. 4 11:45AM - 12:00PM Location: N228

Participants

SST09

Neuroradiology (Cerebrovascular Imaging)

Friday, Dec. 4 10:30AM - 12:00PM Location: N226

NR VA MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Jalal B. Andre, MD, Seattle, WA (*Moderator*) Research Grant, Koninklijke Philips NV; Consultant, Hobbitview, Inc; Research Grant, Toshiba Corporation;

Sub-Events

SST09-01 Subclinical Cardiac Dysfunction Relates to Imaging Markers of Subclinical Brain Disease in the General Population

Friday, Dec. 4 10:30AM - 10:40AM Location: N226

Participants
Hazel I. Zonneveld, MD,MSc, Rotterdam, Netherlands (*Presenter*) Nothing to Disclose
Wiro Niessen, PhD, Rotterdam, Netherlands (*Abstract Co-Author*) Co-founder, Quantib BV; Scientific Director, Quantib BV; Shareholder, Quantib BV
Aad Van Der Lugt, MD, PhD, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Gabriel P. Krestin, MD, PhD, Rotterdam, Netherlands (*Abstract Co-Author*) Consultant, General Electric Company; Research Grant, General Electric Company; Research Grant, Bayer AG; Research Grant, Siemens AG; Speakers Bureau, Siemens AG
Mohammad A. Ikram, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Meike W. Vernooij, MD, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the association between NT-proBNP, a marker of heart disease, and imaging markers of subclinical brain disease on magnetic resonance imaging (MRI) in community-dwelling persons who are free of stroke, dementia, and a clinical diagnosis of cardiovascular disease.

METHOD AND MATERIALS

In 2,475 persons (mean age 56.6 years; 57.3% women) from a prospective population-based study we measured NT-proBNP in serum. All persons underwent brain MRI on a 1.5-tesla MRI system, yielding imaging markers for global brain structure, focal abnormalities (lacunes, white matter lesions, cerebral microbleeds), and microstructural white matter integrity. We used multivariable linear and logistic regression models to investigate the association between NT-proBNP (continuous levels and per tertile) and markers of subclinical brain disease.

RESULTS

Higher NT-proBNP was associated with smaller total brain volume (mean difference per SD increase in NT-proBNP: -0.023, 95% confidence interval [CI] -0.036;-0.009, p=0.001), predominantly driven by grey matter volume (mean difference per SD increase in NT-proBNP: -0.037, 95%CI -0.057;-0.017, p<0.001), and less by white matter volume. Higher NT-proBNP was associated with larger white matter lesion volume (mean difference per SD increase in NT-proBNP: 0.099, 95%CI 0.060; 0.137, p<0.0001), and with lower fractional anisotropy and higher mean diffusivity in white matter.

CONCLUSION

In community-dwelling persons, subclinical cardiac dysfunction as reflected by serum NT-proBNP levels, is associated with global and microstructural imaging markers of subclinical brain disease.

CLINICAL RELEVANCE/APPLICATION

Our data provide more insight into the heart-brain connection, which is essential since both cardiac dysfunction and subclinical brain disease are growing problems in an aging population.

SST09-02 Endovascular Management of Post-irradiated Carotid Blowout Syndrome

Friday, Dec. 4 10:40AM - 10:50AM Location: N226

Participants
Feng-Chi Chang, MD, Taipei, Taiwan (*Presenter*) Nothing to Disclose
Chao-Bao Luo, MD, Taipei, Taiwan (*Abstract Co-Author*) Nothing to Disclose
Ting-Yi Chen, MS, Taipei, Taiwan (*Abstract Co-Author*) Nothing to Disclose
Chung-Jung Lin, MD, PhD, Taipei, Taiwan (*Abstract Co-Author*) Nothing to Disclose
Wan-Yuo Guo, MD, PhD, Taipei, Taiwan (*Abstract Co-Author*) Nothing to Disclose
Jiing-Feng Lirng, MD, Taipei, Taiwan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Purpose: To retrospectively evaluate the clinical and technical factors related to the outcomes of endovascular management in patients with head-and-neck cancers associated with post-irradiated carotid blowout syndrome (PCBS)

METHOD AND MATERIALS

Between 2000 and 2013, 96 patients with PCBS underwent endovascular management. The 40 patients with the pathological lesions located in the external carotid artery were classified as group 1 and were treated with embolization. The other 56 patients

with the pathological lesions located in the trunk of the carotid artery were divided into 2 groups as follows: group 2A comprised the 38 patients treated with embolization, and group 2B comprised the 18 patients treated with stent-graft placement. Fisher's exact test was used to examine endovascular methods, clinical severities, and postprocedural clinical diseases as predictors of outcomes.

RESULTS

Technical success and immediate hemostasis were achieved in all patients. The results according to endovascular methods (group 1 vs 2A vs 2B) were as follows: technical complication (1/40[2.5%] vs 9/38[23.7%] vs 9/18[50.0%], P=0.0001); rebleeding (14/40[35.0%] vs 5/38[13.2%] vs 7/18[38.9%]), P=0.0435). The results according to clinical severity (acute vs ongoing PCBS) were as follows: technical complication (15/47[31.9%] vs 4/49[8.2%], P=0.0035); rebleeding (18/47[38.3%] vs 8/49[16.3%], P=0.0155). The results according to post-procedural clinical disease (regressive vs progressive change) were as follows: alive (14/21[66.7%] vs 8/75[10.7%], P<0.0001); survival time (34.1±30.6[0.3-110] vs 3.6±4.0[0.07-22] months, P<0.0001).

CONCLUSION

We suggest that taking embolization whenever this is possible, performing endovascular intervention in slight clinical severity and aggressive management of the post-procedural clinical disease can improve the outcomes of endovascular management.

CLINICAL RELEVANCE/APPLICATION

As embolization is the best option of PCBS, application of pre-procedural and post-procedural CT/CTA for disease predication and follow-up can be a central role of its management. Aggressive management of the post-procedural clinical disease is also mandatory.

SST09-03 3D Black-Blood T1-mVISTA for the Diagnosis of Temporal and Ophthalmic Involvement in Patients with Giant Cell Arteritis

Friday, Dec. 4 10:50AM - 11:00AM Location: N226

Participants
Nora N. Kammer, MD, Munich, Germany (*Presenter*) Nothing to Disclose
Karla Maria Treitl, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Eva M. Coppenrath, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Hendrik Kooijman, Hamburg, Germany (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Maximilian F. Reiser, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Tobias Saam, MD, Munich, Germany (*Abstract Co-Author*) Research Grant, Diamed Medizintechnik GmbH; Research Grant, Pfizer Inc

PURPOSE

To assess the diagnostic accuracy of a modified, sub-millimeter isotropic whole-brain 3D black-blood T1w-TSE sequence (T1-mVISTA) for the diagnosis of temporal and ophthalmic involvement in patients with giant cell arteritis.

METHOD AND MATERIALS

28 patients were included in this study: 9 patients with clinically diagnosis of temporal arteritis (age: mean: 70.4; median 73; 5 male) and 19 controls (age: mean: 62.3 median 63; 7 male). Among patients with temporal arteritis, 5 were also positive for non-atherosclerotic anterior ischemic optic neuropathy (AION) as defined by fundoscopy. A contrast-enhanced T1-mVISTA sequence (resolution=0.8mm isotropic, scan time 4:43 minutes) was acquired at 3T, additionally to the standard MRI sequences. Two radiologists assessed the images in consensus blinded to the clinical diagnosis. Left/right temporal and short posterior ciliary arteries were evaluated for the presence of mural thickening and contrast enhancement of the vessel wall, indicating arteritis (overall 112 arterial segments). Regional fat suppression (3-point Likert scale), over all image quality (4-point Likert scale) and diagnostic confidence for the presence or absence of arteritis (5-point Likert scale) were also assessed.

RESULTS

Contrast-enhanced T1-mVISTA sequence had a high sensitivity and specificity (100% and 94.7%, respectively) for the diagnosis of temporal arteritis. Positive and negative predictive values (PPV and NPV) were 90.0% and 100%, resepectively. Sensitivity and specificity for vasculitis of the short posterior ciliary arteries in patients with clinical confirmed AION was 83.3% and 75.0%, respectively resulting in PPV of 83.3% and NPV of 75.0%. Over all image quality (mean: 3.8±0.6; median: 4) and regional fat suppression were good (temporal: mean: 2.8±0.4; median: 3; ophthalmic: mean: 2.5±1.2; median: 3) and diagnostic confidence was high (mean: 4.8±0.5; median: 5).

CONCLUSION

3D black-blood T1-mVISTA allows an accurate diagnosis of involvement both for the temporal arteries, as well as the short ciliary arteries in patients with giant cell arteritis.

CLINICAL RELEVANCE/APPLICATION

Whereas sonography, biopsy and fundoscopy were the methods of choice for diagnosing affection of the extracranial arteries, new MRI sequences with black-blood technique can accurately diagnose this on cross-sectional imaging.

SST09-04 Diffusion Tensor Measurement of the Corpus Callsom Correlate with Cognitive Dysfunction in Patients of Subcortical Ischemic Vascular Disease

Friday, Dec. 4 11:00AM - 11:10AM Location: N226

Participants
Lin Lin, Fuzhou, China (*Presenter*) Nothing to Disclose
Yunjing Xue, MD, Fuzhou, China (*Abstract Co-Author*) Nothing to Disclose
Hailong Lin, Fuzhou, China (*Abstract Co-Author*) Nothing to Disclose
Qing Duan, MD, Fuzhou, China (*Abstract Co-Author*) Nothing to Disclose
ShaoFan Jiang, FuZhou, China (*Abstract Co-Author*) Nothing to Disclose
Chengsheng Wang, Fuzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate correlation between microstructure changes of the corpus callosum and cognitive dysfunction in subcortical ischemic vascular disease(SIVD) patients using atlas-based diffusion tensor analyses.

METHOD AND MATERIALS

50 right-handed SIVD patients were recruited and divided into vascular cognitive impairment no dementia(VCIND) group and normal cognition(NC) group. 22 VCIND patients and 28 NC patients were underwent in DTI scanning and neuropsychological assessment. Atlas-based analysis(ABA) were performed on each subject for extracting fractional anisotropy(FA) and mean diffusivity(MD) measures from all subregions of the corpus callosum . The correlation between DTI measures and MoCA scores were evaluated. Receiver operating characteristic curves were used to test for the parameter with the best sensitivity and specificity for cognitive function discrimination.

RESULTS

Among VCIND, as compared to NC patients, FA were significantly lower and MD were higher in the genu, body, splenium, left and right tapetum of the corpus callosum (all P<0.001). Moreover, MoCA scores correlated with DTI values in all subregions of the corpus callosum(all P<0.01). In addition, the highest sensitivity and specificity for discriminating between VCIND and NC patients were found for FA (77.27% and 89.29%, respectively) and MD(95.45% and 64.29%, respectively) in the body of the corpus callosum. Optimal thresholds for FA and MD in the body of the corpus callosum for differentiating VCIND and NC patients were 0.421 and 1.038, respectively.

CONCLUSION

The corpus callsum damage occurs in SIVD patients with cognitive impairment, and the damage correlate with cognitive dysfunction. Using Altas-based DTI analysis can evaluate the severity of this disease.

CLINICAL RELEVANCE/APPLICATION

The DTI measures of the corpus callosum can reflect cognitive impairments in SIVD patients and serve as imaging biomarkers for early diagnosis and disease progression of cognitive impairments.

SST09-05 Accuracy of Carotid In-Stent Stenosis Measurement in a Phantom Model Using Effective Atomic Number Imaging Produced by Dual Layer Dual Energy CT

Friday, Dec. 4 11:10AM - 11:20AM Location: N226

Participants
Eliel Ben-David, MD, Jerusalem, Israel (*Presenter*) Nothing to Disclose
John M. Gomori, MD, Jerusalem, Israel (*Abstract Co-Author*) Consultant, Medymatch Technology Ltd
Isaac Leichter, PhD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Zimam Romman, Haifa, Israel (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Jacob Sosna, MD, Jerusalem, Israel (*Abstract Co-Author*) Consultant, ActiViews Ltd Research Grant, Koninklijke Philips NV

PURPOSE

In-stent plaque stenosis is difficult to assess in CT angiography of the neck. Effective Atomic Number (EAN) is a projection-space reconstruction of the spectral raw data that calculates the effective atomic number of the voxels. Our purpose was to examine accuracy of in-stent plaque measurment using EAN imaging produced by dual layer dual energy CT in a phantom model.

METHOD AND MATERIALS

A Conichrome stent containing an enhanced radiopaque tantalum core (WALLSTENT, Boston Scientific) and a Nitinol stent (PRESCISE PRO RX, Cordis), both of 0.2mm thickness and 8 mm diameter, were deployed around water-equivalent tubes of 1.5mm wall thickness and 5.0mm lumen. Each tube was filled with iodine solution (16mg/ml), immersed in a water-filled cylinder, and placed in a 10cm diameter water-equivalent phantom (model of in-stent stenosis). The phantom was scanned using a dual layer dual energy CT (Philips Healthcare, Cleveland, OH, USA) at 120kVp and 250mAs and generated simultaneous conventional 120 kV and EAN datasets. Full Width at Half Maximum (FWHM) technique was used to measure accuracy and reproducibility of tube lumen and wall thickness in both datasets.

RESULTS

In the conventional dataset, the average wall thickness and lumen diameter of the Conichrome and Nitinol stents were 0.8 and 4.8mm, and 1.1 and 4.7mm, respectively, reflecting a deviation of -40.7%, -10.0% and -26.7.0%, -6.0% from actual dimensions. In the EAN dataset, the measurements were 1.3, 4.3 mm and 1.2, and 4.6mm, respectively, reflecting a deviation of -13.3%, -14.0% and -20.0%, -8.0% from actual dimensions. For the Conichrome stent the blooming artifact in the conventional dataset was reduced in EAN imaging, and the visualization of the tube wall mimicking the stenosis was improved. For the Nitinol stent, both datasets showed comparable visualization.

CONCLUSION

In our model, EAN imaging, produced by dual layer dual energy CT, improves visualization and increases accuracy of in-stent stenosis assessment in a tantalum-core Conichrome stent.

CLINICAL RELEVANCE/APPLICATION

Carotid in-stent stenosis in high-attenuation metallic metal stents may be more accurately evaluated using effective atomic number (EAN) imaging produced by dual layer dual energy CT.

Honored Educators

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SST09-06 Changes of Cerebral Blood Flow in Patients with Maintaining Hemodialysis: An Aterial Spin Labeling Study

Friday, Dec. 4 11:20AM - 11:30AM Location: N226

Participants
Mengjie Zhang, Tianjin, China (*Presenter*) Nothing to Disclose
Chao Chai, MD, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
E. Mark Haacke, PhD, Detroit, MI (*Abstract Co-Author*) Research Grant, Biogen Idec Inc President, Magnetic Resonance Innovations, Inc
Lei Liu, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Wen Shen, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
Shuang Xia, MD, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the patterns of cerebral blood flow (CBF) changes using arterial-spin labeling (ASL) MRI in maintaining hemodialysis patients and correlate them with laboratory and neuropsychological tests.

METHOD AND MATERIALS

35 patients with maintaining hemodialysis and 35 age- and sex-matched normal subjects were recruited in this study. Mini-mental state examination (MMSE) was obtained to evaluate their neuropsychological conditions. Pulsed arterial spin labeling was performed on 3.0T MRI scanning in both patients and normal controls. CBF was measured using an SPM8 -based ASL Data Processing Toolbox. Independent sample t test analysis was used to compare CBF difference between the patients and normal controls. Correlation between the neuropsychological tests and CBF changes was calculated by Pearson correlation analysis. Multiple linear regression analysis was used to investigate the effect of laboratory tests on the CBF changes in patients with maintaining hemodialysis.

RESULTS

Compared with normal controls, patients show significantly increased CBF in the left orbital superior frontal lobe, the right insula, bilateral hippocampus and parahippocampal gyrus, the right amygdala, the left calcarine gyrus, bilateral lingual gyrus, the left superior and inferior occipital lobe, bilateral fusiform gyrus, the left pallidum, bilateral thalamus and whole brain white matter (all $P< 0.05$, Bonferroni corrected). The MMSE score of patients is significantly lower than normal controls ($P<0.001$); Increased CBF of the left fusiform gyrus is negatively correlated with MMSE score ($P<0.05$). Multiple linear regression results show that most increased CBF are negatively correlated with the pre-dialysis systolic blood pressure (SBP). Hemoglobin, creatinine, albumin and serum iron are negatively associated with changes of CBF in many regions, while glycerin trilaurate and cholesterol are positively associated with some CBF changes ($P<0.05$).

CONCLUSION

The patients with hemodialysis show increased CBF which is associated with neurocognitive dysfunction. The pre-dialysis SBP, hemoglobin, creatinine, albumin, serum iron, glycerin trilaurate and cholesterol may be the important risk factors for increased CBF in patients with hemodialysis.

CLINICAL RELEVANCE/APPLICATION

Arterial-spin labeling (ASL) MRI can provide cerebral blood flow (CBF) changes which are associated with neurocognitive dysfunction in patients with maintaining hemodialysis.

SST09-07 An Assessment on the Incremental Value of High-resolution Magnetic Resonance Imaging to Identify Culprit Plaques in Atherosclerotic Disease of the Middle Cerebral Artery

Friday, Dec. 4 11:30AM - 11:40AM Location: N226

Participants
Wenjia Peng, MD,PhD, Shanghai, China (*Presenter*) Nothing to Disclose
Qian Zhan, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Yuanliang Jiang, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Xuefeng Zhang, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Qi Liu, MD, PhD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Jianping Lu, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

This study was designed to quantify the incremental value of high-resolution, multi-contrast magnetic resonance imaging (hrMRI) to define culprit atherosclerotic lesions in the middle cerebral artery (MCA) over luminal stenosis, suggesting an optimal combination of anatomic parameters to identify lesions responsible for clinical symptoms.

METHOD AND MATERIALS

Patients suspected with atherosclerotic stenosis of MCA underwent hrMRI. Luminal stenosis was measured from TOF images. Lumen and outer wall boundary were manually segmented, allowing calculation of plaque burden (PB), volume (PV), length (PL) and minimum luminal area (MLA).A culprit plaque was defined as a lesion arising on the ipsilateral side to an ischemic stroke on neuro-imaging with accompanying clinical symptoms, whilst a non-culprit plaque was defined as either a plaque occurring in a contralateral artery of a symptomatic patient or one in asymptomatic controls.

RESULTS

MR data from 165 lesions (112 culprit and 53 non-culprit) in 139 individuals were included. Culprit lesions were larger and longer with a narrower lumen and increased PB compared with non-culprit lesions. More culprit lesions showed contrast enhancement. Both PB and MLA were better indicators than stenosis in differentiating lesion types with AUC being 0.649, 0.732 and 0.737 for stenosis, PB and MLA, respectively. Further analysis demonstrated that combinations of PB, MLA and stenosis could improve positive predictive value (PPV) and specificity significantly. An optimal combination of stenosis≥50%, PB≥77% and MLA≤2.0mm2 produced a

PPV=85.7%, negative predictive value=54.1%, sensitivity=69.6%, specificity=75.5%, and accuracy=71.5%.

CONCLUSION

hrMRI plaque imaging provides incremental information to luminal stenosis in differentiating patient clinical presentations. Both luminal and plaque-based measures should be considered in an integrative way for the accurate identification of MCA culprit plaques.

CLINICAL RELEVANCE/APPLICATION

For evaluating culprit plaque of MCA, both luminal and plaque-based measures should be considered in an integrative way,and the optimal combination of morphological characters were stenosis≥50%, PB≥77% and MLA≤2.0mm2.

SST09-09 Evaluation of Cervical Carotid Plaque Using 3D T1-weighted Black-blood MR Imaging at 3T: Comparison of Turbo Field-echo and Turbo Spin-echo Sequences

Friday, Dec. 4 11:50AM - 12:00PM Location: N226

Participants
Katsuhiro Inoue, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Masayuki Maeda, MD, Tsu, Japan (*Presenter*) Nothing to Disclose
Maki Umino, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Tsunehiro Yamahata, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Hajime Sakuma, MD, Tsu, Japan (*Abstract Co-Author*) Departmental Research Grant, Siemens AG; Departmental Research Grant, Koninklijke Philips NV; Departmental Research Grant, Bayer AG; Departmental Research Grant, Guerbet SA; Departmental Research Grant, DAIICHI SANKYO Group; Departmental Research Grant, FUJIFILM Holdings Corporation; Departmental Research Grant, Nihon Medi-Physics Co, Ltd

PURPOSE

3D black-blood (BB) MRI can provide high-resolution images and improved anatomic coverage with retrospective visualization of the vessel wall using multiplanar reconstruction. However, no report has described the comparison between the two 3D T1-weighted (T1-W) sequences including 3D turbo spin-echo (TSE) and 3D turbo field-echo (TFE) T1-W BB MRI. The aim of our study is to compare the capability in the delineation of cervical carotid plaque and the difference of signal-intensity ratio of the plaque to adjacent muscle between 3D T1-W TFE and T1-W TSE BB MRI in patients with cervical carotid stenosis.

METHOD AND MATERIALS

43 patients with moderate or severe cervical carotid stenosis confirmed by 3D rotational angiography were studied with 3D T1-W TSE and 3D T1-W TFE BB MRI at 3T (Achieva, Philips). The border between plaque and the lumen was rated visually (four-point analysis) and quantitatively (contrast-to-noise ratio; CNR). The signal-intensity ratio (SIR) of the plaque to adjacent muscle was also measured. The data were analyzed statistically between 3D T1-W TSE and 3D T1-W TFE using a Wilcoxon signed-rank test.

RESULTS

Visual analysis and quantitative analysis revealed that the border between plaque and lumen was better delineated on 3D T1-W TSE BB than on 3D T1-W TFE BB MRI ($p<0.01$, respectively). 3D T1-W TFE BB MRI occasionally showed incomplete suppression of blood signal, resulting in poor rating particularly in cases with iso-signal-intensity plaques. The SIR of plaque to adjacent muscle was higher on 3D T1-W TFE BB than on 3D T1-W TSE BB MRI ($p<0.05$). High-signal-intensity plaques with a SIR greater than 1.5 (intraplaque hemorrhage) were underestimated in 20 % of cases using 3D T1-W TSE BB MRI.

CONCLUSION

Our results showed that 3D T1-W TSE BB MRI was superior to 3D T1-W TFE BB MRI for plaque delineation. However, high-signal-intensity plaque suggesting intraplaque hemorrhage was underestimated using 3D T1-W TSE BB MRI. We need to know both advantages and disadvantages of the two 3D T1-W BB MRI sequences.

CLINICAL RELEVANCE/APPLICATION

3D T1-weighted black-blood MRI can demonstrate carotid plaque morphology and intraplaque hemorrhage and is recommended in the evaluation of cervical carotid artery stenosis.

SST16

Vascular/Interventional (Advances in CT angiography)

Friday, Dec. 4 10:30AM - 12:00PM Location: E352

VA CT

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
James C. Carr, MD, Chicago, IL (*Moderator*) Research Grant, Astellas Group Research support, Siemens AG Speaker, Siemens AG Advisory Board, Guerbet SA
Elizabeth M. Hecht, MD, New York, NY (*Moderator*) Nothing to Disclose

Sub-Events

SST16-01 Patient Tailored Contrast Volume for Preoperative CT Angiography of the Aorta: A Prospective Study Based on Patient Heart Rate and Body Surface Area Differences

Friday, Dec. 4 10:30AM - 10:40AM Location: E352

Participants
Adriana Dubbeldam, MD, Leuven, Belgium (*Presenter*) Nothing to Disclose
Federica Zanca, PhD, Leuven, Belgium (*Abstract Co-Author*) Nothing to Disclose
Walter Coudyzer, Leuven, Belgium (*Abstract Co-Author*) Nothing to Disclose
Hilde Bosmans, PhD, Leuven, Belgium (*Abstract Co-Author*) Co-founder, Qaelum NV Research Grant, Siemens AG
Geert Maleux, MD, PhD, Leuven, Belgium (*Abstract Co-Author*) Speakers Bureau, Merit Medical Systems, Inc Speakers Bureau, W. L. Gore & Associates, Inc Speakers Bureau, Medtronic, Inc

PURPOSE

The quality of CT aortography is known to critically depend on contrast agent injection. Therefore, relatively high dose (historical and safe) injection protocols are being used. A recent retrospective analysis showed a large variability in contrast enhancement in the aorta, with Hounsfield units (HU) from 123 to 510, while all images remained of acceptable quality. This suggested that contrast doses could be lowered. Our aim is to test whether patient specific contrast dose calculation would allow to reduce contrast dose.

METHOD AND MATERIALS

We performed a randomized prospective study of 60 patients undergoing CT-angiography for aortic aneurysm/dissection. Patients were scanned on a Siemens Somatom Definition Flash optimized for fast acquisition. An in-house developed injection-calculator (iCalc by Nemoto Kyorindo, Tokyo) proposed an optimal patient contrast dose based on patient weight, length, heart rate and contrast medium concentration. Image quality was determined quantitatively (HU-measurements) and qualitatively (five-point visual scale with intra-observer control). All patients received a non-contrast and arterial phase acquisition. Triggering was performed at 120HU at the suprarenal level. Patients were randomly divided in 3 study groups: 1) a control group with standard dose of 120ml, 2) an injector-calculated contrast dose, 3) an additional dilution of 50% on top of the injector-calculated dose.

RESULTS

The average contrast dose in group 2 was reduced by 15% (mean injected dose 101,8ml) compared to group 1 (p-value 0,0012), with a decrease in mean HU-values of only 1%. The range of HU units reduced from [156,3-569.8HU] to [155,6-421,3HU]. The visual score (4,5/5) was unchanged. For group 3, contrast dose reduction was 60% (mean injected dose 48,1ml) (p-value <<0,00001) with a mean decrease in HU-values of 32% (p-value 0,001) and range [79,1-449,1HU]. Average image quality dropped (3,7/5). In 2/20 patients, both diagnosed with dissection, image quality was suboptimal but still of diagnostic quality.

CONCLUSION

Contrast dose for CT-aortography was reduced by 15% without compromising image quality and interpretation. Images remained diagnostic even with further dose reduction to 60%. We would however recommend not to apply this in dissection patients.

CLINICAL RELEVANCE/APPLICATION

The use of a patient specific contrast dose determination can be safely applied for CT aortography with a significant contrast dose reduction.

SST16-02 Feasibility Study of Spectral CT Imaging Associated with Ultra-low Volume Contrast Medium for Aorta CTA: Compared with Conventional 120kVp

Friday, Dec. 4 10:40AM - 10:50AM Location: E352

Participants
Ping Hou, MD, Zhengzhou, China (*Presenter*) Nothing to Disclose
Xiang-Nan Feng, MS, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose
Jianbo Gao, MD, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jie Liu, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yaojun Jiang, MD, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the image quality of Spectral CT associated with ultra-low volume contrast medium for aorta CTA, compared with conventional 120kvp scan with 70ml contrast medium.

METHOD AND MATERIALS

62 patients underwent aorta CTA examination on a spectral CT scanner(Discovery CT, GE Healthcare) were divided into 2 groups. 31 patients were scanned using GSI mode with contrast agent volume of 0.4ml/kg and injection rate calculated as volume/(delay time + exposure time) were the study group. After examined, images using 55keV and 70keV were reconstructed. Those two sets of images were named as set 1 and 2. Another 31 patients scanned using 120kvp with contrast agent volume of 70ml and 5ml/s injection rate were control group. The obtained images were regarded as set 3. CT values and CNR of aorta and its branches were obtained and compared. The overall image quality was evaluated on a five-point scale. Results were analyzed using rank-sum test, t test and Bonferroni test.

RESULTS

No significant differences existed in image quality of the renal arteries between set 1 and 3(p=0.468). However, higher CNR values were obtained in set 1 than in set 2 and 3(CNR 18.12±5.89vs12.11±4.07vs13.23±1.89 in ascending aorta; 18.34±5.81vs12.19±3.85vs12.39±1.80 in descending aorta; 16.82±4.47vs11.55±3.71vs 12.44±2.17 in celiac trunk; 17.27±4.73vs11.61±3.21vs12.51±1.94 in renal arteries) (p<0.05), while there was no significant difference between set 2 and 3(p>0.05). CT values for aorta and its branches were(358.47±69.56vs213.80±91.03vs374.46±34.23), (361.17±64.09vs216.22±37.65vs353.72±30.68),(336.89±55.70vs205.01±34.45vs354.28±36.96) and (333.57±54.62vs201.22±34.45vs356.99±54.62)HU for the set 1, 2 and 3. There were significant differences among the three groups (p=0. 00) and between set 1 and 2, and set 2 and 3 (p=0.00). There was no significant difference between set 1 and 3(p>0.05). The amount of contrast agent for each patient in the study group was 28.87±4.42ml, while that in the control group was 70ml. There were significant differences of the contrast medium volume among the two groups (F = 537.09, p=0.00).

CONCLUSION

Monochromatic images of 55keV in spectral aortic CTA with ultra-low volume contrast medium was feasible and can provide good image quality compared with conventional 120kVp scan.

CLINICAL RELEVANCE/APPLICATION

Monochromatic images of 55keV in spectral aortic CTA can significantly reduce the amount of contrast agent and injection rate with improved image quality.

SST16-03 Feasibility Study of Spectral CT Imaging Associated with Ultra-Low Volume of 20ml Contrast Medium for Pulmonary CTA

Friday, Dec. 4 10:50AM - 11:00AM Location: E352

Participants
Jie Liu, Zhengzhou, China (*Presenter*) Nothing to Disclose
Jianbo Gao, MD, Zhengzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the image quality of Spectral CT associated with ultra-low volume of 20ml contrast medium for pulmonary CTA compared with conventional 120kvp scan with 50ml contrast

METHOD AND MATERIALS

25 patients underwent CTPA examination on a spectral CT scanner(Discovery CT,GE Healthcare) using 20ml contrast agent and 5ml/s injection rate as group A. 15 patients scanned by 120kvp with 50ml contrast agent and 5ml/s injection rate was retrospectively reviewed as control group B.5ml contrast agent were firstly used in the test bolus scan to get the peak time of the aorta and the pulmonary artery (T1, T2).Peak time of CTA scan was calculated as followed: Tpeak= T2+ 1/2(T2-T1). After the examination, images of 60keV with 50%ASiR were reconstructed.CT values of the pulmonary artery, lobar artery, and segmental artery were obtained. The overall image quality was evaluated on a five-point scale by two radiologists.Sample T test were used to compare image quality between A group and group B.

RESULTS

CT value of pulmonary artery, lobar artery and segmental artery in group A and B were 399± 15 vs 406±79,(t=0.356, P=0.724), 386 ±59 vs 396±77,(t=0.377,P=0.709) and 428± 99 vs 441 ±81,(t= 0.377,P=0.709),SNR was 13.0 ± 2.3 and 14.7 ± 4.2 for Group A and B. CNR was 22.3 ± 9.5 and 23.6 ± 10.1(both >0.05), respectively.There was no significant difference between group A and group B. But The image quality score were 3.4±0.6 vs 4.5±0.6,(t=4.279,P=0.001),There was significant difference between group A and group B

CONCLUSION

Spectral CT associated with ultra-low volume of 20ml contrast medium for pulmonary CTA can provide good artery enhancement and image quality saving half the contrast medium dose.

CLINICAL RELEVANCE/APPLICATION

There is also potential for further reduction in the contrast volume

SST16-04 Spot the Clot: Improvements in CT Detection of Thrombus Using an in Vitro Dual-Energy Based Phantom Model

Friday, Dec. 4 11:00AM - 11:10AM Location: E352

Participants
Jason DiPoce, MD, Jerusalem, Israel (*Presenter*) Nothing to Disclose
Jacob Sosna, MD, Jerusalem, Israel (*Abstract Co-Author*) Consultant, ActiViews Ltd Research Grant, Koninklijke Philips NV
Dorith Shaham, MD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Zimam Romman, Haifa, Israel (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Nahum Goldberg, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the added value of dual energy CT utilizing low iodine concentration for the detection of thrombus in an in-vitro phantom model.

METHOD AND MATERIALS

Phantoms were constructed by collecting fresh swine blood which was allowed to form clots. These clots (n=8) were transferred into 11mL tubes. Heparinized blood containing 2 mg/ml iodine (Iomeron 350 mg/ml) was then added to the tubes. Control tubes (n=8) were filled with blood and the same iodine concentration without clot. A 17cm wide cube water bath phantom held the tubes. Scans were obtained using a 64-slice spectral detector CT (Philips Healthcare, Cleveland, OH) with the following iso-dose imaging parameters: 120kV, 250mAs and 80 kV, 700mAs. For each scan, 120 and 80 kV polyenergetic 1.5mm thick images were reconstructed. Monoenergetic images at 40, 50, 65, 80 and 100keV were generated from the 120kV scan. A 112 image presentation was created to display individual tubes in a random order. Three experienced radiologists blindly ranked the images for the presence of clots according to a 6 point certainty scale and a 4 point graded image quality scale. The clot detection confidence and image quality of monoenergetic compared to polyenergetic images were analyzed using T-test.

RESULTS

The mean HU values of the iodinated blood at 120 and 80 kV, and 40, 50, 65, 80, 100 keV were 87, 118, 207, 142, 91, 66, and 51, respectively. Clot detection and image quality ranks were significantly better in low energy monoenergy images at 40 and 50 keV when compared to 120 and 80 kV polyenergetic images ($p<0.05$). Greater sensitivity and specificity were seen for 40 keV images (100% and 100%) and 50 keV (77.8% and 85.7%) compared to 120 kV conventional images (20.0% and 14%) and 80 kV conventional images (38.5% and 25.0%). Likewise, 40 and 50 keV monoenergy images significantly increased image quality ranks (3.9 and 3.6, respectively) compared to 120 and 80kV conventional images (2.8 and 3.1) ($p<0.05$, both comparisons).

CONCLUSION

Visualization of clot is improved when using dual energy monoenergetic images when compared to standard and low kV polyenergetic images. Our phantom model will likely also be useful in further identifying thresholds of low dose contrast for other diagnostic applications.

CLINICAL RELEVANCE/APPLICATION

Our results imply that dual energy scanning can permit reduced contrast dose while increasing reader confidence of clot detection.

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Jason DiPoce, MD - 2013 Honored Educator
Jacob Sosna, MD - 2012 Honored Educator

SST16-05 Preliminary Study of 70 kVp and Tailored Contrast Injection Protocol on Foot CT Perfusion

Friday, Dec. 4 11:10AM - 11:20AM Location: E352

Participants
Li Guo, MD, Beijing, China (*Presenter*) Nothing to Disclose
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Xin Qi, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Haochen Wang, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xiaohui Zhang, Shanghai, China (*Abstract Co-Author*) Employee, Siemens AG
Min Yang, Peking, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study is to apply 70 kVp and tailored contrast injection protocol in foot CT perfusion, and investigate the clinical use of foot CT perfusion.

METHOD AND MATERIALS

18 patients with lower extremity arterial occlusive disease(including 7 patients with diabetic foot) were examined with foot CT perfusion, aged from 54 to 86 years old, 10 men and 8 women. Contrast enhancement was achieved with intravenous injection of nonionic iodinated contrast medium(320mgI/ml) and 30 mL of saline solution with the same flow rate. The volume (ranged from 29 to 54 mL) and the flow rate of contrast medium (ranged from 2.9 to 5.4 mL/s) was calculated with a tailoring approach according to the patients' body weight, height and age. CT perfusion was carried out on Siemens dual source CT, with the following parameters: 128×0.6mm collimation, tube voltage 70 kV, rotation time 0.28s, acquisition time 57s(31 scans), with a fixed start delay of 20s. The radiation dose was 0.87 mSv (CTDI 70.59 mGy). The images were analyzed with commercial CT software (SyngoMMWP VE40B). A circular region of interest was placed in the distal anterior or posterior tibial artery of the foot to get a time-density curve(TDC). Perfusion parameters (blood volume [BV], blood flow [BF], and mean transit time [MTT]), and the TDC of the foot tissue were automatically calculated by the software for both feet.

RESULTS

1.Three types TDC were obtained:type A, B and C. Most of the TDCs were type B, which has whole arising part, peak value and descending part. Type A curve was observed in a red hot diabetic foot, which genius-quickly peaks in the early parts of the scans. And type C curves were observed in black swallon feet, which peaks very slow or only has the arising part without the peak value and the descending part. 2. Because of motion artifact, perfusion parameters (including BV,BF and MTT) of 27 feet out of 36(both sides for one patient) were obtained, and only 10 feet could get expected TDCs of the foot soft tissue, which shows a curve with whole arising part, peak value and descending part.

CONCLUSION

70 kVp CT perfusion could be a potential technique to determine the information about foot vascularization, and meanwhile,further study is needed to justify tailored contrast injection protocol.

CLINICAL RELEVANCE/APPLICATION

70 kVp CT perfusion could be a potential technique to determine the information about foot vascularization.

SST16-06 Comparison of 4D Dynamic Computed Tomography Angiography and 4D Dynamic Magnetic Resonance Angiography in Patients with Peripheral Arterial Occlusive Disease

Friday, Dec. 4 11:20AM - 11:30AM Location: E352

Participants
Philipp Riffel, MD, Mannheim, Germany (*Presenter*) Nothing to Disclose
Holger Haubenreisser, Mannheim, Germany (*Abstract Co-Author*) Speaker, Siemens AG; Speaker, Bayer AG
Sonja Sudarski, MD, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Mathias Meyer, Mannheim, Germany (*Abstract Co-Author*) Speaker, Siemens AG; Speaker, Bracco Group
Stefan O. Schoenberg, MD, PhD, Mannheim , Germany (*Abstract Co-Author*) Institutional research agreement, Siemens AG
Thomas Henzler, MD, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study was to compare diagnostic image quality of 4D dynamic computed tomographic angiography (d-CTA) of the lower leg in comparison to 4D dynamic magnetic resonance angiography (MRA) at 3T in patients with peripheral arterial occlusive disease (PAOD).

METHOD AND MATERIALS

22 patients with PAOD (PAOD stage 1: 4 patients; PAOD stage 2: 7 patients; PAOD stage 3: 2 patients; PAOD stage 4: 9 patients) were examined with a combined CTA protocol on a 3rd generation 2 x 192 slice dual-source CT system consisting of a static CTA (s-CTA) of the lower leg runoff and d-CTA of the calves with a z-axis coverage of 80 cm. Additionally the patients underwent a MRA protocol combining continuous table movement (CTM) MRA of the runoff vasculature (s-MRA) as well as time-resolved MRA (d-MRA) of the calves with a z-axis coverage of 45 cm. Diagnostic image quality of s-MRA and s-CTA alone was compared with s-MRA and s-CTA in addition with d-MRA and d-CTA by two independent radiologists with a time interval of 4 weeks between the reading sessions for the static examination and for the combination of static and dynamic examinations. The images were evaluated according to a 4-point Likert-like rating scale assessing image quality on a segmental basis.

RESULTS

For static angiography 637 segments were included in the assessment of image quality. For s-CTA 62% of segments were rated as excellent, 20% as good, 16% as moderate and 2% as poor. No segments were rated as non-diagnostic. For s-MRA 20% of segments were rated as excellent, 20% as good, 20% as moderate and 26% as poor. 14% of segments were rated as non-diagnostic (all p-values < 0.0001). For dynamic angiography 264 segments were included in the assessment of image quality. For d-CTA 89% of segments were rated as excellent or good (78% as excellent, 11% as good). For d-MRA 40% of segments were rated as excellent or good (20% as excellent, 20% as good), while 28% of segments were rated as non-diagnostic.

CONCLUSION

In patients with PAOD the addition of d-CTA leads to an improved depiction of the calf vessels compared to s-CTA alone. The combined static and dynamic CTA yield improved image quality in comparison to a combined 3-T MRA protocol.

CLINICAL RELEVANCE/APPLICATION

A combined static and dynamic CTA yield improved image quality in comparison to a combined 3-T MRA protocol and should be considered as a valuable alternative in patients with all stages of PAOD.

SST16-07 Dual-Energy CT with Advanced Image-Based Virtual Monoenergetic Reconstructions Improves Depiction of Portal Vein Thrombosis

Friday, Dec. 4 11:30AM - 11:40AM Location: E352

Participants
Moritz H. Albrecht, MD, Frankfurt am Main, Germany (*Presenter*) Nothing to Disclose
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Martin Beeres, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
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Julian L. Wichmann, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To investigate the impact of an advanced monoenergetic reconstruction algorithm on visualization and diagnostic performance in dual-energy computed tomography (DECT) imaging of portal vein thrombosis (PVT).

METHOD AND MATERIALS

Forty patients (22 men; mean age, 67.5 years ± 17.6 years) who underwent contrast-enhanced portal-venous-phase DECT of the upper abdomen within clinical routine were retrospectively evaluated. Standard linearly blended (M_0.5, 50% low-kV spectrum) and virtual monoenergetic images were calculated using a basic (Mono) and an advanced image-based monoenergetic algorithm (Mono+) with energy levels ranging from 40-100 keV (10-keV increments). ROI measurements were performed in the portal vein proximally and, if visible, distal to the thrombus, and the splenic and superior mesenteric vein for objective contrast-to-noise ratio (CNR) calculation. Five-point likert scale ratings regarding image quality, contrast, noise, suitability for PVT assessment and

diagnostic performance of 2 radiologists in the diagnosis of PVT were evaluated.

RESULTS

Twenty patients (50%) showed findings of PVT. Mono+ images at 40 keV showed the best objective image quality (mean CNR, 7.2 ± 5.1, P < 0.01) compared to all other image series and were rated most suitable for PVT assessment (rating, 4.9 ; P = 0.03). Intravenous attenuation and contrast between Mono and Mono+ series showed no significant difference (objectively, P < 0.88 ; subjectively, P < 0.52), but substantially increased noise was found for Mono 40 and 50 keV compared to Mono+ and all other reconstructions (objectively, P < 0.01 ; subjectively, P < 0.01). Mono+ 60 keV images were rated best regarding subjective image quality (P = 0.67). Diagnostic performance for diagnosis of PVT was highest for both radiologists at Mono+ 40 keV compared to all other available image series (mean sensitivity, 100 % ; mean specificity, 93,4 %, P < 0.04).

CONCLUSION

Mono+ reconstructions at 40 keV in DECT facilitate significantly improved diagnostic performance for detection of PVT compared to both standard linearly blended and basic Mono images.

CLINICAL RELEVANCE/APPLICATION

Additional reconstruction of Mono+ DECT series at 40 keV may improve detection and assessment in cases of suspected PVT.

SST16-08 AngioCTA in the Preoperative Planning of Perforator Flaps in Plastic Reconstructive Surgery

Friday, Dec. 4 11:40AM - 11:50AM Location: E352

Participants
Ruben Guerrero Vara, MD, Barcelona, Spain (*Presenter*) Nothing to Disclose
Claudia Alejandra Nunez Peralta, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
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Jose Sarria, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To evaluate the utility of CTA in planning perforator surgery in different kind of flaps. To demonstrate the radiologic correlation between intraoperative and radiological findings.

METHOD AND MATERIALS

202 CTAs performed from January 2011 to January 2014 and their intraoperative findings were reviewed. We focused on DIEP(96), SIEA (25), ALTF(51), TDAP(18) and SGAP(12) flaps. The images were pre-operatively evaluated by a radiologist and a plastic surgeon. The best perforator vessel was selected and its position was identified by means of an X and Y axis respect to anatomic references. These anatomic references were different depending on the kind of flap. The obtained coordinates (x-y) for each perforator vessel were transferred to patient's skin before the surgical intervention.All the vessels depicted in CTA were found in the surgery. We consider good correlation if doppler ultrasound over the skin located at the exact given reference, could detect the vessel. We consider poor correlation if the vessel was located more than 10 mm distant from the reference or if the vessel was not found during surgery.

RESULTS

We found a very reliable relationship for DIEP (99,5%), SGAP(97%) and ALTF (98%)flaps. In SIEA flap (80%) the correlation was less exact since it has an inconstant anatomy and a learning curve for the radiologist is necessary. However, when we analysed the data of the last year, a 94% success was achieved.In TDAP flap (80%) the different position between the image acquisition and the surgery was the cause of the results. TDAP was the only flap where the images couldn't be acquired in the same position as surgery would be performed. Nevertheless, all perforators were always found in an area of 2 cm2 around the point given by CTA.

CONCLUSION

CTA provides important information about vascular anatomy before perforator flap surgery. Choosing the dominant vessel allows faster and safer perforator flap surgical procedures. A proper knowledge of the anatomy and a good understanding of the surgical procedure by the radiologist are of paramount importance to achieve optimal results.

CLINICAL RELEVANCE/APPLICATION

CTA is nowadays a pre-operative examination of choice to perform perforator flap surgery since faster and safer surgical procedures have been demonstrated after its use.

SST16-09 The Gravitational Gradient (GG), Defined as the Dependent Divided by Independent Region of Interest (ROI) Attenuation in Abdominal Aortic Aneurysms (AAA), Strongly Predicts Rapid Aneurysm Growth in Patients with Less Intramural Thrombus

Friday, Dec. 4 11:50AM - 12:00PM Location: E352

Participants
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Frank J. Rybicki III, MD, PhD, Ottawa, ON (*Abstract Co-Author*) Research Grant, Toshiba Corporation;

PURPOSE

The GG quantifies 1st pass AAA CTA contrast variation; uniform enhancement (0.90.4 cm/yr) AAA growth, and (b) the presence of

Near-Circumferential (>270° of sac) Intraluminal Thrombus (NCIT) significantly modifies the ability of GG to predict rapid growth.

METHOD AND MATERIALS

156 consecutive pre-intervention AAA pts who met study criteria (multiple exams >6mo apart to compute growth, >= 1 first-pass CTA to compute GG) underwent AAA dimension and volume (sac, lumen, and intramural thrombus) measurements. The GG was computed from the CTA dated closest to intervention. We evaluated (a) the relationship between abnormal GG (defined as <0.9 and >1.1) and rapid growth, and (b) if the presence of NCIT modifies the GG predictive ability.

RESULTS

42/156 (26%) pts were female; age=71±9.6 (22-92yrs). 103 pts had >2 scans. 66/156 (42%) had NCIT. The mean of the largest AAA diameter was 4.2±0.7cm on the first scan and 5.0±0.9 cm on the scan closest in time to the intervention. Mean vol of AAA sac, lumen, and thrombus on initial scan=65.2±34.7cc, 38.6±16cc and 26.6±25.7 cc, respectively. On scan closest to intervention, mean volume of AAA sac, lumen, and thrombus=91.04±38.9cc, 52.6±24.3cc and 38.4±29.3cc, respectively. 53/156 (33%) of patients had rapid growth (>0.4cm/year). 63/156 (40%) of patients had an abnormal GG. GG is significantly associated with rapid growth with unadjusted OR 1.19 (95% CI: [1.03, 1.38], p<0.02). Furthermore, its ability in predicting rapid growth is dependent on the presence of circumferential thrombus. Based on a logistic regression model including an interaction between GG and presence of circumferential thrombus, the OR for GG=6.05 (95% CI: [2.0, 18], p<0.001) for those without NCIT and 1.30 (95% CI: [0.45, 3.72], p=0.63) for those with NCIT. The presence of NCIT significantly modifies the ability of GG to predict rapid growth (test for interaction, p<0.05).

CONCLUSION

Patients with a positive GG within the AAA sac have rapid aneurysm growth, and AAA patients with an abnormal GG and without NCIT have an odds ratio > 6 for rapid growth, a significant modification of the predictive ability of the GG.

CLINICAL RELEVANCE/APPLICATION

Observation of a positive GG in an AAA sac warrants close attention, particularly when there is little intramural thrombus.