103rd Scientific Assembly and Annual Meeting

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BR004-EB-X

Cysts with Internal Echoes: Do They Need Further Examination?

All Day Room: NA Hardcopy Backboard

Participants
Yumi Kashikura, MD,PhD, Matsusaka, Japan (*Presenter*) Nothing to Disclose
Noriko Hanamura, Matsusaka, Japan (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

pocchi0427@gmail.com

TEACHING POINTS

Cystic lesions of the breast are common findings on breast ultrasonography. Simple cysts, complicated cysts, and oil cysts are commonly observed, which do not need invasive diagnostic procedures if they are certain, however, some of them appear as complex cystic and solid masses, and can be confusing. Intraductal papillomas are benign lesions of complex cystic and solid masses and could be hard to distinguish from malignancies. Encapsulated papillary carcinomas and ductal carcinomas in situ are malignant lesions of this type and should not be misjudged. Evaluating cystic lesions in detail with precise ultrasonographic imaging techniques can help avoid unnecessary invasive procedures for benign lesions and misdiagnoses of malignant lesions.

TABLE OF CONTENTS/OUTLINE

1. Introduction 2. Typical benign and malignant lesions with their important findings on ultrasonography 3. Ultrasonographic imaging techniques and technical pitfalls 4. Useful points to distinguish between confusing cysts 5. Findings that could be of significant diagnostic value for distinguishing intraductal papillomas from intracystic carcinomas

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BR134-ED-X

ACR BI-RADS 5 Breast Ultrasound Lexicon and Reporting: How Well Do You Know It? Take a Quiz!

All Day Room: NA Digital Education Exhibit

Participants
Kudrat Gill, MD, New York, NY (*Presenter*) Nothing to Disclose
Kristin C. Byrne, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The 5th edition of BI-RADS contains several changes to the ultrasound section, namely the lexicon and reporting system. Unfortunately, many radiologists have not incorporated these changes. It is important for radiologists to become familiar with the changes and describe findings appropriately. This helps provide standardized reporting and better communication among clinicians. This exhibit aims to review the new changes and hopefully familiarize radiologists with it, reminding them to incorporate them into their reports and hopefully become more experienced radiologists.

TABLE OF CONTENTS/OUTLINE

The cases will be presented in quiz format. List of cases will address the following: TISSUE COMPOSITION:Recognizing normal background echotexture patterns as well as changes that occur during lactation and gynecomastia. MASSES: including margins, shape orientation, echo pattern. CALCIFICATIONS ASSOCIATED FEATURES SPECIAL CASES: Especially examples of simple and complicated cyst, clustered Microcysts, post surgical fluid collections etc. REPORTING SYSTEM: What should be included. What comparisons. What measurements should be reported for benign/suspicious lesions. Management changes.

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BR138-ED-X

Correlation between US and MR Findings in Women with Breast Implants

All Day Room: NA Digital Education Exhibit

FDA Discussions may include off-label uses.

Participants
Mariana C. Planells, MD, Alicante, Spain (*Presenter*) Nothing to Disclose
Miriam Reche Blanes I, MD,PhD, Alicante, Spain (*Abstract Co-Author*) Nothing to Disclose
Carlos Dominguez II, MD, Alicante, Spain (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

mcplanells@gmail.com

TEACHING POINTS

1. To establish a satisfactory protocol of imaging (using US and MR) in patients with breast implants. 2. To explore the normal and abnormal findings in patients with breast implants. 3. Correlate US and MR findings in women with breast implants with cases and images from our center.

TABLE OF CONTENTS/OUTLINE

1. Criteria for performing an adequate US and MR protocol in women with single lumen breast implants. 2. Cases in which completing an US study with MR is indicated. A negative ultrasound examinatión has a very high predictive value for implant integrity. 3. Normal findings in US and MR in women with single lumen breast implants. Valoration of axillary and internal mammary lymph nodes, localization of the implant (retroglandular/ retropectoral), differentiation of the type of implant (saline/silicone). Ultrasound and MR characteristics of the type of implant. 4. Findings in oncologic patients with breast reconstruction Patients that have received radiotherapy after a mastectomy may be reconstructed with a graft derived from the latissimus dorsi or the rectus abdominalis with a retropectoral implant. 5. Abnormal findings in US and MR and correlation: • Capsular contraction, gel bleed. • Hematoma and infection. • Implant rupture (intracapsular/ extracapsular). • Silicone granuloma. • Implant herniation.

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BR144-ED-X

Ultrasound Optimization Techniques for Visualizing Post-Neoadjuvant Clipped Axillary Lymph Nodes During Radioactive Seed Localization

All Day Room: NA Digital Education Exhibit

Participants
Brenda J. Hyde, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Christine U. Lee, MD, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

hyde.brenda@mayo.edu

TEACHING POINTS

Results from the American College of Surgeons Oncology Group (ACOSOG) Z1071 trial showed that clip placement in positive axillary lymph nodes at diagnosis with removal of the clipped node after neoadjuvant chemotherapy during sentinel lymph node (SNL) surgery reduces the false-negative rate of SNL surgery from 13% to 7%. Following favorable response to neoadjuvant therapy, sonographic identification of the clipped axillary lymph node for localization prior to surgery is frequently challenging due to surrounding tissue interfaces and alteration in lymph node morphology or extrusion of the clip. Clips available for marking axillary lymph nodes vary in design. Optimization of ultrasonographic techniques can improve conspicuity and confidence of clip detection.

TABLE OF CONTENTS/OUTLINE

1. Background A) ACOSOG Z1071 Trial B) Variability of Clips i) Design ii) Composition 2. Ultrasonographic Appearance of Clips in Axillary Lymph Nodes i) Localization of Clips in Cadaver Models ii) Clinical Experience 3. Case Examples of Challenging Axillary Lymph Node Radioactive Seed Localizations 4. Ultrasonographic Optimization Techniques to Improve Clip Visualization 5. Additional Non-Sonographic Techniques for Clip Localization

wHdÿ¿½2pÿ¿½

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BR150-ED-X

Ultrasound Screening is Here: Are You Ready?

All Day Room: NA Digital Education Exhibit

Participants
Stephanie Blatch, MA, Providence, RI (*Presenter*) Nothing to Disclose
Elizabeth H. Dibble, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Ana P. Lourenco, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Elizabeth Lazarus, MD, Barrington, RI (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Describe history & current role of breast US screening 2. Recognize BI-RADS 2 US screening findings using multiple choice questions with answers & explanations appearing on click 3. Examine appearance & management of BI-RADS 3, 4, & 5 findings on US screening using multiple choice questions with answers & explanations appearing on click

TABLE OF CONTENTS/OUTLINE

I. Role of US screening A. Relevance of breast density B. Breast density notification laws C. Utility of dense breast US screening i) Additional cancers detected, sensitivity, specificity, PPV of US screening (1) Small, node-negative mammographically-occult breast cancer D. Cost of US screening i) Monetary consideration ii) Time & workflow E. Role of automated breast US II. Examples of BI-RADS 2 findings drawing from >3000 US screening examinations performed at our tertiary breast imaging centers since legislation passed A. Cysts i) Simple ii) Multiple cysts including complicated & clustered microcysts B. Dilated ducts C. Postsurgical changes i) Scar ii) Fat necrosis D. Stable Fibroadenomas E. Lipomas F. Hamartomas III. Examples & management of BI-RADS 3, 4, & 5 findings drawing from >3000 US screening examinations performed at our tertiary breast imaging centers since legislation passed A. Complicated cyst B. Fibroadenoma C. Cancer

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BR162-ED-X

Echogenic Breast Masses: Why Worry?

All Day Room: NA Digital Education Exhibit

Participants
Ekta Gupta, MD, Floral Park, NY (*Presenter*) Nothing to Disclose
Suzanne McElligott, MD, Manhasset, NY (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

Egupta@Northwell.edu

TEACHING POINTS

1. An echogenic breast mass is a lesion that has increased echogenicity relative to subcutaneous fat or equal to fibroglandular tissue at ultrasound (US). 2. Although rare, these echogenic breast masses are not always benign and account for 0.5% of all breast malignancies. 3. Breast lesions with fat, fibrous, vascular elements or high cellularity can present as a hyperechoic mass at US. 4. US features of nonparallel orientation, irregular shape and noncircumscribed margins are more predictive of malignancy among hyperechoic lesions. 5. Knowledge of the US appearance of a wide spectrum of benign and malignant echogenic breast masses in conjunction with clinical and mammographic (MG) findings will help establish a correct differential diagnosis, avoid unnecessary biopsy or misdiagnosis, and determine imaging-pathology concordance after biopsy.

TABLE OF CONTENTS/OUTLINE

(1) Evaluating echogenic masses on US with respect to BI-RADS lexicon classification. (2) Common and uncommon echogenic benign and malignant breast lesions on US. (3) Categorizing these lesions based on underlying histology to form a meaningful differential diagnosis. (4) Correlating clinical history and multimodality imaging findings to avoid or recommend biopsy. (5) Diagnostic workup, pearls, and pitfalls for detection; biopsy considerations; management.

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BR178-ED-X

Ultrasound Approach to Nipple-Areolar Complex: What the Radiologist Should Know

All Day Room: NA Digital Education Exhibit

Awards
Cum Laude

Participants
Angelica R. Chiorean, MD, PhD, CLUJ NAPOCA, Romania (*Presenter*) Nothing to Disclose
Madalina B. Szep, MD, Cluj-Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose
George Dindelegan, Cluj-Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose
Diana S. Feier, MD, Cluj-Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose
Dan Eniu, Cluj-Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose
Marco Chiorean, Cluj-Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose
Rares Buiga, Cluj-Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose
Sonia Dragomir, Cluj-Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose
Gabriel Feier, Cluj-Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose
Horia Chiorean, Cluj-Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose
Maria M. Duma, MD, Cluj Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

chiorean_angi@yahoo.com

TEACHING POINTS

Describe US technique for optimal visualization of the nipple-areolar complex (NAC). Discuss the diagnostic value of US in the detection of the NAC lesions. List the imaging findings of pathologic conditions that may affect this anatomical region.

TABLE OF CONTENTS/OUTLINE

A 4 years retrospective study was performed including patients diagnosed with NAC lesions. Imaging findings, pathology results and clinical notes were reviewed. Aspects were assessed according to BI-RADS and Tsukuba elasticity score. Means of diagnostic were:percutaneous or excisional biopsies for BI-RADS 4 and 5 lesions;short-term follow-up BI-RADS 3 lesions and no further assessment for lesions categorized as BI-RADS 2. Of 91 cases identified,75 were benign including duct ectasia,nipple calcifications,inflammation,cysts,nipple leiomyoma,fibroepithelial polyp of the nipple,papillary lesions without atypia and with atypia,papillary lesions associated with atypical ductal hyperplasia. 16 cases were malignant:Paget disease,DCIS restricted to nipple,as well as breast carcinoma involving the nipple. US is a first-line imaging method for the evaluation of the NAC, with a high rate of detection when optimal technique is applied. However,contrast-enhanced MRI is generally performed to further characterize an US finding and/or to appreciate the intramammary extension of the disease.

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BR193-ED-X

What You Must Know About Complex Cystic Breast Masses

All Day Room: NA Digital Education Exhibit

Participants
Karina Pesce, Capital Federal, Argentina (*Presenter*) Nothing to Disclose
Maria B. Orruma, MD, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Alejandra Wercnike, Capital Federal, Argentina (*Abstract Co-Author*) Nothing to Disclose
Silvina Cadullo, Bueno Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Maria F. Calvo, Capital Federal, Argentina (*Abstract Co-Author*) Nothing to Disclose
Carola Allemand, Capital Federal, Argentina (*Abstract Co-Author*) Nothing to Disclose
Raquel Nievas, Concepcion, Argentina (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

drakarina.pesce@gmail.com

TEACHING POINTS

Discuss the classification, clinical and imaging features of complex cystic breast masses Describe breast imaging techniques of ultrasound for distinguish between complicated cysts and complex masses Describe the benign and malignant entities that may be complex cystic breast masses at ultrasound Identify appropriate evaluation and management strategies.

TABLE OF CONTENTS/OUTLINE

Introduction Examination techniques Ultrasound signs of complicated cysts Ultrasound signs of complex masses Ultrasound classification of complex masses Benign conditions Malignant conditions Interventional diagnostic strategy Radiologic/pathologic correlation Conclusion

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VI012-EB-X

Tending to Tendinosis: A Percutaneous Approach Utilizing Ultrasonic Energy Debridement

All Day Room: NA Hardcopy Backboard

Awards
Certificate of Merit

Participants
Eric Chow, MD, Richmond, VA (*Presenter*) Nothing to Disclose
Michael V. Perone, MD, Richmond, VA (*Abstract Co-Author*) Nothing to Disclose
Jeffrey A. Brown, MD, Richmond, VA (*Abstract Co-Author*) Nothing to Disclose
Reza Imani-Shikhabadi, MD, MS, Richmond, VA (*Abstract Co-Author*) Nothing to Disclose
Bipin Rajendran, MD, Richmond, VA (*Abstract Co-Author*) Nothing to Disclose
Jeffrey D. Elbich, MD, Menomonee Falls, WI (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Tendinosis is a common and painful condition, theorized to originate from a disordered healing response to chronic repetitive microtrauma to tendons. Most cases of tendinosis are successfully treated conservatively, though there is an increasing role for ultrasound-guided treatments in recalcitrant cases. Our goal is to review the ultrasound appearance of tendinosis, to discuss ultrasound-guided treatment options, with an emphasis on our institution's experience in percutaneous tenotomy via ultrasonic energy debridement, and to discuss the early outcomes data for this technique.

TABLE OF CONTENTS/OUTLINE

1. Overview of the pathophysiology of tendinosis 2. Normal tendon ultrasound appearance 3. Ultrasound findings associated with tendinosis and common areas of occurrence 4. Review of treatment options (i.e. conservative vs. percutaneous vs. surgical) 5. Percutaneous tenotomy via ultrasonic energy debridement a. Patient selection b. Theory and protocol c. Procedure context d. Institutional experience and examples e. Recovery and follow-up 6. Early outcomes literature review

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VI136-ED-X

Ultrasound Evaluation of Varicose Veins: Basics for Endovenous Ablation

All Day Room: NA Digital Education Exhibit

Participants
Namrata M. Bhalla, MBBS, MD, Ahmedabad, India (*Abstract Co-Author*) Nothing to Disclose
Deepali Bhalla, Brookfield, WI (*Abstract Co-Author*) Nothing to Disclose
Manav Bhalla, MD , MILWAUKEE, WI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

manavbhalla72@gmail.com

TEACHING POINTS

1. To review Ultrasound imaging technique and interpretation of lower extremity veins, pre and post endovenous ablation, and intraprocedurally.2. To discuss imaging findings which impact management of individual conditions, including anatomical morphology and variants.3. To discuss information required from imaging pre and post endovenous ablation.

TABLE OF CONTENTS/OUTLINE

• Ultrasound of Lower extremity veins from ablation perspective: Imaging technique• Venous measurements (including diameter and reflux): technique, recommended locations, maneuvers and normal limits.• Venous abnormalities: Imaging key points for diagnosis, imaging considerations impacting endovenous procedure.• Pre procedural imaging: What information is needed?• Post procedural imaging: Indications, timing follow up studies, expected imaging findings, complications.• Familiarity with various endovenous techniques for managing varicose veins.

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VI139-ED-X

It's Not All Deep Vein Thrombosis: Sonography of the Painful Lower Extremity

All Day Room: NA Digital Education Exhibit

Awards
Certificate of Merit

Participants
Haresh V. Naringrekar, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose
Joel Y. Sun, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Ripple S. Patel, DO, Camden, NJ (*Abstract Co-Author*) Nothing to Disclose
Charles C. Ko, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Cheryl L. Kirby, MD, Cherry Hill, NJ (*Abstract Co-Author*) Nothing to Disclose
Peter S. Wang, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Shuchi K. Rodgers, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

rodgerss@einstein.edu

TEACHING POINTS

Teaching Points: 1. Review normal lower extremity anatomy and sonographic imaging protocol 2. List findings that differentiate acute deep vein thrombosis (DVT) from chronic post thrombotic change 3. Describe signs of acute superficial thrombophlebitis 4. Recognize non-vascular etiologies of lower extremity pain and swelling

TABLE OF CONTENTS/OUTLINE

1. Normal lower extremity vascular and soft tissue anatomy 2. Lower extremity venous protocol 3. DVT - Differentiate acute DVT from chronic post thrombotic change 4. Abnormal spectral Doppler a. Dampened or monophasic common femoral vein (CFV) waveforms indicating upstream disease i. Obstructing pelvic mass or adenopathy ii. Iliac or CFV stenosis b. Increased pulsatility: elevated right heart pressures 5. Acute superficial thrombophlebitis 6. Non-vascular causes of lower extremity swelling a. Muscle or tendon tear i. Gastrocnemius tear ii. Plantaris tendon rupture b. Baker's cyst c. Peripheral nerve sheath tumors d. Lymphedema e. Cellulitis

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VI161-ED-X

Treatment for Posttraumatic Chylothorax: Focusing on the Technical Aspects of Intra-nodal Lymphangiography and Thoracic Duct Embolization via Left Venous Angle

All Day Room: NA Digital Education Exhibit

Participants
Masatoshi Kato, Ube, Japan (*Presenter*) Nothing to Disclose
Etsushi Iida, MD, Ube, Japan (*Abstract Co-Author*) Nothing to Disclose
Kenichiro Ihara, Ube, Japan (*Abstract Co-Author*) Nothing to Disclose
Masahiro Tanabe, MD, Ube, Japan (*Abstract Co-Author*) Nothing to Disclose
Munemasa Okada, MD, PhD, Ube, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To review the treatment of chylothorax. 2. To look back on the recent advancements of thoracic duct embolization. 3. To describe the procedure and techniques of lymphangiography and catheterization to the thoracic duct via left venous angle for embolization.

TABLE OF CONTENTS/OUTLINE

1. Anatomy of lymphatic system and thoracic duct. 2. Causes of chylothorax. 3. Techniques for pedal and intra-nodal lymphangiography. 4. Techniques of catheterization to the thoracic duct. 5. Guide wire selection for transvenous catheter insertion into thoracic duct. 6. Embolic material selection during thoracic duct embolization.

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VI167-ED-X

Vascular Compression Syndromes: Anatomy, Pathophysiology, Clinical and Imaging Diagnosis: How Can Ultrasound Help?

All Day Room: NA Digital Education Exhibit

Participants
Luciana C. Zattar-Ramos, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Renata V. Leao, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Davi d. Romao, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Ana I. Oliveira, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Marcos Felippe P. Correa, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Antonio S. Marcelino, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Marcelo Bordalo-Rodrigues, MD,PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Claudia D. Leite, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Giovanni G. Cerri, MD,PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Renata F. Pereira, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

luzattar@gmail.com

TEACHING POINTS

The "vascular compression syndromes" (VCS) is heterogeneous group of disorders characterized by external compression of vascular structures or the compression of hollow viscera by vascular structures. To achieve accurate and timely diagnoses and appropriate treatment of each case, the US is among the most effective methods since it provides hemodynamic information and allows dynamic maneuvers for confirmation and appropriate intraoperative evaluation. This study aims to demonstrate and illustrate such conditions. The purpose of this exhibit is:- To illustrate characteristic imaging findings of the normal vascular anatomy- To discuss the fisiopathology and clinical findings of the VCS- To describe the main imaging findings of VCS with images and videos- To list and illustrate ultrasound techniques and findings that may help reaching the correct characterization of the VCS- To describe and illustrate different imaging methods and treatments for the VCS

TABLE OF CONTENTS/OUTLINE

I. INTRODUCTIONII. DISCUSSION- BOW-HUNTER SYNDROME- THORACIC OUTLET SYNDROME- HYPOTHENAR HAMMER SYNDROME - MEDIAN ARCUATE LIGAMENT SYNDROME- NUT-CRACKER SYNDROME- SUPERIOR MERENTERIC ARTERY SYNDROME- MAY-THURNER / COCKETT SYNDROME- POPLITEAL ENTRAPMENT SYNDROMEIII. CONCLUSION

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VI179-ED-X

Vascular Complications in Routine Procedures: What to Look For

All Day Room: NA Digital Education Exhibit

Participants
Rodrigo R. San Martin, MD, Santiago, Chile (*Presenter*) Nothing to Disclose
Fernanda Rojas, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Jorge Ortiz Vega, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose
Cristian Varela, MD, Santiago, Chile (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

rosanmartin@gmail.com

TEACHING POINTS

The purpose of this exhibit is:• To present part of the spectrum of vascular lesions that can be developed in relation to both endovascular and non-endovascular procedures, based on cases from our institution.• To know the important role of Doppler ultrasonography, as well as angiographic tomographic techniques in the diagnosis and characterization of such complications.

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VI192-ED-X

Contrast Enhanced Ultrasound Applications within Interventional Radiology at a Major Tertiary Medical Center

All Day Room: NA Digital Education Exhibit

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Participants
Zubair Syed, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Henry Chen, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Lisa Walker, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Chad Cox, MD , Riverview, FL (*Abstract Co-Author*) Nothing to Disclose
Dean A. Nakamoto, MD, Beachwood, OH (*Abstract Co-Author*) Research agreement, Toshiba Medical Systems Corporation
Nami R. Azar, MD, Highland Heights, OH (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

henry.chen@uhhospitals.org

TEACHING POINTS

Explain potential applications for the use of Contrast Enhanced Ultrasound (CEUS) Review guidelines, current indications, limitations, and pitfalls of ultrasound contrast Review the strength and weakness of contrast enhanced ultrasound Demonstrate the clinical application of contrast enhanced ultrasound in clinical practice at a major tertiary center

TABLE OF CONTENTS/OUTLINE

1. What is Contrast Enhanced Ultrasound and How is it Currently Being Used? 2. Guidelines and Current Indications for Contrast Enhanced Ultrasound 3. Strengths, Weaknesses, Limitations, and Pitfalls 4. Case Series Review of Contrast Enhanced Ultrasound Interventions and Diagnostics a. Biopsies i. Portal Vein ii. Liver iii. Kidney b. Therapeutic Interventions i. Liver Neuroendocrine Malignancy Microwave Ablation c. Drainage i. Abscess Drain ii. Nephrostomy iii. Biliary Drain d. Diagnostic i. Prostate

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VI206-ED-X

Pelvic Vascular Pathologies: Make Your Call!

All Day Room: NA Digital Education Exhibit

Participants
Amir Imanzadeh, MD, Shelton, CT (*Abstract Co-Author*) Nothing to Disclose
Sarvenaz Pourjabbar, MD, New Haven, CT (*Presenter*) Nothing to Disclose
John S. Pellerito, MD, Manhasset, NY (*Abstract Co-Author*) Nothing to Disclose
Jonathan D. Kirsch, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Mike Spektor, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Margarita V. Revzin, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

amir.imanzadeh@yale.edu

TEACHING POINTS

A wide spectrum of symptoms are associated with various pelvic vascular pathologies, ranging from characteristic clinical signs to vague complaints such as pelvic pain or pressure. The goal of this presentation is to familiarize the radiologist with the utility of ultrasound in the evaluation of different pelvic vascular pathologies. This will aid in improving the radiologist's ability to make the correct diagnosis (even when it is not suspected) and minimize the rate of misdiagnosis.

TABLE OF CONTENTS/OUTLINE

1. Overview of relevant pelvicvascular anatomy. 2. Review ultrasound protocols and techniques for optimization of ultrasound parameters. 3. The sonographic features of various pelvic vascular pathologies will be reviewed in 4 main categories: 3-1. Pathologies of the iliac vessels (AV fistula, May-Thurner syndrome, arterial stenosis, pelvic vein thrombosis, aneurysms, interrupted IVC). 3-2. Pelvic floor and perineal wall pathologies (labial and groin varices, perineal hematoma, hemorrhoidal veins). 3-3. Female and male pelvic vascular pathology (gonadal vein thrombosis,congestion syndrome,uterine AVM and AVF, IVC leiomyoma, dorsalis penis arterial and vein thrombosis). 3-4. Pelvic hemorrhage (bladder hemorrhage, hematocolpos, fractured penis). 4. Current management of the presented pelvic vascular pathologies.

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VI211-ED-X

New Tools in carotid Placque's US Evaluation: CEUS Elastography and 3D-arterial Analysis

All Day Room: NA Digital Education Exhibit

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Participants
Gregorio Alagna, Rome, Italy (*Presenter*) Nothing to Disclose
Vito Cantisani, MD, Roma, Italy (*Abstract Co-Author*) Speaker, Toshiba Medical Systems Corporation; Speaker, Bracco Group; Speaker, Samsung Electronics Co, Ltd
Nicola Di Leo, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Valeria de Soccio, JD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Ferdinando D'Ambrosio, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Valerio Forte, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To introduce new diagnostic tools in carotid plaque's US assessment; To learn about new available parameters in the evaluation of atherosclerotic plaque's vulnerability.

TABLE OF CONTENTS/OUTLINE

Tips and tricks to correctly perform CEUS; Advantages in using CEUS for stenosis measurements; CEUS in plaque's angiogenesis evaluation; Brief overview of the different types of elastography; Correlation between elastography data and risk stratification of the plaque; To show how 3D-Arterial Analysis software works; Use of new 3D-Arterial Analysis software for measuring stenosis percentage; Diagnostic accuracy of 3D-Arterial Analysis software in the evaluation of vascular wall vulnerability as compared with histologic examination; Utility of 3D-colorimetric map in surgical planning; Limitations of multiparametric US in carotid evaluation; Clinical cases presentation.

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VI217-ED-X

Master Your Doppler Skills: A Tutorial for Radiologists to Optimize Image Quality When Evaluating Blood Flow

All Day Room: NA Digital Education Exhibit

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
Amir Imanzadeh, MD, Shelton, CT (*Presenter*) Nothing to Disclose
Sarvenaz Pourjabbar, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Kevin M. Johnson, MD, Madison, CT (*Abstract Co-Author*) Nothing to Disclose
Jonathan D. Kirsch, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Adel A. Mustafa, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Margarita V. Revzin, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

amir.imanzadeh@yale.edu

TEACHING POINTS

To provide a comprehensive tutorial, via case review, on how to optimize Doppler parameters for the evaluation of blood flow. This will aid in improving radiologists' ability to correctly diagnose vascular disorders and minimize the rate of misdiagnosis and misinterpretation.

TABLE OF CONTENTS/OUTLINE

1. Brief review of ultrasound physics with respect to blood flow detection and calculation of blood flow velocity 2. Different Doppler modes will be discussed (Color, Spectral and Power Doppler)3. Comprehensive review of techniques for optimization of different Doppler parameters a. Color bar b. Baseline c. Velocity scale d. Gain e. Wall filter f. Angle correction4. Pitfalls and major Doppler artifacts will be discussed (blooming artifact, tissue vibration artifact, absence of flow due to suboptimal angle of insonation, etc) 5. Interactive cases on the topic of image optimization, with questions and answers, in order to ensure understanding of the presented material

RC110

Liver and Biliary Tree, Including Doppler, Contrast, and Elastography

Sunday, Nov. 26 2:00PM - 3:30PM Room: E353B

GI US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

LEARNING OBJECTIVES

New in 2017: PLEASE NOTE - All courses designated for SAM credit at RSNA 2017 will require attendees bring a personal device e.g. phone, iPad, laptop to complete the required test questions during the live session.

Sub-Events

RC110A Liver Doppler Ultrasound

Participants
Mark E. Lockhart, MD, Birmingham, AL (*Presenter*) Author, Oxford University Press; Author, JayPee Brothers Publishers; Deputy Editor, John Wiley & Sons, Inc

LEARNING OBJECTIVES

1) Describe the technique of liver Doppler ultrasound and methods to improve study quality. 2) Review qualitative and quantitative criteria for diagnosing vascular abnormalities in liver ultrasound Doppler examinations.

ABSTRACT

This presentation will initially describe the liver Doppler ultrasound examination with emphasis on techniques to improve study quality. Subsequently, normal Doppler waveforms and threshold values will be reviewed. A variety of abnormal liver Doppler findings will then be discussed in the context of several disease processes. A significant portion of the presentation will revolve around vascular abnormalities associated with liver diseases and evaluation of TIPS shunts will be addressed. Brief discussion of how diagnostic criteria apply to complications of liver transplantation will also be covered.

RC110B Contrast for Liver Masses

Participants
Stephanie R. Wilson, MD, Calgary, AB (*Presenter*) Equipment support, Koninklijke Philips NV; Equipment support, Siemens AG; Equipment support, Samsung Electronics Co, Ltd; Speaker, General Electric Company; Speaker, Koninklijke Philips NV; Speaker, Saumsung

For information about this presentation, contact:

stephanie.wilson@ahs.ca

LEARNING OBJECTIVES

1) To comprehend the value of imaging liver masses with microbubble contrast agents. 2) To understand the mechanism of action of the purely intravascular bubbles as compared with contrast agents for CT and MR scan. 3) To appreciate the advantages afforded by dynamic real time imaging for CEUS showing enhancement regardless of its timing or duration.

RC110C Liver Elastography

Participants
Paul S. Sidhu, MRCP, FRCR, London, United Kingdom (*Presenter*) Speaker, Koninklijke Philips NV; Speaker, Bracco Group; Speaker, Hitachi, Ltd; Speaker, Siemens AG; Speaker, Samsung Electronics Co, Ltd

LEARNING OBJECTIVES

1) Understand the normal anatomy, anatomic variants of the hepatic vasculature. 2) Identify the normal Doppler flow profiles of the hepatic vasculature. 3) Understand the hemodynamic principles of portal hypertension and how they impact the Doppler waveforms of the hepatic arteries, portal veins and hepatic veins. 4) Understand the role of ultrasound in the evaluation of variceal pathways.5) Indications when to use contrast enhanced ultrasound (CEUS) in focal liver diseases. 6) Kinetics of US contrast agents. 7) Learning about the importance of the three contrast phases, how CEUS performs in detecting and characterizing focal liver lesions. 8) Learning about the potential value as well as the limitations of CEUS in liver disease. 9) Learning how CEUS performs when compared to B-mode, color Doppler, CT and MRT imaging. 10) Understand the concept of liver fibrosis grading and the implications for healthcare management. 11) Review the basis for the assessment of liver fibrosis using elastography, with emphasis on the different techniques. 12) Understand the differences in the techniques and the variability in measurement assessment. 13) Achieve and overview of the need and position of this technique in clinical care.

RC110D Acute Cholecystitis, Complications and Mimics

Participants
Anthony E. Hanbidge, MBBCh, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Anthony.hanbidge@uhn.ca

LEARNING OBJECTIVES

1) Discuss the value of ultrasound in the assessment of acute cholecystitis. 2) Identify the imaging features of acute cholecystitis and its complications. 3) Describe additional pathologic conditions that can confuse the diagnosis.

ABSTRACT

Acute cholecystitis is the most common cause of acute pain in the right upper quadrant (RUQ), and urgent surgical removal of the gallbladder is the treatment of choice for uncomplicated disease. However, cross-sectional imaging is essential because more than one-third of patients with acute RUQ pain do not have acute cholecystitis. In addition, patients with complications of acute cholecystitis, such as perforation, are often best treated with supportive measures initially and elective cholecystectomy later. Ultrasound (US) is the primary imaging modality for assessment of acute RUQ pain; US is both sensitive and specific in demonstrating gallstones, biliary dilatation, and features that suggest acute inflammatory disease. Occasionally, additional imaging modalities are indicated. Computed tomography is valuable, especially for confirming the nature and extent of the complications of acute cholecystitis. Successful imaging requires familiarity with both the characteristic and the unusual features of a wide variety of pathologic conditions. In addition, potential pitfalls must be recognized and avoided.

Active Handout:Anthony Edward Hanbidge

http://abstract.rsna.org/uploads/2017/17000084/Active RC110D.pdf

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RC131

US for Thyroid Cancer: Diagnosis, Surveillance, and Treatment

Sunday, Nov. 26 2:00PM - 3:30PM Room: E451A

NR US HN OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jill E. Langer, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Kathryn A. Robinson, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Sheila Sheth, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the sonographic characteristics of thyroid nodules that are suspicious for malignancy. 2) Discuss the Bethesda Cytology Classification of Thyroid FNA results and the risk of malignancy associated with each category. 3) Describe the indications for new genetic tests that may be performed on FNAs obtained from thyroid nodules with indeterminate cytology. 4) Describe the technique of US-guided biopsy of thyroid nodules and cervical lymph nodes in patients who have undergone thyroidectomy for thyroid cancer. 5) Discuss the rationale and method of performance of US-guided ethanol ablation of malignant cervical adenopathy in post thyroidedctomy patients.

ABSTRACT

This presentation will consist of a three individual presentations. The first will review the sonographic characteristics of thyroid nodules that are suggestive of malignancy. Recommendations for selecting which thyroid nodules require ultrasound-guided biopsies which have been provided by both Radiology consensus conferences and published Endocrinology guidelines will be discussed. The second presentation will review with the Bethesda Cytology Classification of Thyroid FNA results and the risk of malignancy associated with each category. Additionally this presentation describes the indications for two new genetic tests that may be performed on FNAs obtained from thyroid nodules with indeterminate cytology. The last presentation will provide a detailed description of the technique for performing ultrasound guided biopsy of thyroid nodules and cervical lymph nodes. Various methods will be discussed and required equipment outlined. Possible complications, though rare, will be described. A comparison of the typical sonographic features of normal versus abnormal lymph nodes will be presented in an effort to identify those patients in whom sonographic follow up can be used instead of biopsy. A discussion of the possible advantages of adding thyroglobulin assay to cytologic evaluation will be provided. The rationale for and technique of performing ultrasound guided ethanol ablation of malignant cervical lymph nodes in patients with thyroid cancer will be undertaken.

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RC152

US-guided Interventional Breast Procedures (Hands-on)

Sunday, Nov. 26 2:00PM - 3:30PM Room: E264

BR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Karen S. Johnson, MD, Durham, NC (*Presenter*) Nothing to Disclose
Jocelyn A. Rapelyea, MD, Washington, DC (*Presenter*) Speakers Bureau, General Electric Company;
Shambhavi Venkataraman, MD, Boston, MA (*Presenter*) Nothing to Disclose
Angelique C. Floerke, MD, Chicago, IL (*Presenter*) Consultant, Becton, Dickinson and Company
Anita K. Mehta, MD, MSc, Washington DC, DC (*Presenter*) Nothing to Disclose
Nicole S. Lewis, MD, Washington, DC (*Presenter*) Nothing to Disclose
Kathleen R. Gundry, MD, Atlanta, GA (*Presenter*) Nothing to Disclose
Michael N. Linver, MD, Albuquerque, NM (*Presenter*) Scientific Advisory Board, Hologic, Inc; Scientific Advisory Board, Real Imaging Ltd; Scientific Advisory Board, Seno Medical Instruments, Inc
Christina G. Marks, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Tilden L. Childs III, MD, Fort Worth, TX (*Presenter*) Stockholder, Pfizer Inc
Evguenia J. Karimova, MD, Memphis, TN (*Presenter*) Nothing to Disclose
Caroline M. Ling, MD, Darby, PA (*Presenter*) Nothing to Disclose
Sora C. Yoon, MD, Durham, NC (*Presenter*) Nothing to Disclose
Connie E. Kim, MD, Durham, NC (*Presenter*) Spouse, Consultant, ClarVista Medical, Inc; Spouse, Royalties, Leica Biosystems Nussloch GmbH; Spouse, Intellectual property, Leica Biosystems Nussloch GmbH
Mary S. Soo, MD, Durham, NC (*Presenter*) Nothing to Disclose
Margaret M. Szabunio, MD, Lexington, KY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ekarimov@bidmc.harvard.edu

mary.soo@duke.edu

karen.johnson2@dm.duke.edu

margaret.szabunio@uky.edu

LEARNING OBJECTIVES

1) Describe the equipment needed for ultrasound guided interventional breast procedures. 2) Review the basic principles of ultrasound guidance and performance of minimally invasive breast procedures. 3) Practice hands-on technique for ultrasound guided breast interventional procedures.

ABSTRACT

This course is intended to familiarize the participant with equipment and techniques in the application of US guided breast biopsy and needle localization. Participants will have both basic didactic instruction and hands-on opportunity to practice biopsy techniques on tissue models with sonographic guidance. The course will focus on the understanding and identification of: 1) optimal positioning for biopsy 2) imaging of adequate sampling confirmation 3) various biopsy technologies and techniques 4) potential problems and pitfalls

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MSMI21

Molecular Imaging Symposium: Basics of Molecular Imaging

Monday, Nov. 27 8:30AM - 10:00AM Room: S405AB

BQ MI MR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Zaver M. Bhujwalla, PhD, Baltimore, MD (*Moderator*) Nothing to Disclose
Jan Grimm, MD, PhD, New York, NY (*Moderator*) Nothing to Disclose

Sub-Events

MSMI21A MI Using Radioactive Tracers

Participants
Jan Grimm, MD, PhD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the various radio tracers and their applications in Molecular Imaging studies. 2) Understand in which situations to use which radio tracers, what to consider when developing the imaging construct and what controls to obtain for nuclear imaging studies. 3) Examples will contain imaging with small molecules, with antibodies and nanoparticles as well as with cells in order to provide the participants with examples how o correctly perform their imaging studies. 4) Most of the examples will be from the oncology field but their underlying principles are universally applicable to other areas as well.

ABSTRACT

Nuclear Imaging is currently the only true "molecular" imaging method utilized in clinic. It offers quantitative imaging of biological processes in vivo. Therefore, it is not surprising that it is also highly frequented in preclinical imaging applications since it is currently the only true quantitative imaging method. Multiple agents have been developed, predominantly for PET imaging but also for SPECT imaging.In this talk, we will discuss the application of radio tracers to molecular imaging and what to consider. Common pitfalls and mistakes as well as required measures to avoid these will be discussed. We will discuss various examples of imaging constructs, ranging from small molecules to antibodies, nanoparticles and even cells. In addition, the imaging modalities will also briefly discussed, including PET, SPECT and Cherenkov imaging.

MSMI21B MI MRI and MRS

Participants
Zaver M. Bhujwalla, PhD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To define the role of MRI and MRS in molecular and functional imaging and cover specific applications in disease processes. 2) The primary focus will be advances in novel theranostic approaches for precision medicine.

ABSTRACT

With an array of functional imaging capabilities, magnetic resonance imaging (MRI) and spectroscopy (MRS) techniques are valuable in obtaining functional information, but the sensitivity of detection is limited to the 0.1-1 mM range for contrast agents and metabolites, respectively. Nevertheless, MRI and MRS are finding important applications in providing wide-ranging capabilities to tackle key questions in cancer and other diseases with a 'molecular-functional' approach. An overview of these capabilities and examples of MR molecular and functional imaging applications will be presented with a focus on theranostic imaging for precision medicine.

MSMI21C Nanoparticles

Participants
Heike E. Daldrup-Link, MD, Palo Alto, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

heiked@stanford.edu

LEARNING OBJECTIVES

1) Understand important safety aspects of ultrasmall superparamagnetic iron oxide nanoparticles, which are used as contrast agents for magnetic resonance imaging. 2) Recognize the value of immediately clinically applicable iron oxide nanoparticles for cancer imaging. 3) Learn about intrinsic immune-modulating therapeutic effects of USPIO.

ABSTRACT

Amid recent concerns about nephrogenic sclerosis and gadolinium deposition in the brain, patients and physicians are questioning

the use of gadolinium chelates and are actively seeking alternatives. In North America, the iron supplement ferumoxytol has gained considerable interest as an MR contrast agent. Ferumoxytol is composed of superparamagnetic iron oxide nanoparticles with strong T1- and T2-relaxivities and therefore can be used "off label" to enhance soft tissue contrast on MR images. In fact, ferumoxytol was originally designed as an MR contrast agent, but was later developed for anemia treatment. Ferumoxytol (Feraheme) is increasingly being used for a varierty of MR imaging applications in North America. In parallel, the iron oxide nanoparticle compound ferumoxtran-10 (Sinerem/Combidex) has regained a surge of interest in Europe and is currently undergoing continued clinical development. As these agents are adopted by a new generation of radiologists, it is important to build on the many lessons learned from previous experience with other iron oxide nanoparticle compounds. This presentation will explain basic concepts of iron oxide nanoparticle safety, biodistribution and MR imaging patters and offer important practical insights for the use of these agents for clinical MR imaging. Open questions and research needs will be discussed as well.

MSMI21D Advances in Ultrasound Molecular Imaging

Participants
Katherine W. Ferrara, PhD, Davis, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Inform of clinical utility and safety of contrast enhanced ultrasound (CEUS) imaging. 2) Educate on current diagnostic and therapeutic approaches. 3) Introduce newer concepts for combined diagnostic and therapeutic applications.

ABSTRACT

Contrast-Enhanced Ultrasound (CEUS) provides a novel, multi-faceted approach to diagnostic imaging and localized drug/gene delivery systems. The value-added proposition of CEUS centers on the pillars of safety, effectiveness, and economics. Specifically, in the field of diagnostic imaging, 3D CEUS ultrasound technology challenges the established formats CT, MR, and PET. CEUS provides distinct advantages including real-time volumetric imaging, unparalleled spatial and temporal resolution, economies of scale and all without exposure to unnecessary, ionizing radiation. Our efforts to develop 3D and contrast-enhanced ultrasound imaging continues to provide academic leadership while advancing the clinical field of cardiovascular medicine, urology (prostate imaging), and cancer (monitoring and therapy). In the evolving field of the ultrasound therapeutics, CEUS provides a novel, localized delivery system for ethical drugs and nucleic acids; all effectively delivered without viral-mediated agents. Further, the global installed base of ultrasound along with the safety record and ease of patient access highlights the utility of CEUS as a truly competitive, therapeutic delivery modality.In April 1, 2016, the USA FDA approved CEUS for liver imaging in adults and children. This is likely to have a major, paradigm chage in healthcare in the USA.

MSMI21E Quantitative Imaging Biomarkers

Participants
Robert J. Gillies, PhD, Tampa, FL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify at least one method of quantitatively assessing anatomic tumor response. 2) Identify at least one method of quantitatively assessing metabolic tumor response using FDG PET. 3) Identify an MRI quantitative metric which is associated with cellularity of biological processes and which can be used in response assessments.

ABSTRACT

Radiology initially developed as an analog imaging method in which non quantitative data were interpreted in a "qualitative and subjective" manner. This approach has worked well, but modern imaging also is digital, quantitative and has the opportunity for more quantitative and objective interpretations. This lecture will focus on a few areas in which quantitative imaging is augmenting qualitative image assessments to lead to more precise interpretation of images. Examples of such an approach can include measuremental of tumor "metabolic" activity using formalisms such as PERCIST 1.0; methods of assessment of tumor size and volumes using the RECIST 1.1 and emerging formalisms and metrics of tumor heterogeneity, density, receptor density, diffusion, vascular permeability and elasticity using techniques incuding PET/SPECT, MRI, CT and ultrasound. With quantitative imaging, the opportunity to move from qualitative methods to precise in vivo quantitative pheontyping is a real one, with a quantitative "phenome" complementing other "omics" such as genomics. However, the quality of quantitation may vary and close attention to technical methodologies and process are required to have reliable and accurate quantitation. The RSNA QIBA effort will be briefly reviewed as one approach to achieve precise quantiative phenotyping. Examples of the use of quantitative phenotyping to inform patient management will be discussed.

RC210

Vascular Doppler

Monday, Nov. 27 8:30AM - 10:00AM Room: N230B

VA US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

SAM

New in 2017: PLEASE NOTE - All courses designated for SAM credit at RSNA 2017 will require attendees bring a personal device e.g. phone, iPad, laptop to complete the required test questions during the live session.

Sub-Events

RC210A 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.

ABSTRACT

At the conclusion of the refresher course, the learners should be familiar with how carotid waveforms change with systemic, regional and local vascular disease. They should also be able to recognize common waveform variants and their attendant clinical significance.

RC210B Vertebral Artery Ultrasound: A Gateway to the Great Vessels

Participants
Mindy M. Horrow, MD, Philadelphia, PA (*Presenter*) Spouse, Employee, Merck & Co, Inc

For information about this presentation, contact:

horrowm@einstein.edu

LEARNING OBJECTIVES

1) Identify the anatomy of the vertebral arterial circulation. 2) Describe the spectrum of subclavian steal syndrome. 3) Describe the findings in the vertebral artery and carotid circulation which indicate brachiocephalic disease.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Mindy M. Horrow, MD - 2013 Honored EducatorMindy M. Horrow, MD - 2016 Honored Educator

RC210C Upper Extremity Arterial and Venous Doppler: Beyond the Basics

Participants
Gowthaman Gunabushanam, MD, New Haven, CT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review qualitative and quantitative criteria for diagnosing arterial abnormalities in the upper extremity. 2) Describe the technique for dynamic testing using provocative maneuvers. 3) Describe the pitfalls and limitations of Doppler ultrasound in diagnosing arterial and venous diseases of the upper extremity.

RC210D Leg Pain and Swelling: The Unusual Suspects

Participants
Leslie M. Scoutt, MD, New Haven, CT (*Presenter*) Speaker, Koninklijke Philips NV

For information about this presentation, contact:

leslie.scoutt@yale.edu

LEARNING OBJECTIVES

1) Review pelvic causes of leg pain and swelling. 2) Discuss arterial vascular pathology that can cause leg pain and swelling. 3) Describe how to diagnose musculoskeletal causes of leg pain and swelling.

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

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RC231

Hands-on Musculoskeletal Ultrasound: A Forum for Question and Answer (Hands-on)

Monday, Nov. 27 8:30AM - 10:00AM Room: E258

MK US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Marnix T. van Holsbeeck, MD, Detroit, MI (*Presenter*) Consultant, General Electric Company; Stockholder, Koninklijke Philips NV; Stockholder, General Electric Company; Stockholder MedEd3D; Grant, Siemens AG; Grant, General Electric Company;
Joseph H. Introcaso, MD, Neenah, WI (*Presenter*) Nothing to Disclose
Humberto G. Rosas, MD, Madison, WI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

marnix@rad.hfh.edu

LEARNING OBJECTIVES

1) Recognize and identify pitfalls of scanning that lead to false positive or false negative musculoskeletal ultrasound results. 2) Perform skills for scanning difficult patients. 3) Follow rigorous protocols for the examination of different anatomic regions. 4) Position patients for more complicated musculoskeletal ultrasound examinations. 5) Recognize and integrate the importance of tissue movement in judging the functionality of the extremities.

ABSTRACT

In this Musculoskeletal Ultrasound Master class, an opportunity will be given to participants to start a written dialogue in advance to RSNA 2017. The electronically submitted questions will be sorted by instructors and organized per topic. A select number of recurrent themes in these questions will be prepared for dialogue on stage. When the questions focus on a particular scanning skill, the authors of the questions will be invited on the examination platform to show problems they encounter in their practice. By using a step-by step approach in solving the scanning issues, all who are present should benefit from the technical interactions on stage. Cameras will project scanning details on large screens. The seating in the class will guarantee close proximity for an enriching interaction between audience and stage. If you plan to attend this session and you want your questions answered please contact us soon as possible at marnix@rad.hfh.edu

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RC252

Techniques for Interventional Sonography and Thermal Ablation (Hands-on)

Monday, Nov. 27 8:30AM - 10:00AM Room: E264

US IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Stephen C. O'Connor, MD, Boston, MA (*Presenter*) Nothing to Disclose
Veronica J. Rooks, MD, Tripler AMC, HI (*Presenter*) Nothing to Disclose
Kristin M. Dittmar, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Carmen Gallego, MD, Madrid, Spain (*Presenter*) Nothing to Disclose
Mabel Garcia-Hidalgo Alonso, MD, Majadahonda, Spain (*Presenter*) Nothing to Disclose
Hollins P. Clark, MD, Winston Salem, NC (*Presenter*) Research Consultant, Galil Medical Ltd
James W. Murakami, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Sara E. Zhao, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Humberto G. Rosas, MD, Madison, WI (*Presenter*) Nothing to Disclose
William W. Mayo-Smith, MD, Boston, MA (*Presenter*) Author with royalties, Reed Elsevier;
Jeremiah J. Sabado, MD, Kennett Square, OH (*Presenter*) Nothing to Disclose
John D. Lane, MD, Bayside, WI (*Presenter*) Nothing to Disclose
Neil T. Specht, MD, Trumbull, CT (*Presenter*) Nothing to Disclose
Manish N. Patel, DO, Cincinnati, OH (*Presenter*) Nothing to Disclose
Yassine Kanaan, MD, Dallas, TX (*Presenter*) Nothing to Disclose
Njogu Njuguna, MD, Springfield, MA (*Presenter*) Nothing to Disclose
Robert M. Marks, MD, San Diego, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

robert.m.marks.mil@mail.mil

hclark@wakehealth.edu

ronirooks@gmail.com

cgallego@salud.madrid.org

Stephen.o'connor@bhs.org

james.murakami@nationwidechildrens.org

manish.patel@cchmc.org

LEARNING OBJECTIVES

1) Identify basic skills, techniques, and pitfalls of freehand invasive sonography. 2) Discuss and perform basic skills involved in thermal tumor ablation in a live learning model. 3) Perform specific US-guided procedures to include core biopsy, abscess drainage, vascular access, cyst aspiration, soft tissue foreign body removal, and radiofrequency tumor ablation. 4) Incorporate these component skill sets into further life-long learning for expansion of competency and preparation for more advanced interventional sonographic learning opportunities.

CS22

Contrast-Enhanced Ultrasound (CEUS): Innovations and a Problem Solving Tool in Clinical Practice: Presented by Samsung

Monday, Nov. 27 1:30PM - 3:00PM Room: S102AB

PARTICIPANTS

Dirk-André Clevert, MD, Munich, Germany; Paul S. Sidhu, BSc, MB, BS, MRCP, FRCR, DTM&H, FAIUM(Hon.), London, United Kingdom; Vito Cantisani, MD, Rome, Italy; Stephanie Wilson, MD, Calgary, Alberta

PROGRAM INFORMATION

Contrast-enhanced Ultrasound (CEUS) is potentially a safe and cost-effective imaging technology. Speakers will share their expert opinion on how to cost effectively manage complicated lesions in abdomen using CEUS.

CME

The Course does not offer CME credit

SSE01

Breast Imaging (Ultrasound Screening)

Monday, Nov. 27 3:00PM - 4:00PM Room: Arie Crown Theater

BR US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Wendie A. Berg, MD, PhD, Pittsburgh, PA (*Moderator*) Nothing to Disclose
Stamatia V. Destounis, MD, Scottsville, NY (*Moderator*) Hologic, Inc. Scientific Advisory Board

Sub-Events

SSE01-01 Ultrasound Screening After Digital Mammography versus Digital Breast Tomosynthesis

Monday, Nov. 27 3:00PM - 3:10PM Room: Arie Crown Theater

Participants
Elizabeth H. Dibble, MD, Providence, RI (*Presenter*) Nothing to Disclose
Tisha M. Singer, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Nneka Jimoh, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Grayson L. Baird, PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Ana P. Lourenco, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the yield of dense breast ultrasound (US) screening following digital mammography (DM) versus digital breast tomosynthesis (DBT).

METHOD AND MATERIALS

IRB-approved, HIPAA compliant retrospective search of radiology databases at two tertiary breast imaging centers and an office practice staffed by the same fellowship-trained breast radiologists to identify screening US examinations from 10/1/14-9/30/16. Prior DM vs. DBT, demographic information, abnormalities on screening US, and pathology results were recorded. Additional breast cancers detected with US after DM vs. DBT and additional benign lesions requiring biopsy or follow-up were calculated. Because the time between DM or DBT and US varied, time between exams was estimated using Kaplan-Meier analysis. Differences between DM and DBT were compared using Chi Square and Fisher's Exact Tests.

RESULTS

3187 screening breast US exams were performed (3025 (94.9%) initial screening US exam; mean age 54.4, range 18.2-90.1); 1434 after DM and 1672 after DBT. 81 did not have a prior mammogram available. There were 201(14.0%) BI-RADS 3 results after DM and 177 (10.6%) after DBT (p=0.004). 119 biopsies or aspirations had results available. Of the 44 biopsies or aspirations after DM, 7 (16%) were malignant and 37 (84%) were benign; of the 75 biopsies or aspirations after DBT, 9 (12%) were malignant and 66 (88%) were benign (p=0.546). The additional cancer detection rate by US after DM was 5/1434 or 3.5 per 1000 women screened and after DBT was 5/1672 or 3 per 1000 women screened (p=0.810). Figure 1 summarizes US screening results. The median time between cancer detection with US after DM vs. DBT was not statistically significantly different (p=0.999).

CONCLUSION

No significant difference was observed in additional cancer detection rate with screening US following DM vs. DBT. The BI-RADS 3 rate of screening US was significantly lower following DBT.

CLINICAL RELEVANCE/APPLICATION

Knowing that the cancer yield of screening US is similar for prior DBT vs. DM may help inform clinical practice, as questions abound about whether DBT is sufficient supplemental screening for women with dense breast tissue.

SSE01-02 A Prospective Study of Automated Breast Ultrasound (ABUS) in a DBT Based Screening Practice of Women with Dense Breasts

Monday, Nov. 27 3:10PM - 3:20PM Room: Arie Crown Theater

Participants
Denise M. Chough, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose
David Gur, PhD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Grace Y. Rathfon, MD, Monroeville, PA (*Abstract Co-Author*) Nothing to Disclose
Amy H. Lu, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Terri-Ann Gizienski, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Christiane M. Hakim, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Marie A. Ganott, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Wendie A. Berg, MD, PhD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

gurd@upmc.edu

PURPOSE

To assess prospectively the informativeness and reporting consistency of ABUS as supplemental imaging of women with dense breast tissue as determined from prior mammograms.

METHOD AND MATERIALS

We are currently performing a prospective, fully balanced, IRB approved trial in which women with dense breasts undergo DBT plus ABUS screening. Two of six specifically trained, participating radiologists independently and sequentially first interpret DBT, or ABUS, alone and then interpret the other modality. The primary interpreting radiologist receives the second interpreting radiologist's opinion only when there is a disagreement and determines the final clinical management recommendation. We report all screening recommendations and diagnostic outcomes on the first 467 examinations performed prior to January 31, 2017 and for which all diagnostic workups, if any, are complete.

RESULTS

Of 934 initial independent interpretations (467X2), the initial recall recommendations rates were 64 (6.9%) and 102 (10.9%) on DBT alone and ABUS alone, respectively. Disagreement rates between the two readers for the same modality (double readings) were higher ($p < 0.05$) for ABUS (68 disagreements) than DBT (48 disagreement). After reviewing second opinions, when applicable, by the primary reader, 29 initial recommendations/decisions were changed (11 from "negative" or "benign" to "recall" and 18 from "recall" to "negative" or "benign). Only 31% of actually recalled patients were initially recalled by both modalities, suggesting that DBT and ABUS tend to frequently depict different "suspicious" abnormalities. Of the 15 biopsies performed to date, 3 were initially recalled by DBT alone, 7 by ABUS alone, and 5 by both. Three cancers were found, two initially recalled by both DBT and ABUS and one was recalled by ABUS only.

CONCLUSION

ABUS, perhaps with double reading only of examinations initially rated as BIRDS 0, may prove efficacious as a supplement to DBT and possibly as a primary screening modality of women with dense breasts.

CLINICAL RELEVANCE/APPLICATION

ABUS with double readings of initially suspected examinations should be investigated both as a potential supplement to DBT as well as a possible primary screening modality of women with dense breasts.

SSE01-03 Accuracy and Outcomes of Screening Breast Ultrasound in Women with a Personal History of Early-Stage Breast Cancer

Monday, Nov. 27 3:20PM - 3:30PM Room: Arie Crown Theater

Participants
Soo-Yeon Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Nariya Cho, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Bo Ra Kwon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung Ui Shin, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sooyeon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Su Hyun Lee, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung Min Chang, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, General Electric Company
Woo Kyung Moon, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

river7774@gmail.com

PURPOSE

To evaluate the performances of breast ultrasonographic (US) screening in women with a personal history of breast cancer (PHBC) by comparison with those in women without personal history of breast cancer (non-PHBC).

METHOD AND MATERIALS

Between January 2013 and December 2013, 12747 consecutive screening whole breast US examinations were identified. Among them, women with early-stage breast cancer (stage 0, I or II) were eligible. Non-PHBC women who underwent incident screens at least 9 months ago and had negative mammography and at least 1-year follow-up were matched 1:1 to PHBC women according to breast density and age. Screening performance measures were calculated and compared between the two groups by using generalized estimation equation or chi-square test. Characteristics of screen-detected and interval cancers were described.

RESULTS

There were 3435 exams in 3226 PHBC women (mean age, 52.3; range, 24-83 years) and 3291 exams in 3226 matched women without PHBC (mean age, 52.2; range, 25-84 years) (603 fatty, 2623 dense women for each group). Fourteen cancers (10 screen-detected, 4 interval cancers) were observed in PHBC women and 13 cancers (12 screen-detected, 1 interval cancer) in non-PHBC women. Performances of PHBC vs non-PHBC women were similar in the following outcomes; cancer detection rate of 2.9 per 1000 vs 3.6 per 1000 (P=.60), interval cancer rate of 1.2 per 1000 vs 0.3 per 1000 (P=.23), sensitivity of 71.4% (10/14) vs 92.3% (12/13) (P=.33), positive predictive value for biopsy performed(PPV3) of 10.9% (4/37) vs 21.1% (12/57) (P=.20). Specificity and abnormal interpretation rate of PHBC were better than those of non-PHBC as follows; 93.2% (3176/3421) vs 89.6% (2917/3278) (P<.001) and 7.4% (255/3435) vs 11.2% (373/3291) (P<.001). In addition, 70% (7/10) of screen-detected cancers and 50% (2/4) of interval cancers in PHBC women were stage I or II, while all observed cancers (100%, 13/13) were stage I or II in non-PHBC women (64.3% [9/14] vs. 100% [13/13], P=.04).

CONCLUSION

US screening in PHBC women detects early second breast cancers with higher specificity, however, has more advanced stage observed cancers, relative to those in non-PHBC women.

CLINICAL RELEVANCE/APPLICATION

Supplemental breast US screening in addition to mammography is recommendable for breast cancer survivors, although more advanced stage cancers are observed than those in non-PHBC women.

SSE01-04 Background Echotexture on Breast Ultrasound: Impact on Diagnostic Performance of Supplemental Screening in Women with Negative Mammography

Monday, Nov. 27 3:30PM - 3:40PM Room: Arie Crown Theater

Participants
Su Hyun Lee, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ann Yi, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung Min Chang, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, General Electric Company
Nariya Cho, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Woo Kyung Moon, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Soo-Yeon Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

moonwk@snu.ac.kr

PURPOSE

To evaluate the effect of background echotexture on the diagnostic performance of screening ultrasound (US) in women with negative mammography.

METHOD AND MATERIALS

This retrospective study was approved by our institutional review board and the requirement for written informed consent was waived. Between January 2012 and December 2014, 10277 women who underwent screening US after negative mammography and had a report on background echotexture were identified. Bilateral whole breast US were performed with a handheld device by experienced radiologists. Background echotexture was prospectively assessed according to the BI-RADS classification. The abnormal interpretation rate, cancer detection rate, and positive predictive value of screening US were compared between groups with homogeneous and heterogeneous background echotextures using a chi-square test.

RESULTS

Of 10277 women, 7206 (mean age, 53.6 yrs) showed homogeneous background echotexture and 3071 (mean age, 48.5 yrs; P<.001) showed heterogeneous background echotexture. Abnormal interpretation rate was significantly higher in group with heterogeneous background echotexture than those with homogeneous background echotexture (20.0% [613/3071] vs 8.1% [582/7206]; P<.001). Eleven cancers (4 DCIS and 7 invasive) were detected in group with homogeneous background echotexture (cancer detection rate, 1.5 per 1000 exams) and 9 cancers (1 DCIS and 8 invasive) were detected in group with heterogeneous background echotexture (cancer detection rate, 2.9 per 1000 exams; P=.147). Positive predictive value for biopsy performed (PPV3) was 9.5% (10/105) in group with homogeneous background echotexture and 5.0% (5/100) in group with heterogeneous background echotexture (P=.286). There were 3 known false-negative screening US in our study population, all performed in women with heterogeneous background echotexture.

CONCLUSION

Heterogeneous background echotexture on breast US was associated with higher abnormal interpretation rate in supplemental screening. Higher cancer detection rate and lower PPV3 were noted in screening US with heterogeneous background echotexture although the difference was not statistically significant.

CLINICAL RELEVANCE/APPLICATION

Background echotexture can affect the diagnostic performance of screening US. Care should be taken when interpreting screening US in women with heterogeneous background echotexture.

SSE01-05 Diagnostic Performance of Automated Breast Ultrasound in Breast Cancer Screening: Independent Evaluation of Coronal View and Transverse View

Monday, Nov. 27 3:40PM - 3:50PM Room: Arie Crown Theater

Participants
Megumi Nakajima, MD, Obihiro-Shi, Japan (*Presenter*) Nothing to Disclose
Kiyoshi Namba, MD, Obihiro, Japan (*Abstract Co-Author*) Medical Advisor, QView Medical, Inc; Medical Advisor, Volpara Health Technologies Limited; Educator, General Electric Company

PURPOSE

Automated Breast Ultrasound (ABUS) has been proven to find more invasive breast cancers when used as adjunct to mammography (MG) in screening. ABUS is characterized by coronal view (CV) and transverse view (TV). ABUS reading is directed to go through both views to elicit the result. Despite CV is innovative and potential invention of diagnostic ultrasound, no independent scientific evaluation has ever been pursued. Purpose of this study is to pursue diagnostic performance and efficiency of CV and TV independently. The way of reading whole breast data of ABUS is different from hand-held ultrasound (HHUS), and we have investigated the efficient way. The CV is unique view of ABUS which we are not used to reading and the TV is similar to HHUS which we are used to. We think detecting by CV and evaluating by TV is safe and short time way in breast cancer screening. So we studied about the safety of detecting breast cancers by CV by comparing with TV. This prospective study is the first trial to evaluate the diagnostic performance of ABUS in comparison between CVand TV.

METHOD AND MATERIALS

Two separate image data sets (a total of 200 breasts, 100 CVs & 100 TVs) were blindly prepared. Each set contained unilateral breast images 32 nomal, 38 benign, and 30 malignant cases. All readers completed ABUS Mandatory Program in advance.Three breast cancer specialists (A,B,C) of different degrees of experience with ABUS (A: >2y ABUS, B: 50 ABUS, C: HHUS only) read CV

and TV independently. Two sets were read separately, whithin one hour per day, with no clinical imformation. Subjects: ABUS (Oct.2014 - Jan.2017). 24-81 y.o.(median: 552.0, average: 53.2). A total of 30 cancers were DCIS (4), IDC (22), mucinous carcinoma (2), ILC (2), and findings of them were non-mass (4) and masses (26). Average tumor size was 13.8mm (6.1mm-23.2mm). BI-RADS (ACR) categories were used for evaluation.The sensitivity, specificity and reading time were assessed.

RESULTS

1. Sensitivity was 80.0% and 75.6% (CV vs TV, *P*=0.0179). 2. Specificity was 81.9% and 80.5% (CV vs TV, *P*=0.423). 3. The average reading time of CV and TV were 136 seconds/case and 166 seconds/case respectively.

CONCLUSION

Diagnostic performance of CV was superior to TV, and reading time was shorter in CV. CV was suggested to be useful in screening setting.

CLINICAL RELEVANCE/APPLICATION

Future appropriate application of CV interpretention has a potential to improve values of ABUS in breast cancer screening.

SSE01-06 Recall Rates for Technologist-Performed Screening Ultrasound Compared to DBTs and Influence of Double Reading

Monday, Nov. 27 3:50PM - 4:00PM Room: Arie Crown Theater

Participants
Wendie A. Berg, MD, PhD, Pittsburgh, PA (*Presenter*) Nothing to Disclose
David Gur, PhD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Andriy I. Bandos, PhD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Denise M. Chough, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Marie A. Ganott, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Marcela Bohm-Velez, MD, Pittsburgh, PA (*Abstract Co-Author*) Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, Seno Medical Instruments Inc.; Research Grant, Delphinus Medical Technologies, Inc.;
Christiane M. Hakim, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Terri-Ann Gizienski, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Cathy S. Tyma, MD, Sewickley, PA (*Abstract Co-Author*) Nothing to Disclose
Brandy Griffith, DO, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Joe M. Chan, MD, Erie, PA (*Abstract Co-Author*) Nothing to Disclose
Margarita L. Zuley, MD, Pittsburgh, PA (*Abstract Co-Author*) Research Grant, Hologic, Inc;
Danielle Sharek, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Ernestine A. Thomas, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Thomas S. Chang, MD, Pittsburgh, PA (*Abstract Co-Author*) Consultant, iCad, Inc

For information about this presentation, contact:

wendieberg@gmail.com

PURPOSE

To assess recall rate after technologist-performed handheld screening ultrasound (US) read in batch mode compared to recall rate using tomosynthesis with synthetic 2D reconstructions (DBTs) in women with dense breasts.

METHOD AND MATERIALS

Across three practices, from 12/1/15 through 1/31/17, 3021 women, with at least heterogeneously dense breasts by prior mammography or on baseline, aged 40-75 years, were enrolled in an IRB-approved HIPAA-compliant protocol to have technologist-performed handheld US with standard documentation after clinically performed DBTs. Two breast-imaging specialist radiologists reviewed images from each modality in batch mode, initially blinded to the other modality results, with one observer interpreting US first and one DBTs first. After reviewing both modalities together, observers were asked if they would still recall the patient. Reader 1 considered the input of reader 2 for final participant management.

RESULTS

Median participant age was 54.5 years. Across 6042 readings (3021x2), recall rate from either observer on DBTs was 496 (8.2%) and from US 576 (9.5%, p= 0.009); after reviewing both modalities, recall was recommended in 821 (13.6%) of interpretations. This represents an increase in recalls of 325/6042 (5.4%) compared to DBTs alone. Recall rates varied significantly by site, ranging from 2.5% to 14.5% (p<0.0001) for ultrasound and from 3.2% to 10.4% (p<0.0001) for DBTs. Only 42 US recalls were for immediate additional evaluation (BI-RADS 0) before a final assessment could be rendered. There were 376 reader disagreements regarding participant recall: 172 based on US only; 210 on DBTs only; and 25 on both. After reader integration, 18 participants were changed to US recall, 32 to DBTs recall, and 9 to both; 2 were changed to no recall on US, 19 to no recall on DBTs, and 32 to no recall on either modality, for a net change of 6 additional recalls.

CONCLUSION

Adding technologist-performed handheld US to screening DBTs increased recall rate by 5.4%. Observers gave a final assessment for 6000/6042 (99.3%) interpretations of technologist-performed handheld US using a standardized screening protocol. Double reading had a neutral effect on recall rate.

CLINICAL RELEVANCE/APPLICATION

It is feasible to implement technologist-performed screening US with batch interpretation, though recall rates for additional testing varied by site.

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SSE08

Gastrointestinal (Elastography)

Monday, Nov. 27 3:00PM - 4:00PM Room: E352

GI MR US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Mitchell E. Tublin, MD, Pittsburgh, PA (*Moderator*) Nothing to Disclose
Sudhakar K. Venkatesh, MD, FRCR, Rochester, MN (*Moderator*) Nothing to Disclose

Sub-Events

SSE08-01 Hepatic MR Elastography at 3T: Agreement Across Pulse Sequences and Effect of Hepatic Iron

Monday, Nov. 27 3:00PM - 3:10PM Room: E352

Participants
Ely R. Felker, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Kang-Sun Choi, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Kyunghyun Sung, PhD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Holden H. Wu, PhD, Los Angeles, CA (*Abstract Co-Author*) Institutional research support from Siemens
Steven S. Raman, MD, Santa Monica, CA (*Abstract Co-Author*) Nothing to Disclose
Bradley D. Bolster JR, PhD, Salt Lake City, UT (*Abstract Co-Author*) Employee, Siemens AG
Stephan Kannengiesser, Erlangen, Germany (*Abstract Co-Author*) Employee, Siemens AG
Ning Jin, Columbus, OH (*Abstract Co-Author*) Employee ,Siemens AG
Kari Sorge, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
David S. Lu, MD, Los Angeles, CA (*Abstract Co-Author*) Consultant, Medtronic plc; Speaker, Medtronic plc; Consultant, Johnson & Johnson; Research Grant, Johnson & Johnson; Consultant, Bayer AG; Research Grant, Bayer AG ; Speaker, Bayer AG

For information about this presentation, contact:

efelker@mednet.ucla.edu

PURPOSE

To compare 3 prototype hepatic magnetic resonance elastography (MRE) sequences at 3T with the standard clinical implementation gradient echo (GRE) sequence and to determine the effect of hepatic R2* on measurable area of liver stiffness (LS).

METHOD AND MATERIALS

52 patients (28 men, 24 women; mean age 56 years) underwent liver MRE at 3T (MAGNETOM Prisma, Siemens Healthcare) in this IRB-approved, HIPAA-compliant study. Sequences included: GRE (TR/TE 50/22 msec; slice thickness/gap 5/1 mm; matrix 77 x128; phase partial Fourier; flip angle, 250; breath hold, 18 sec), rapid GRE (TR/TE 25/22 msec; slice thickness/gap 5/1 mm; matrix, 84 x 128; flip angle, 150, breath hold, 9 sec), rapid fractional GRE (TR/TE 25/15 msec; slice thickness/gap 5/1 mm; matrix, 84 x 128; flip angle, 150, breath hold, 9 sec), and spin-echo echoplanar imaging (SE-EPI) (TR/TE 1600/49; slice thickness/gap 5/1 mm; matrix, 128 x 128; echo train length, 47; flip angle, 900; breath hold 18 sec). Hepatic R2* values were calculated using a multi-echo Dixon technique (LiverLab, Siemens). Mean LS and measurable area of stiffness (> 95% confidence threshold) were compared. Hepatic R2* was correlated with measurable area of LS and technical success rate.

RESULTS

In 6/52 patients, $\geq$ 1 sequence (5 GRE, 1 GRE and SE-EPI) failed (< 100 mm2 measurable area of LS). Mean LS was not significantly different across the 4 sequences (GRE 2.55 kPa, Rapid GRE 2.66 kPa, Rapid Fractional GRE 2.51 kPa, SE-EPI 2.52 kPa; P = 0.10). There was a significant difference in measurable area of LS (GRE 12389 mm2, Rapid GRE 14053 mm2, Rapid Fractional GRE 17039 mm2, SE-EPI 11212 mm2, P < 0.0001). Hepatic R2* was inversely correlated with measurable LS area for all 4 sequences (P < 0.0004). Mean hepatic R2* was higher among patients in whom $\geq$ 1 pulse sequence failed (mean R2* 100 sec-1 vs 50 sec-1, P = 0.0065).

CONCLUSION

Measured LS was equivalent across 4 hepatic MRE sequences, but there was a significant difference in measurable area of LS, with the largest area achieved with the rapid fractional GRE sequence. Hepatic R2* was significantly correlated with measurable area of LS and was significantly higher among patients with one or more failed sequences.

CLINICAL RELEVANCE/APPLICATION

Modified GRE (reduced TR/TE) or SE-EPI sequences may be useful alternatives for hepatic MRE, especially at 3T, because of less susceptibility to T2* effects associated with liver iron and shorter breath-holds.

SSE08-02 Evaluation of Hepatic Fibrosis by Using Monoexponential, Biexponential, and Stretched Exponential Diffusion-Weighted MR Imaging

Monday, Nov. 27 3:10PM - 3:20PM Room: E352

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

PURPOSE

To compare the ability of diffusion parameters acquired from monoexponential, biexponential, and stretched exponential diffusion-weighted imaging (DWI) models for the diagnosis of hepatic fibrosis (HF)

METHOD AND MATERIALS

Ninety five patients who underwent DWI using 9 b-values at 3T and had a pathologic reference standard of HF were included in this study. Liver apparent diffusion coefficient (ADC) obtained from a monoexponential model; true diffusion coefficient (Dt), pseudo-diffusion coefficient (Dp), and perfusion fraction (f) calculated from a biexponential model; distributed diffusion coefficient (DDC) and diffusion heterogeneity index (a) obtained from a stretched exponential model were compared with the pathologic HF stage (F). For the stretched exponential model, parameters were also obtained using a 6 b-value dataset with omitted lower b values (DDC#, a#). Spearman correlation analysis was performed to assess the relationship between HF and DWI parameters. The accuracy of DWI in the determination of HF stage was evaluated with Obuchowski measures. Diagnostic performance in diagnosing significant HF (>= F2) was compared using generalized estimating equation.

RESULTS

All parameters except Dt showed a significant negative correlation with the HF stage ($P < 0.05$). Among these, DDC# showed the strongest negative correlation with the HF stage ($\rho = -0.61$). The diagnostic accuracy for HF staging was highest for DDC# (Obuchowski measures, 0.770 ± 0.03) followed by a# (0.768 ± 0.04), DDC (0.748 ± 0.03), and Dp (0.728 ± 0.04). The accuracy of DDC# (78.9%) for determining significant HF (>= F2) was significantly higher than that of ADC, Dt, and f ($P < 0.05$). Dp showed similar accuracy (74.7%) with DDC# for determining >= F2 ($P > 0.999$), but revealed significantly lower specificity than DDC# (61.4% vs. 93.2%, $P < 0.001$). The diagnostic performance of DDC and a obtained with all b-values were not significantly different from those with 6 b-values (DDC#, a#) ($P > 0.05$).

CONCLUSION

Stretched exponential DWI is a promising method in the staging of HF. DDC showed comparable or better diagnostic performance with Dp even at fewer b-value acquisition.

CLINICAL RELEVANCE/APPLICATION

Stretched exponential DWI is a promising noninvasive method for classifying the severity of hepatic fibrosis, and it has the advantage of reducing scanning time with fewer b-value acquisitions.

SSE08-03 Evaluation of 2-D Ultrasound Shear Wave Elastography, Magnetic Resonance Elastography and Transient Elastography for the Non-Invasive Diagnosis of Advanced Fibrosis in Patients with Nonalcoholic Fatty Liver Disease: Preliminary Results

Monday, Nov. 27 3:20PM - 3:30PM Room: E352

Participants
Alessandro Furlan, MD, Pittsburgh, PA (*Presenter*) Book contract, Reed Elsevier; Research Grant, General Electric Company; Consultant, General Electric Company
Mitchell E. Tublin, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Lan Yu, PhD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Mike Clark, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Amir Borhani, MD, Pittsburgh, PA (*Abstract Co-Author*) Consultant, Guerbet SA; Author, Reed Elsevier
Matthew T. Heller, MD, Gibsonia, PA (*Abstract Co-Author*) Author, Reed Elsevier; Consultant, Reed Elsevier;
Jaideep Behari, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

furlana@upmc.edu

PURPOSE

To evaluate the performance of 2D ultrasound shear wave elastrography (2D-SWE), magnetic resonance elastography (MRE) and transient elastography (TE) for the diagnosis of advanced fibrosis in patients with biopsy-proven nonalcoholic fatty liver disease (NAFLD).

METHOD AND MATERIALS

In this IRB-approved, cross-sectional study 35 (21F, 14M) adult subjects (mean age, 50 years) with biopsy-proven NAFLD were prospectively recruited. The patients underwent 2D-SWE, MRE and TE the same day and with a median interval time of 72 days from liver biopsy. 2D-SWE was performed on a GE LOGIQ E9 scanner. MRE was conducted on a 1.5T scanner using a 2D-GRE sequence (GE Healthcare). TE was performed on Fibroscan (Echosens) using the XL probe. The median of measurements in the right hepatic lobe was considered for statistical analysis. Histologic evaluation included the fibrosis stage (F0-4) and the NAFLD activity score (NAS). Receiver operating characteristic (ROC) analysis was used to evaluate the performances of 2D-SWE, MRE and TE in diagnosing advanced fibrosis (F3-F4). Logistic regression analysis was used to assess the effect of BMI and NAS score on the diagnostic performance.

RESULTS

The distribution of fibrosis stage was as follow: F1, n=10; F2, n=13; F3, n=6; F4, n=4. 2D-SWE, MRE and TE detected advanced fibrosis with an area under the ROC (AUROC) respectively of 0.85 (95% confidence interval [CI], 0.72-0.97; P=0.001), 0.95 (95%

CI, 0.88-1.0; P<0.001) and 0.94 (95% CI, 0.86-1.0; P<0.001). The mean ± SD BMI was 34.5 ± 7.3 kg/m2 and the mean ± SD NAS was 4.7±1.4. NAS was significantly associated with changes in AUROC (Odds ratio=3.1; P=0.012).

CONCLUSION

2D-SWE, MRE and TE are highly accurate methods for the non-invasive diagnosis of advanced fibrosis in patients with NAFLD.

CLINICAL RELEVANCE/APPLICATION

Ultrasound and MR-based elastography methods are highly accurate for the detection of advanced fibrosis in patients with NAFLD.

SSE08-04 Correlation of Liver Stiffness Values Measured by Transient Elastography with Histopathologic Grading of Hepatic Fibrosis by Quantitative Morphometric Measurement and Semi-Quantitative Analysis

Monday, Nov. 27 3:30PM - 3:40PM Room: E352

Participants
So Hyun Park, MD, Incheon, Korea, Republic Of (*Presenter*) Nothing to Disclose
So Yeon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Roh, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sang-Yeob Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yun Jae Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung Soo Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Moon-Gyu Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

sykim.radiology@gmail.com

PURPOSE

To correlate liver stiffness values measured by transient elastography with two different histopathologic fibrosis grading systems, i.e. quantitative morphometric measurement of the fibrosis area and semi-quantitative analyses using the METAVIR score

METHOD AND MATERIALS

This prospective study was approved by the institutional review board and informed consent was obtained. We finally enrolled 74 subjects who were examined by transient elastography and underwent liver resection for focal hepatic lesions (60 subjects) or donor lobectomy (14 subjects) from March 2015 to January 2016. The time interval between transient elastography and liver resection was less than one month. Histopathologic hepatic fibrosis was graded quantitatively by using morphometry of the fibrosis area and semi-quantitatively by using the METAVIR score. The Spearman correlation coefficient (ρ) was used to examine the correlation between liver stiffness values measured by transient elastography and the two histopathologic fibrosis grading systems. The correlation between the two histopathologic fibrosis grading systems was also analyzed.

RESULTS

Liver stiffness values measured by transient elastography were poorly correlated with quantitiative morphologic analysis of the fibrosis area ($\rho = 0.305$, $P = 0.008$), while they were much better correlated with the METAVIR score ($\rho = 0.729$, $P < 0.001$). The correlation between the two histopathologic fibrosis grading systems was also poor and not significant ($r = 0.265$, $P = 0.265$).

CONCLUSION

Liver stiffness values measured by transient elastography were correlated better with semi-quantitative histopathologic grading than with qualitative morphometric analyses.

CLINICAL RELEVANCE/APPLICATION

This study enhances our understanding of physical properties measured by US elastography on the basis of histopathologic backgrounds.

SSE08-05 Two-Center Experience with Ultrasound Elastography in Cirrhosis: Factors Affecting the Application of SRU Consensus Guidelines

Monday, Nov. 27 3:40PM - 3:50PM Room: E352

Participants
Amol Shah, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
David T. Fetzer, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Stefan J. Friemel, MD, Irving, TX (*Abstract Co-Author*) Nothing to Disclose
Chandra Sehgal, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Anil Chauhan, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

Amol.Shah@uphs.upenn.edu

PURPOSE

1) To evaluate if patients with known hepatic cirrhosis have shear wave velocities of >2.2 m/s, the cutoff for advanced fibrosis established by recent SRU guidelines.2) To identify potential patient or technique-related factors that can lower the otherwise expected high stiffness measurements in patients with cirrhosis.

METHOD AND MATERIALS

In this IRB-approved study, we identified 131 patients with known cirrhosis from two large academic centers. Thirty of these patients did not qualify due to lack of sufficient criteria for cirrhosis, 17 were excluded due to high interquartile range/median value

(>0.3), and 2 were considered invalid due to unexpectedly high numbers (>5 m/s). All of the remaining 82 patients underwent Acoustic Radiation Forced Impulse (ARFI) Shear Wave Elastography (SWE) using a Philips EPIQ ultrasound machine. Ten shear wave velocity (SWV) measurements were obtained and the median was considered the final SWV.

RESULTS

Patient age ranged from 28-79 years (mean 58). SWV ranged from 1.17-2.66 m/s. Only 9 (11%) patients met the SRU cutoff of SWV > 2.2 m/s for advanced fibrosis, and 9 (11%) patients demonstrated normal SWV (<1.34 m/s). There was weak correlation (0.3-0.5) between SWV and elevated liver function tests (LFTs) as well as lower platelet counts. However, there was no correlation between SWV and HCV titers, serum fibrosis/inflammation tests, body-mass-index, age, and presence of portal hypertension. All patients with sustained viral response (SVR) and/or Harvoni treatment had SWV <1.8 m/s, but there was no significant difference in SWV between patients with and without SVR.

CONCLUSION

The vast majority (89%) of patients with cirrhosis demonstrate SWV less than the SRU cutoff of 2.2 m/s. Only weak correlation was noted between SWV and LFTs as well as low platelet counts. No other factors demonstrated a significant effect on SWV alone, indicating a multifactorial approach may be more appropriate. Our study suggests that revision of the current SRU cutoff may be necessary in the near future.

CLINICAL RELEVANCE/APPLICATION

The current SRU cutoff of SWV > 2.2 m/s would miss the majority of patients with advanced fibrosis (including cirrhosis) and thus revision of these guidelines may be necessary in the near future.

SSE08-06 Hepatic Sinusoidal Obstruction Syndrome: Diagnostic Value of Ultrasound Shear-Wave Elastography - An Experimental Study in a Rat Model

Monday, Nov. 27 3:50PM - 4:00PM Room: E352

Participants
Eun Kyoung Hong, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ijin Joo, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kyoung-Bun Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyo-Cheol Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seunghyun Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyoung In Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Young Lee, MD,PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic value of ultrasound shear-wave elastography (SWE) in the assessment of hepatic sinusoidal obstruction syndrome (SOS) in a monocrotaline (MCT)-induced rat SOS model.

METHOD AND MATERIALS

The institutional animal care and use committee approved this study. Twenty rats were randomly divided into four groups with five animals each. Each group of animals were administered phosphate-buffered saline vehicle, or different doses of MCT (90, 160, and 200 mg/kg) by gavage. All rats underwent liver stiffness measurement (LSM) by 2D ultrasound SWE and immediately sacrificed to obtain liver tissue. LSMs were correlated with histologic grades of SOS using Spearman's rank correlation test, and receiver operating characteristic (ROC) curve analysis was performed to determine the accuracy and cutoff values for SOS severity.

RESULTS

According to histologic analysis, 10, 4, and 6 rats were categorized as having none, mild, and moderate/severe SOS, respectively. LSM by ultrasound SWE showed significant correlation with SOS severity (rho = 0.91, P <0.001) with means of 6.2, 10.5, and 12.3 kPa, in none, mild, and moderate/severe SOS, respectively. The area under the ROC curves were 0.98 (none vs. mild or moderate/severe) and 0.93 (none or mild vs. moderate/severe) with optimal cutoffs of LSM of 7.9 and 8.5 kPa, respectively.

CONCLUSION

LSM by ultrasound SWE may be helpful in the diagnosis and severity classification of hepatic SOS.

CLINICAL RELEVANCE/APPLICATION

Hepatic sinusoidal obstruction syndrome (SOS), a drug-induced liver injury, is associated with increased morbidity after major hepatectomy. Therefore, there has been a great need of a noninvasive quantitative test for diagnosis and monitoring of hepatic SOS. This animal study suggests that ultrasound shear wave elastography can be useful in the noninvasive assessment of hepatic SOS while further validation is needed in human subjects.

SSE10

Science Session with Keynote: Gastrointestinal (Contrast Enhanced Ultrasound)

Monday, Nov. 27 3:00PM - 4:00PM Room: E353C

GI US BQ

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Anthony E. Samir, MD, Boston, MA (*Moderator*) Consultant, Pfizer Inc; Consultant, General Electric Company; Consultant, PAREXEL International Corporation; Research Grant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, Toshiba Medical Systems Corporation; Research Grant, General Electric Company; Research Grant, Samsung Electronics Co, Ltd; Research Grant, Analogic Corporation; Research support, SuperSonic Imagine; Research support, Hitachi, Ltd
Aya Kamaya, MD, Stanford, CA (*Moderator*) Nothing to Disclose

Sub-Events

SSE10-01 Gastrointestinal Keynote Speaker: Update on Contrast Enhanced Ultrasound (CEUS)

Monday, Nov. 27 3:00PM - 3:10PM Room: E353C

Participants
Anthony E. Samir, MD, Boston, MA (*Presenter*) Consultant, Pfizer Inc; Consultant, General Electric Company; Consultant, PAREXEL International Corporation; Research Grant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, Toshiba Medical Systems Corporation; Research Grant, General Electric Company; Research Grant, Samsung Electronics Co, Ltd; Research Grant, Analogic Corporation; Research support, SuperSonic Imagine; Research support, Hitachi, Ltd

SSE10-02 Preoperative and Intraoperative Contrast-Enhanced Ultrasound (CEUS/IOCEUS) of Liver Tumors in Comparison to Magnetic Resonance Imaging and Histopathology

Monday, Nov. 27 3:10PM - 3:20PM Room: E353C

Participants
Ernst Michael Jung, MD, Regensburg, Germany (*Presenter*) Speaker, Bracco Group
Isabel Wiesinger, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Christian R. Stroszczynski, MD, Regensburg, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic significance of preoperatively and intraoperatively performed contrast-enhanced ultrasound (CEUS/IOCEUS) in the diagnosis of liver tumors, in comparison to magnetic resonance imaging (MRI) and histopathology.

METHOD AND MATERIALS

Findings of CEUS and IOCEUS were compared to MRI findings in 70 cases. CEUS and IOCEUS were performed using multifrequency linear probes (1-5, 6-15 MHz) after bolus injection of 1-5 ml sulphur hexaflouride microbubbles. Evaluation of histopathology after surgical resection, of MRI morphology (T1, T2, VIBE, Diffusion sequences) and wash-in/wash-out-kinetics of CEUS.

RESULTS

In 70 analyzed patient cases 64 malignant liver lesions could be detected 6 patients had benign liver lesions. Among the 64 malignant lesions there were 28 metastases, 24 hepatocellular carcinomas (HCC), 9 cholangiocellular carcinomas (CCC) and 3 gallbladder carcinomas. There was no significant difference when determining the lesion's malignancy/ benignity (p=1,000). Furthermore, there was no statistical significance between preoperative CEUS and MRI regarding the general differential diagnosis of a tumor (p=0,210) and the differential diagnosis classification between HCCs (p=0,453) and metastases (p=0,250).There was no statistical significance in tumor size (10 mm - 151 mm; Mean 49 mm SD +/- 31 mm) and localization (tumor size p=0,579; allocation to liver lobes p=0,132; segment diagnosis p=0,121) between preoperatively performed CEUS and MRI. IOCEUS offered the substantial advantage of locating additional liver lesions (p=0,004 compared to preoperative MRI, p=0,002 compared to preoperative CEUS). In 10/37 cases (27%) IOCEUS could locate further liver lesions which had not been recognized during CEUS and/or MRI preoperatively, so that operative therapy was adapted accordingly and resection was extended if necessary.

CONCLUSION

During liver operations CEUS plays an important role in surgical therapy decisions.

CLINICAL RELEVANCE/APPLICATION

After FDA permission very important indication for CEUS

SSE10-03 Hepatic Artery Obstruction after Liver Transplantation: Diagnostic Performance of CT Angiography and Contrast-Enhanced US

Monday, Nov. 27 3:20PM - 3:30PM Room: E353C

Participants
Jin Sil Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Kyoung Won Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Soyeong Jeong, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
So Yeon Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jae Hyun Kwon, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Gi Won Song, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung Gyu Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

truth0508@nate.com

PURPOSE

To evaluate diagnostic performance of computed tomographic angiography (CTA) and contrast-enhanced US (CEUS) to diagnose significant hepatic artery obstruction (HAO) in liver transplantation (LT) recipients suspected of HAO by Doppler US.

METHOD AND MATERIALS

The institutional review board approved this study, with a waiver of informed consent. Among 1246 adult LTs with 1320 grafts performed in a single institution from Jan 2014 to Feb 2017, 132 grafts in 130 recipients were suspected of HAO by Doppler US (no flow detection or pulsus parvus pattern). Of these, reference diagnosis of HAO was made by surgery (artery revision or retransplantation), hepatic arteriography, or by associated cross-sectional CT abnormality. We excluded 21 grafts in which neither CTA nor CEUS was obtained within 24 hours of reference diagnosis and the other 111 grafts with CTA (n=91), CEUS (n=68), or both (n=48) within 24 hours of the diagnosis were finally included. CTA and CEUS were retrospectively reviewed and the diagnostic performance of CTA and CEUS was assessed. Diagnostic accuracies of CTA and CEUS were compared using McNemar test in grafts evaluated with both modalities.

RESULTS

Incidence of significant HAO was 1.7% (23/1320). Most significant HAOs were found within 2 weeks after LT (mean, 8.7 days). The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of CTA were 92.9% (26/28), 91.0% (59/63), 86.7% (26/30), 96.7% (59/61), and 93.4% (85/91), respectively. Those of CEUS were 94.7% (18/19), 93.9% (46/49), 85.7% (18/21), 97.9% (46/47), and 94.1% (64/68), respectively. The accuracies of the two modalities were not significantly different ($p = 0.68$). CTA found one HAO that were missed by CEUS, and CEUS found two HAOs that were missed by CTA, vice versa. All false positive cases (n=4) of CTA were stenosis more than 50 % without significant flow disturbance. Two of three false positive cases of CEUS were dual grafts with poor sonic window.

CONCLUSION

Both CEUS and CTA are helpful and complementary tool for diagnosis of significant HAO in recipients with suspected HAO with Doppler US. CEUS was more accurate than CTA, but there was no statistical significance.

CLINICAL RELEVANCE/APPLICATION

Both CEUS and CT are helpful and complementary tool for evaluation of significant hepatic artery obstruction in recipients with suspected hepatic artery abnormality with Doppler US.

SSE10-04 Quantitative Ultrasound Spectroscopy to Differentiate Between Hepatocellular Carcinoma and At-Risk Liver Parenchyma

Monday, Nov. 27 3:30PM - 3:40PM Room: E353C

Participants
Isabelle Durot, MD, Stanford, CA (*Presenter*) Nothing to Disclose
Ahmed El Kaffas, PhD, Palo Alto, CA (*Abstract Co-Author*) Co-founder, Oncoustics
Rosa Maria Silveira Sigrist, MD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Ronesh Puri, Toronto, ON (*Abstract Co-Author*) Co-founder, Oncoustics
Jarrett Rosenberg, PhD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Nishita Kothary, MD, Stanford, CA (*Abstract Co-Author*) Scientific Advisor, Siemens AG;
Juergen K. Willmann, MD, Stanford, CA (*Abstract Co-Author*) Research Consultant, Bracco Group Research Grant, Siemens AG Research Grant, Bracco Group Research Grant, Koninklijke Philips NV Research Grant, General Electric Company Advisory Board, Lantheus Medical Imaging, Inc Advisory Board, Bracco Group

For information about this presentation, contact:

durot@stanford.edu

PURPOSE

Ultrasound is the first-line imaging technology for HCC screening in high risk patients; however, it has limited sensitivity and specificity, in particular in patients with liver cirrhosis. Quantitative ultrasound spectroscopy (QUS) is an emerging technology that allows differentiation of tissue microstructures by analyzing the radiofrequency (RF) signals backscattered from biological tissues. QUS is independent of operator or instrumental settings by normalizing ultrasound signals against a reference. The aim of this study was to clinically assess QUS parameters in HCC compared to cirrhotic and non-cirrhotic at risk liver parenchyma.

METHOD AND MATERIALS

This prospective HIPAA-compliant study was approved by the IRB. Fifteen patients with liver cirrhosis and HCC and 15 non-HCC patients with chronic liver disease (7 chronic hepatitis B; 7 chronic hepatitis C; 1 cryptogenic cirrhosis) were included. Ultrasound RF data were obtained from each of the eight liver segments as well as from all HCC lesions by using an Ultrasonix Tablet at 2 center frequencies (3.3 and 5 MHz) and at 4 focal depths (3, 6, 9 and 12 cm). Regions-of-interest (ROI) were drawn and the three quantitative spectral parameters including mid-band fit (MBF), spectral intercept (SI), and spectral slope (SS) were extracted. Differences in QUS parameters were tested by a mixed-effects regression on ROI location.

RESULTS

There was a significant intra-individual difference in MBF and SI values between HCC and cirrhotic liver parenchyma (p<0.001), as well as a significant inter-individual difference between HCC lesions and the liver parenchyma in at-risk non-HCC liver parenchyma (p<0.001) (Figure). No statistical significance was noted between any of the parameters obtained in liver cirrhosis vs. non-cirrhotic at-risk liver parenchyma. No statistical significance was noted for the SS parameter between any of the groups.

CONCLUSION

The two QUS parameters MBF and SI are significantly different in HCC vs. non-HCC liver parenchyma and could be used for improved HCC detection.

CLINICAL RELEVANCE/APPLICATION

QUS is a complementary technology that can be further developed for improving screening results of ultrasound in patients at increased risk for HCC.

SSE10-05 Diagnostic Performance of 2015 American Thyroid Association Consensus Guidelines, 2005 Society of Radiologists in Ultrasound Consensus Guidelines and a Morphologic-based Likert Scale for Thyroid Cancer Detection after Ultrasound Guided FNA

Monday, Nov. 27 3:40PM - 3:50PM Room: E353C

Participants
Nelly Tan, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Katrina R. Beckett, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Nagesh Ragavendra, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Rinat Masamed, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Michael L. Douek, MD, MBA, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Hannah Chung, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

nelly.tan@gmail.com

PURPOSE

To evaluate the performance of 2015 American Thyroid Association (ATA) Consensus Guidelines, 2005 Society of Radiologists in Ultrasound (SRU) Consensus Guidelines, and a morphology-based Likert scale for detecting thyroid cancer after fine needle aspiration (FNA) of thyroid nodules.

METHOD AND MATERIALS

A HIPAA-compliant, IRB-approved prospective study of 986 patients who underwent FNA from July 2014 to June 2016 was performed. Clinical, imaging, and pathology information were extracted from the medical records. The diagnostic performance of ATA, SRU and a morphologic-based Likert scale for predicting malignancy were assessed. Area under the receiver operating characteristic curve values for each of the reference guidelines and each interpreter were determined and subsequently compared.

RESULTS

986 patients with 1170 nodules were evaluated. The nondiagnostic rate was 63/1170 (5.4%). The malignancy rate was 162/1170 (13.8%). Papillary thyroid cancer made up 160/162 (71.6%) of the thyroid malignancies. Non-diagnostic FNAs (63/1170, 5.4%) were excluded, and the remaining 1107 nodules were analyzed. 691/1107 (62.4%) of nodules met 2005 SRU criteria for FNA. Of those, 90/691 (13.0%) were malignant on FNA. 686/1107 (62.0 %) of nodules met 2015 ATA criteria for FNA. Of those, 108/686 (15.8%) were malignant. 435/1170 (39%) of nodules reached suspicion levels of 3-5 on a 5 point morphologic based Likert scale. Of those 121/435 (27.8%) were malignant. The AUC for predicting malignancy for the morphologic-based Likert scale was 0.76; for ATA 0.68; and for SRU 0.57.

CONCLUSION

A morphologic-based Likert Scale performed better than 2015 ATA Consensus Guidelines, which performed better than the 2005 SRU Consensus Guidelines in predicting thyroid cancer on FNA.

CLINICAL RELEVANCE/APPLICATION

Our study supports the importance of morphologic-based criteria in predicting thyroid malignancy and the need for inter-societal consensus and guidelines, so that primary care physicians, radiologists, endocrinologists and endocrine surgeons can follow standardized lexicon and recommendations.

SSE10-06 Utility of Contrast Enhanced Ultrasound (CEUS) in the Evaluation of Postoperative Recurrence of Crohn's Disease

Monday, Nov. 27 3:50PM - 4:00PM Room: E353C

Participants
Mj Martinez-Perez, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Tomas Ripolles, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Juan M. Pazos Guarin, MD, Valencia, Spain (*Presenter*) Nothing to Disclose
Jose M. Paredes, MD, PhD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Eduardo Moreno, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Fructuoso Delgado, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

chusjmartinez@gmail.com

PURPOSE

To assess the diagnostic accuracy of contrast enhanced ultrasound (CEUS) in the detection of endoscopic postsurgical recurrence of Crohn´s disease (CD) and its severity compared with ileocolonoscopy.

METHOD AND MATERIALS

A prospective study of 108 patients with CD who had undergone ileocolonic resection was performed. Several sonographic parameters were analyzed: neoterminal ileum wall thickness, transmural complications, color Doppler grade and contrast mural enhancement. Colonoscopy results were evaluated according the Rutgeerts score. The ability of ultrasound (US) and CEUS to diagnose endoscopic recurrence, as well as its severity, was assessed by calculating the sensitivity, specificity and positive and negative predictive values, accuracy and odds ratio. In addition a sonographic scale of severity was designed, including our best cutoff and data described in the literature. This scale and the combination of parameters were compared with endoscopic findings of severity.

RESULTS

Recurrence was detected in 90 cases (83%), and severe recurrence was present in 57% of them. The best parameters for the diagnosis of postsurgical endoscopic recurrence were: a) wall thickness >= 3 mm, with sensitivity 94%, specificity 72% and accuracy 91%, with good agreement with the colonoscopy (k = 0.66) and b) the combination of wall thickness >= 3 mm and enhancement >=46 % showing sensitivity, specificity and accuracy of 91%, 89% and 91%, respectively, with good agreement (k = 0.70). The sonographic score of severity obtained a sensitivity of 90% and specificity of 74% in the detection of severe endoscopic recurrence. The presence of any of the next three parameters, thickness >= 6 mm, thickness between 5-6 mm with mural enhancement or the presence of extraintestinal complications showed the best results for the diagnosis of severe recurrence (sensitivity 90%, specificity 87% and accuracy 89%).

CONCLUSION

The combination of neoterminal ileum wall thickness and the parameters of contrast enhanced ultrasound (CEUS) show excellent sensitivity and specificity for the detection of postoperative recurrence in CD and can predict its severity.

CLINICAL RELEVANCE/APPLICATION

CEUS is a tool that can increase our confidence in both postoperative recurrence detection and severity assessment in Crohn´s disease. The application of CEUS in the management of this type of patients can be an alternative to colonoscopy in the follow-up.

SPSI25

Special Interest Session: Integration of CEUS into Radiology Practice

Monday, Nov. 27 4:30PM - 6:00PM Room: N228

US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Andrej Lyshchik, MD, PhD, Philadelphia, PA (*Moderator*) Research support, Bracco Group; Advisory Board, Bracco Group; Research support, General Electric Company; Research support, Siemens AG; Research support, Toshiba Medical Systems Corporation; Speaker, SonoScape Co, Ltd; ;

For information about this presentation, contact:

Andrej.Lyshchik@jefferson.edu

LEARNING OBJECTIVES

1) To provide the participants with overview of contrast-enhanced ultrasound applications and discuss integration of CEUS into clinical radiology practice.

Sub-Events

SPSI25A How to Integrate CEUS into Your Radiology Practice

Participants
Richard G. Barr, MD, PhD, Campbell, OH (*Presenter*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Toshiba Medical Systems Corporation; Research Grant, Esaote SpA; Research Grant, BK Ultrasound; Research Grant, Hitachi, Ltd

LEARNING OBJECTIVES

1) To review current approaches of CEUS integration in clinical radiology practice including which patients are appropriate for CEUS, brief review of how to develop a CEUS program, and discussion of on label and off label uses of CEUS based on the literature.

ABSTRACT

This lecture will review current approaches of CEUS integration in clinical radiology practice including which patients are appropriate for CEUS, brief review of how to develop a CEUS program, and discussion of on label and off label uses of CEUS based on the literature.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Richard G. Barr, MD, PhD - 2017 Honored Educator

SPSI25B CEUS: Technique, Protocols and Lexicon

Participants
Andrej Lyshchik, MD, PhD, Philadelphia, PA (*Presenter*) Research support, Bracco Group; Advisory Board, Bracco Group; Research support, General Electric Company; Research support, Siemens AG; Research support, Toshiba Medical Systems Corporation; Speaker, SonoScape Co, Ltd; ;

For information about this presentation, contact:

Andrej.Lyshchik@jefferson.edu

LEARNING OBJECTIVES

1) To review basics of CEUS image acquisition including available contrast agents, scanner settings, image acquisition protocols and lexicon of imaging findings.

SPSI25C CEUS in Multi-Modality Assessment of Benign and Malignant Liver Disease in the Non-cirrhotic Liver

Participants
Stephanie R. Wilson, MD, Calgary, AB (*Presenter*) Equipment support, Koninklijke Philips NV; Equipment support, Siemens AG; Equipment support, Samsung Electronics Co, Ltd; Speaker, General Electric Company; Speaker, Koninklijke Philips NV; Speaker, Saumsung

For information about this presentation, contact:

stephanie.wilson@ahs.ca

LEARNING OBJECTIVES

1) To review CEUS characteristics of focal liver lesions in non-cirrhotic liver and discuss value of CEUS in multimodality liver tumor assessment.

SPSI25D CEUS in Multi-Modality Assessment of the Liver at Risk for HCC

Participants
Hyun-Jung Jang, MD, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hyun-jung.jang@uhn.ca

LEARNING OBJECTIVES

1) To describe use of CEUS in patients at risk for HCC including. 2) To understand recently proposed CEUS LI-RADS and CEUS integration with CT and MRI LI-RADS.

SPSI25E Multimodality Assessment of Renal Masses: Combination of CEUS and CT/MRI

Participants
Wui K. Chong, MD, Houston, TX (*Presenter*) Advisory Board, Bracco Group;

For information about this presentation, contact:

wkchong@mdanderson.org

LEARNING OBJECTIVES

1) To provide overview of CEUS imaging characteristics of benign and malignant renal masses and describe value of CEUS in multimodality renal mass imaging.

SPSI25F Molecular Imaging with CEUS

Participants
Juergen K. Willmann, MD, Stanford, CA (*Presenter*) Research Consultant, Bracco Group Research Grant, Siemens AG Research Grant, Bracco Group Research Grant, Koninklijke Philips NV Research Grant, General Electric Company Advisory Board, Lantheus Medical Imaging, Inc Advisory Board, Bracco Group

For information about this presentation, contact:

Willmann@stanford.edu

LEARNING OBJECTIVES

1) To learn the principle of molecular imaging with CEUS. 2) To understand clinical indications of molecular imaging with CEUS. 3) To learn about the first feasibility, safety and efficacy data of molecular imaging with CEUS in patients.

ABSTRACT

Molecular imaging with ultrasound has recently moved into first-in-human clinical trials. This talk focuses on clinical indications and early clinical data in patients with prostate, ovarian, and breast cancer using ultrasound molecular imaging.

RSNA 2017 Explore. Invent. Transform.
103rd Scientific Assembly and Annual Meeting
November 26 to December 1
McCormick Place, Chicago
Explore Invent Transform

RC304

Musculoskeletal Series: Ultrasound

Tuesday, Nov. 28 8:30AM - 12:00PM Room: E450A

MK US

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

FDA Discussions may include off-label uses.

Participants
Marnix T. van Holsbeeck, MD, Detroit, MI (*Moderator*) Consultant, General Electric Company; Stockholder, Koninklijke Philips NV; Stockholder, General Electric Company; Stockholder MedEd3D; Grant, Siemens AG; Grant, General Electric Company;
Ogonna K. Nwawka, MD, New York, NY (*Moderator*) Research Grant, General Electric Company
Jon A. Jacobson, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose
Kambiz Motamedi, MD, Los Angeles, CA (*Moderator*) Nothing to Disclose
Arvin Kheterpal, MD, Philadelphia, PA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Access the results of new research and access their potential applications to clinical practice. 2) Research will be integrated with the hands-on practice of established techniques of musculoskeletal ultrasound.

Sub-Events

RC304-01 Elbow Ultrasound (Demonstration)

Tuesday, Nov. 28 8:30AM - 9:05AM Room: E450A

Participants
Marnix T. van Holsbeeck, MD, Detroit, MI (*Presenter*) Consultant, General Electric Company; Stockholder, Koninklijke Philips NV; Stockholder, General Electric Company; Stockholder MedEd3D; Grant, Siemens AG; Grant, General Electric Company;

LEARNING OBJECTIVES

View Learning Objectives under main course title

RC304-02 Shear Wave Ultrasound Evaluation of the Supraspinatus Muscle: Anisotropy and Age Considerations

Tuesday, Nov. 28 9:05AM - 9:15AM Room: E450A

Participants
Alexander N. Merkle, MD, New York, NY (*Presenter*) Nothing to Disclose
Benjamin Abiri, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Dana Lin, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
James S. Babb, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Ronald S. Adler, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Evaluation of muscle atrophy in the rotator cuff is integral to preoperative evaluation, with implications for repair outcomes. Preliminary work suggests that shear wave elastography (SWE) provides a more robust quantitative assessment of muscle status. The effects of age and transducer orientation in this cohort have not yet been fully evaluated. Anisotropy may be of substantial importance, yet recent literature describing SWE application to muscle has varied in probe orientation, with uncertain effect. Age has also been shown to affect muscle SWE measurements, likely independent of visible atrophy. We hypothesize that probe orientation affects measurement and that changes in stiffness occur in aging.

METHOD AND MATERIALS

IRB approval and informed consent were obtained. 11 asymptomatic subjects with SWE of one or both shoulders resulted in 19 eligible studies. Exams were performed with a 9MHz linear transducer on a Siemens S3000 scanner with VTIQ software (Siemens). Absence of supraspinatus (SSM) fatty degeneration was confirmed in subjects under 40 by US evaluation. Concurrent MRI confirmation was required in subjects over 40 (N = 6). SWE measurements of the SSM in the longitudinal (parallel to fibers) and transverse orientations were obtained at the midpoint of the muscle belly under mild preload positioning.

RESULTS

A highly significant difference was seen between mean velocities measured in long and trans in the SSM ($p < 0.001$). A highly significant difference in velocity variance was also seen between trans and long orientations ($p=0.002$), with increased variance in trans. A weakly significant increase in mean velocity was seen in an over 40 subgroup in long orientation (3.95 vs 4.00 cm/s; $p = 0.048$), with a paradoxical decrease in mean velocity in trans position in the same subgroup (6.75 vs 5.00 cm/s; $p < 0.001$).

CONCLUSION

Effects of anisotropy in SWE measurement may be substantial in vivo. Longitudinal probe orientation appears to provide less

variance. Mildly increased stiffness seen in normal older subjects in the longitudinal orientation more closely corresponds to prior histologic and other findings, which may support using the longitudinal position for muscle elastography.

CLINICAL RELEVANCE/APPLICATION

Interpretation of shear wave ultrasound elastography in muscle.

RC304-03 Rotator Cuff Calcifictendinitis: Ultrasound-Guided Needling and Lavage vs Subacromial Corticosteroids - Five-Year Outcomes of a Randomized Controlled Trial

Tuesday, Nov. 28 9:15AM - 9:25AM Room: E450A

Participants
Pieter Bas de Witte, MD, Leiden, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Arjen Kolk, Leiden, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Ferdinand Overes, Leiden, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Rob G. Nelissen, MD, Leiden, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Monique Reijnierse, MD, Leiden, Netherlands (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

m.reijnierse@lumc.nl

PURPOSE

To compare the long-term results of two regularly applied treatments in patients with RCCT: ultrasound (US)-guided barbotage combined with US-guided corticosteroids injection in the subacromiall bursa (SAI0 (Group I) vs. US-guided SAI alone (Group II)

METHOD AND MATERIALS

Patients were randomly assigned to Group I (barbotage and SAI) or II (SAI) and evaluated before and after treatment at regular time-points until 12 months and in addition at 5 years, using the Constant Score (CS, primary outcome), the Western Ontario Rotator Cuff Index (WORC) and the Disabilities of the Arm, Shoulder and Hand score (DASH). Calcifications' location, size and Gartner classification were assessed on radiographs. Rotator cuff condition was evaluated with US. Results were analyzed using t-tests, linear regression and a mixed model for repeated measures.

RESULTS

48 patients were included (mean age 52 (SD=7.3), 25 (52%) females) with an average baseline CS of 69 (SD=11.9). After a mean follow-up of 5.1 years (SD=0.5), mean CS was 90 points (95%-CI:83.0-95.9) in Group I vs 87 (95%-CI:80.5-93.5) in Group II (p=0.58). Average CS improvement in Group I was 18 points (95%-CI:12.3-23.0) vs 21 (95%-CI: 16.2-26.2) in Group II (p=0.32). There was a total resorption of all calcifications in 62% of Group I and 73% in Group II (p=0.45). Rotator cuff status with ultrasound was not significantly different between the groups.With the mixed model the repeated measurements, taking into account baseline CS and Gartner classification, average additional treatment effect was 6 points (95%-CI: -8.9-21.5) in favor of barbotage, but without statistical significance. Follow-up scores were significantly associated with baseline scores and duration of follow-up. Results for DASH and WORC were similar.

CONCLUSION

Wheras results were significantly superior for barbotage after 1 year of follow-up, no more significant differences were found in clinical and radiological outcomes between both treatment groups after 5 years.

CLINICAL RELEVANCE/APPLICATION

Our results show that both treatments lead to short-term clinical improvement, with superior outcome after 6 and 12 months. However, on the longer term (>5 years), mean results are good in both groups. This suggests that barbotage mainly seems to accelerate the natural course.This in concordance with several retrospective and descriptive follow-up studies, showing good long-term outcomes of barbotage and more conservative methods.

RC304-04 Value of Real-time Sonoelastography for Evaluation of Medial Epicondylitis

Tuesday, Nov. 28 9:25AM - 9:35AM Room: E450A

Participants
Minwoo Shin, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seok Hahn, MD, Busan, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jisook Yi, MD, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the diagnostic ability of real-time sonoelastography for medial epicondylitis by the investigation and comparison in clinically suspected patients and asymptomatic patients

METHOD AND MATERIALS

Our study was retrospective. From July 2016 to March 2017, forty-seven elbows of 41 patients (17 males and 24 females; mean 54.4 years +/- 11.6 years) consecutively were performed gray-scale sonography and compression-based real-time color-coded sonoelastography. The two regions of interest; the lesion of common flexor tendon (R1) for the target area and the adjacent normal tendon (R2) for a reference area were obtained to calculated. These patients were divided into two groups consisted of patients who clinically suspected medial epicondylitis and asymptomatic patients based on the patient's symptoms and signs in a physical examination performed by a 12-year experienced orthopedic surgeon. A 10-year experienced radiologist evaluated gray-scale sonography finding (swelling, hypoechogenicity, calcification, and tear) and elastographic grade with 3-point visual scale. There sonographic finding, elastographic grade, and strain ratio were compared between two groups by Mann-Whitney test and diagnostic performance was by receiver operating characteristic curves for elastographic grade and strain ratio.

RESULTS

Of the 41 patients, 13 patients with 16 elbows were diagnosed clinically and 28 patients with 31 elbows had no symptom. Swelling (p=0.551), calcification (p=0.365), and tear (p=0.365) on gray-scale sonography finding showed no significant difference between two groups. However, hypoechogenicity, elastographic grade, and strain ratio showed significant difference (p<0.001), respectively. The areas under the receiver operating characteristic curve were 0.852 (95% confidence interval, 0.689-0.950) for elastographic grade and 0.983 (95% confidence interval, 0.886-1.000) for strain ratio, respectively.

CONCLUSION

Elastographic grade and strain ratio from real-time sonoelastography are valuable and can be sufficient supplementary diagnostic tools in the diagnosis of medial epicondylitis.

CLINICAL RELEVANCE/APPLICATION

When evaluating clinically suspected medial epicondylitis and gray-scale ultrasound finding is not satisfy to diagnose, real-time sonoelastography will be helpful.

RC304-05 Shoulder Ultrasound (Demonstration)

Tuesday, Nov. 28 9:35AM - 10:10AM Room: E450A

Participants
Ogonna K. Nwawka, MD, New York, NY (*Presenter*) Research Grant, General Electric Company

LEARNING OBJECTIVES

View Learning Objectives under main course title

RC304-06 Ankle Ultrasound (Demonstration)

Tuesday, Nov. 28 10:20AM - 10:55AM Room: E450A

Participants
Jon A. Jacobson, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View Learning Objectives under main course title

Honored Educators

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RC304-07 Diagnostic Performance of Ultrasound Examination for the Diagnosis of Ulnar Neuropathy at the Elbow: A Systematic Review and Meta-Analysis of 1349 Examinations

Tuesday, Nov. 28 10:55AM - 11:05AM Room: E450A

Participants
Nima Hafezi Nejad, MD, MPH, Baltimore, MD (*Presenter*) Nothing to Disclose
Ogonna K. Nwawka, MD, New York, NY (*Abstract Co-Author*) Research Grant, General Electric Company
Yoshimi Endo, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Theodore T. Miller, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
John A. Carrino, MD, MPH, New York, NY (*Abstract Co-Author*) Research Consultant, BioClinica, Inc Research Consultant, Pfizer Inc Research Consultant, Carestream Health, Inc Advisory Board, General Electric Company Advisory Board, Halyard Health, Inc

For information about this presentation, contact:

carrinoj@hss.edu

PURPOSE

Ulnar Neuropathy at the Elbow (UNE) is one of the most common entrapment neuropathies. Diagnostic accuracy of Ultrasound (US) examination for the diagnosis of UNE has been explored in numerous studies with limited sample sizes for more than a decade. The purpose of our study was to investigate the current state of literature and to pool the results of smaller studies and quantify the accuracy of US examination for the diagnosis of UNE.

METHOD AND MATERIALS

We performed a systematic literature search of PubMed, EMBASE, Scopus and Web of Science for studies evaluating the diagnostic accuracy of US examination in the setting of UNE. From 774 retrieved records, 24 studies were eligible for inclusion, 13 of which were included in the final analysis. Details of the study designs, US examinations and Nerve Conduction Studies (NCS) were extracted and compared. High between-study heterogeneity was detected (I2 > 0.40), and Random Effect Modeling (DerSimonian-Laird) was utilized throughout the study. Sensitivity analysis was performed to confirm the pooled results' robustness considering differences in study designs, reported ulnar nerve Cross Sectional Areas (CSAs) and CSA cut-offs, use of NCS in confirming the UNE diagnosis, and the departments where the study was conducted. Effect of age, gender, CSA mean (among patients and controls) and CSA cut-off on the Diagnostic Odds Ratio (DOR) was evaluated in the meta-regression analysis.

RESULTS

Pooling the results from 1349 examinations, US examination had a sensitivity of 79.6%(76.4-82.6), specificity of 84.2%(81.2-86.9), DOR of 32.00(16.16-63.36), positive and negative likelihood ratios of 4.54(3.28-6.27) and 0.19(0.12-0.29), respectively. A CSA value of greater 10 cm2 was the most commonly used cut-off. The results were consistent in the sensitivity analysis. Mean/median value of CSA in patients (but not in controls) was a significant predictor of the DOR (beta:0.34±0.11; P:0.02). Every 1 cm2 higher

CSA was associated with 41% increase in the DOR (Relative DOR: 1.41(1.09-1.83)). Receiver Operating Characteristics (ROC) curve analysis demonstrated an excellent performance with the Area Under the Curve (AUC) of 0.917±0.020 (P<0.05).

CONCLUSION

US examination has an acceptable sensitivity (~80%) and specificity (~84%) for the diagnosis of UNE.

CLINICAL RELEVANCE/APPLICATION

We quantified the accuracy of US examination for the diagnosis of UNE in a large meta-analysis by pooling examination level data.

RC304-08 Ultrasound Evaluation of Radial Nerve Palsy Associated with Humeral Shaft Fracture to Guide Operative Versus Conservative Treatment

Tuesday, Nov. 28 11:05AM - 11:15AM Room: E450A

Participants
Mihra S. Taljanovic, MD, Tucson, AZ (*Presenter*) Nothing to Disclose
Melissa Esparza, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Lana H. Gimber, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Tyson S. Chadaz, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Lisa Truchan, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Kurt Mohty, BS, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Jason Wild, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Radial nerve palsies are commonly associated with humeral shaft fractures. Ultrasound (US) evaluation of the radial nerve allows for differentiation of nerve injury secondary to contusion or stretch injuries which are managed conservatively versus laceration or entrapment which require surgical treatment. The purpose of this study is to determine the effectiveness of US at evaluating the condition of the radial nerve in the setting of humeral shaft fractures and determine if surgical management is needed.

METHOD AND MATERIALS

A retrospective review of US studies in patients with radial nerve palsy associated with humeral shaft fractures was conducted. Seventeen patients were identified who met inclusion criteria. Five patients with US diagnosis of radial nerve laceration and/or entrapment underwent prompt ORIF of their humeral shaft fracture. One patient with US diagnosis of complete radial nerve laceration underwent surgery 6 weeks after injury with tendon transfer. Others were initially treated conservatively with 5 patients undergoing subsequent surgical treatment for other reasons unrelated to radial nerve palsy. Clinical, operative and US results were compared.

RESULTS

Of 17 patients, 11 (64.7%) were male and 6 (35.3%) female. Average age was 48.9. Ground level fall and motor vehicle accidents were the most common mechanisms of injury. In 6 patients who underwent initial ORIF of their humeral shaft fracture, US correctly diagnosed 1 partial radial nerve laceration with entrapment, and 4 radial nerve entrapments which were operatively confirmed. In one patient US failed to see the radial nerve at the fracture site which was proven to be complete transection at surgery. In 5 surgically treated patients without radial nerve entrapment or laceration, US diagnosis was concordant with surgical findings. In 5 patients who were treated conservatively, clinical follow-up showed radial nerve recovery. US findings were 100% concordant with surgical findings.

CONCLUSION

US provides accurate diagnosis of radial nerve injuries in patients with humeral shaft fractures and helps in treatment guidance.

CLINICAL RELEVANCE/APPLICATION

US is effective in evaluating radial nerve palsy in humeral shaft fractures by separating patients with laceration/entrapment requiring surgery from those with neurapraxia managed nonoperatively.

Honored Educators

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RC304-09 Improving Operator Dependence in Shear Wave Elastography of the Median Nerve and Carpal Tunnel Flexor Tendons with a Probe Scaffold: Reducing Barriers to Clinical Adoption

Tuesday, Nov. 28 11:15AM - 11:25AM Room: E450A

Participants
Matthew B. O'Brien, MD, Detroit, MI (*Presenter*) Nothing to Disclose
Marnix T. van Holsbeeck, MD, Detroit, MI (*Abstract Co-Author*) Consultant, General Electric Company; Stockholder, Koninklijke Philips NV; Stockholder, General Electric Company; Stockholder MedEd3D; Grant, Siemens AG; Grant, General Electric Company;
Nickolas Nahm, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Lisa M. Walker, MD, Berkley, MI (*Abstract Co-Author*) Nothing to Disclose
Andrew M. Petraszko, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

matthewo@rad.hfh.edu

PURPOSE

Ultrasound elastography (EUS) of the median nerve is of increasing interest in diagnosic Carpal Tunnel Syndrome (CTS). Shear Wave Elastography (SWE) is an EUS subtype less well studied with CTS, but offers promise in quantitative measurement. We evaluated the reproducibility and inter-observer agreement of median nerve SWE across varying experience levels using a simple probe scaffold for acquisition.

METHOD AND MATERIALS

15 cadaver wrists were evaluated with B-mode and SWE. Cross sectional area (CSA) of the nerve was measured at the level of the pronator quadratus (CSAp) and at the carpal tunnel (CSAc). Multiple SWE measurements of the nerve in the carpal tunnel and the adjacent third flexor tendon were obtained. Three observers ranged from 1.5 years to no experience. Velocity readings were made based on a region of interest on a GE Logiq E9 with a 9 MHz transducer, (GE, Milwaukee, WI, USA.)

RESULTS

No wrists were excluded. Intra-class correlation coefficients demonstrated excellent to good agreement between all three observers except for a single moderate agreement, (ICCs ranged from 0.836-0.996, 95% CI ranging from 0.592-0.999; exception 0.746, 95% CI 0.412-0.903.) Median nerve velocities ranged from 2.49 - 5.65 m/s. No significant correlation between CSAp and CSAc was found.

CONCLUSION

Using the scaffold, SWE velocities were highly reliable across multiple observers of variable experience. This is particularly relevant given known challenges of SWE in narrow, bone-enclosed areas such as the carpal tunnel. The scaffolding reduces the highly operator dependent characteristics of EUS and in particular SWE. The lack of correlation between CSA and nerve velocities was likely due to multiple freeze-thaw cycles and the effects on the cadaveric tissue.

CLINICAL RELEVANCE/APPLICATION

A scaffold reduces SWE operator dependence even in untrained observers, a current limitation of clinical EUS, and could facilitate clinical adoption of SWE in CTS and other diagnoses.

RC304-10 Peripheral Nerves Ultrasound (Demonstration)

Tuesday, Nov. 28 11:25AM - 12:00PM Room: E450A

Participants
Kambiz Motamedi, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kmotamedi@mednet.ucla.edu

Active Handout:Kambiz Motamedi

http://abstract.rsna.org/uploads/2017/17000346/Active RC304-10.pdf

LEARNING OBJECTIVES

1) To optimize the ultrasound equipment and choice of probes for proper nerve sonography. 2) To identify the nerves and recognize the proper anatomic landmarks for their precise localization. 3) To understand the value of cine imaging throughout the course of the affected nerve. 4) To understand the morphology and location of the nerves depending on patient positioning. 5) To become familiar with common locations of nerve entrapment syndromes, such as fibroosseus and fibromuscular tunnels.

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RC310

Emergency Obstetrical Ultrasound

Tuesday, Nov. 28 8:30AM - 10:00AM Room: E451A

OB US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

LEARNING OBJECTIVES

1) Recognize sonographic signs of early pregnancy failure and understand which sonographic signs are definitive for pregnancy failure and which are suspicious for but not diagnostic of pregnancy failure. 2) Diagnose and exclude ectopic pregnancy based on sonographer findings, and recognize unusual ectopic pregnancies, such as interstitial and cervical ectopic pregnancy. 3) Use ultrasound to identify the causes of bleeding and pain during pregnancy in each of the three trimesters. 4) Recognize placental abnormalities, including abruption, previa, and accreta, and understand how the sonographic appearance of abnormalities of the placenta may change as pregnancy progresses.

Sub-Events

RC310A Abnormal Findings in Early Intrauterine Pregnancies

Participants
Carol B. Benson, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify a very early intrauterine pregnancy and understand that previously published signs of early pregnancy are not always present when the gestational sac is first identified. 2) Recognize sonographic signs of early pregnancy failure and understand which sonographic signs are definitive for pregnancy failure and which are suspicious for but not diagnostic of pregnancy failure. 3) Understand which sonographic findings indicate that a pregnancy may subsequently miscarry, even though an embryonic heartbeat is present at the time of the sonogram. 4) Understand the role of hGC measurement in the evaluation of pain and bleeding in early pregnancy.

RC310B Acute Pain in the First Trimester

Participants
Peter M. Doubilet, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

pdoubilet@bwh.harvard.edu

LEARNING OBJECTIVES

1) How to diagnose miscarriage in early pregnancy. 2) How to diagnose ectoopic pregnancy. 3) How to diagnose ovarian torsion.

RC310C Second and Third Trimester Emergencies

Participants
Paula J. Woodward, MD, Salt Lake City, UT (*Presenter*) Editor, Reed Elsevier

For information about this presentation, contact:

paula.woodward@hsc.utah.edu

LEARNING OBJECTIVES

1) Recognize the imaging features and be confident in diagnosing cervical insufficiency, vasa previa, and morbidly adherent placenta.

ABSTRACT

Emergencies in the 2nd and 3rd trimester include preterm birth or conditions which pose a significant risk of morbidity or mortality to either the fetus or mother at the time of delivery.

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RC352

US-guided Interventional Breast Procedures (Hands-on)

Tuesday, Nov. 28 8:30AM - 10:00AM Room: E264

BR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants

Stamatia V. Destounis, MD, Scottsville, NY (*Presenter*) Hologic, Inc. Scientific Advisory Board
Gary J. Whitman, MD, Houston, TX (*Presenter*) Book contract, Cambridge University Press
Jean M. Seely, MD, Ottawa, ON (*Presenter*) Nothing to Disclose
Basak E. Dogan, MD, Dallas, TX (*Presenter*) Nothing to Disclose
William R. Poller, MD, Pittsburgh, PA (*Presenter*) Consultant, Devicor Medical Products, Inc; Consultant, General Electric Company;
Paula B. Gordon, MD, Vancouver, BC (*Presenter*) Stockholder, OncoGenex Pharmaceuticals, Inc ; Scientific Advisory Board, Real Imaging Ltd; ;
Annamaria Wilhelm, MD, Jacksonville, FL (*Presenter*) Nothing to Disclose
Michael N. Linver, MD, Albuquerque, NM (*Presenter*) Scientific Advisory Board, Hologic, Inc; Scientific Advisory Board, Real Imaging Ltd; Scientific Advisory Board, Seno Medical Instruments, Inc
Anna I. Holbrook, MD, Atlanta, GA (*Presenter*) Nothing to Disclose
Eren D. Yeh, MD, Boston, MA (*Presenter*) Reader, Hologic, Inc; Reader, Statlife SAS
Gary W. Swenson, MD, Mason City, IA (*Presenter*) Nothing to Disclose
Catherine W. Piccoli, MD, Voorhees, NJ (*Presenter*) Stockholder, Qualgenix LLC;
Phan T. Huynh, MD, Houston, TX (*Presenter*) Nothing to Disclose
Jiyon Lee, MD, New York, NY (*Presenter*) Nothing to Disclose
Tanya W. Moseley, MD, Houston, TX (*Presenter*) Nothing to Disclose
Peter R. Eby, MD, Seattle, WA (*Presenter*) Consultant, Leica Biosystems Nussloch GmbH
Alexis V. Nees, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
H. Carisa Le-Petross, MD, FRCPC, Houston, TX (*Presenter*) Nothing to Disclose
Santo Maimone IV, MD, Jacksonville, FL (*Presenter*) Nothing to Disclose
Susan Weinstein, MD, Philadelphia, PA (*Presenter*) Consultant, iCAD, Inc
Rachna Dutta, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Liane E. Philpotts, MD, New Haven, CT (*Presenter*) Consultant, Hologic, Inc
Jessica W. Leung, MD, Houston, TX (*Presenter*) Nothing to Disclose
Jennifer R. Kohr, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Laurie R. Margolies, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jeseely@toh.ca

cpiccoli@sjra.com

rdutta@metrohealth.org

sdestounis@ewbc.com

liane.philpotts@yale.edu

aiholbr@emory.edu

Jennifer.Kohr@virginiamason.org

peter.eby@virginiamason.org

eyeh@bwh.harvard.edu

jiyon.lee@nyumc.org

LEARNING OBJECTIVES

1) Describe the equipment needed for ultrasound guided interventional breast procedures. 2) Review the basic principles of ultrasound guidance and performance of minimally invasive breast procedures. 3) Practice hands-on technique for ultrasound guided breast interventional procedures.

ABSTRACT

This course is intended to familiarize the participant with equipment and techniques in the application of US guided breast biopsy and needle localization. Participants will have both basic didactic instruction and hands-on opportunity to practice biopsy techniques on tissue models with sonographic guidance. The course will focus on the understanding and identification of: 1) optimal positioning for biopsy 2) imaging of adequate sampling confirmation 3) various biopsy technologies and techniques 4) potential problems and pitfalls

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SSG01

Breast Imaging (Ultrasound Diagnostics)

Tuesday, Nov. 28 10:30AM - 12:00PM Room: E451A

BR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Donna M. Plecha, MD, Strongsville, OH (*Moderator*) Research Grant, Hologic, Inc;
Susan Weinstein, MD, Philadelphia, PA (*Moderator*) Consultant, iCAD, Inc

Sub-Events

SSG01-01 A Multi-center Study of ABUS for the Diagnosis of Breast Cancer in China

Tuesday, Nov. 28 10:30AM - 10:40AM Room: E451A

Participants
Xi Lin, Guangzhou, China (*Presenter*) Nothing to Disclose
Ling-Yun Bao, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Xiang Zhou, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Yaqing Chen, PhD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Peifang Liu, MD, PhD, Tianjin, China (*Abstract Co-Author*) Nothing to Disclose
You-Lin Qiao, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Anhua Li, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

linxi@sysucc.org.cn

PURPOSE

Mammography (MAM) is the first choice of breast screening. However, its practicability is limited in Asian due to dense breast. Meanwhile, hand held ultrasound (HHUS) has obvious operator dependece and poor repeatability. Automated Breast Ultrasound System (ABUS) is a potential method to alleviate current challenges. This study aims to evaluate the initial effectiveness of ABUS by comparing it with Hand Held Ultrasound (HHUS) and Mammography (MAM) in a hospital-based multi-center study.

METHOD AND MATERIALS

Women between the ages of 30 to 69 who visited breast surgeons for the first time without visible, suspicious signs of breast cancer were eligible for our study. All participants underwent HHUS and ABUS, and women in the older group (40 to 69 years old) also received MAM. Image interpretations were done without knowledge of clinical or other imaging results. Lesions classified as BI-RADS 4 or 5 were considered to be "suspicious", and BI-RADS 1 to 3 lesions were assessed as "benign". So far, 1010 eligible women had been enrolled and 656 in the older group. Taking breast as the unit of analysis, we had acquired 2020 HHUS results, 2020 ABUS results and 1312MAM results. The consistency rates and Kappa statistics were calculated to assess the reliability of ABUS compared with HHUS or MAM.

RESULTS

The average subject age was 45.32 (SD 9.756) in the whole group and 50.82 (SD 7.489) in the older group. Of all the 2020 breasts, HHUS detected 395 suspicious lesions and ABUS detected 356 suspicious lesions. Among the 395 suspicious lesions detected by HHUS, ABUS detected 327; In the older group, ABUS detected 275 suspicious lesions and MAM detected 259 suspicious lesions. Among the 259 suspicious lesions detected by MAM, only 41 lesions were undetected by ABUS. Among the 275 lesions detected by ABUS, only 57 were not detected by MAM. Specifically, the consistency rate between HHUS and ABUS was 95.2%, and that between ABUS and MAM was 92.53%. The Kappa value between ABUS and HHUS was 0.8414 and that of ABUS and MAM in the older group was 0.7696.

CONCLUSION

Fairly good reliability was observed in comparisons between ABUS and HHUS or MAM in our initial analysis. It is feasible for all the radiologists with a short term of training of ABUS to have similar lesion interpretation as HHUS or MAM by specialists. ABUS is a promising modality in breast imaging.

CLINICAL RELEVANCE/APPLICATION

ABUS is a promising modality in breast imaging.

SSG01-02 Tumor Doubling Time of Breast Cancer Measured By Ultrasonography: Correlation with Tumor Subtype, Ki-67 Value and Nuclear Grade

Tuesday, Nov. 28 10:40AM - 10:50AM Room: E451A

Participants
Kazuaki Nakashima, MD, Nagaizumi, Japan (*Presenter*) Nothing to Disclose
Takayoshi Uematsu, MD, PhD, Nagaizumi, Japan (*Abstract Co-Author*) Nothing to Disclose
Kaoru Takahashi, MD, Nagaizumi, Japan (*Abstract Co-Author*) Nothing to Disclose
Seiichirou Nishimura, MD, Nagaizumi, Japan (*Abstract Co-Author*) Nothing to Disclose
Takashi Sugino, MD, Nagaizumi, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate tumor doubling time (DT) of breast cancers using ultrasonography and compare DT with tumor subtypes and histopathological findings.

METHOD AND MATERIALS

We included 262 patients with invasive breast carcinomas who received serial ultrasonography (US) at least twice during preoperative period from April 2014 to September 2016. The mean interval between initial and second US was 56.5 days (range, 12-119). Ultrasound examinations were performed by four experienced ultrasonographers. Tumor diameters were measured in three directions and tumor volumes were approximated by ellipsoids. The DT was calculated according to the Collins method from the interval between US examinations and the change in tumor volume. We also compared DT with tumor subtypes, Ki-67 values and nuclear grades. Tumor subtypes were defined as luminal (ER+/HER2-), luminal-HER2 (ER+/HER2+), HER2 (ER-/HER2+), and triple negative (ER-/HER2-).

RESULTS

The mean tumor volume at initial and second US were 2994 mm3 and 3299 mm3, respectively. The observed volume did not change in 94 of 262 (36%) tumors between initial and second US and increased in 124 of 207 (60%) luminal, 12 of 15 (80%) luminal-HER2, 9 of 13 (69%) HER2, and 23 of 27 (85%) triple-negative tumors. Triple-negative tumors showed volume increase more frequently than luminal tumors ($p = 0.011$). Mean DT of luminal tumors was longer than that of triple-negative tumors (190 and 128 days, respectively; $p = 0.042$). Volume-increased tumors had significantly higher Ki-67 values than those of volume-stable tumors (all subtypes, 31 vs 18; $p < 0.001$, luminal, 24 vs 17; $p = 0.002$) and higher nuclear grades (all subtypes, 1.77 vs 1.41; $p = 0.001$, luminal, 1.50 vs 1.29; $p = 0.022$). In triple-negative tumors, Ki-67 values of short DT (< 90 days) tumors were significantly higher than those of long DT (> 90 days) tumors (mean, 83 and 41, respectively; $p = 0.005$).

CONCLUSION

The difference of tumor growth rate depending on breast cancer subtype, Ki-67 value and nuclear grade was confirmed by measuring DT using ultrasonography.

CLINICAL RELEVANCE/APPLICATION

Considering breast cancer subtypes and other pathological factors are helpful in predicting tumor growth rate and planning surgical waiting time or neoadjuvant chemotherapy.

SSG01-03 The Importance of Peritumoral Comparisons by Ultrasound Tomography: Radiomics and Breast Mass Discrimination

Tuesday, Nov. 28 10:50AM - 11:00AM Room: E451A

Participants
Gursharan Sandhu, PhD, Novi, MI (*Presenter*) Employee, Delphinus Medical Technologies, Inc
Peter J. Littrup, MD, Providence, RI (*Abstract Co-Author*) Founder, CryoMedix, LLC ; Research Grant, Galil Medical Ltd; Research Grant, Endo International plc ; Consultant, Delphinus Medical Technologies, Inc
Mark Sak, PhD, Novi, MI (*Abstract Co-Author*) Employee, Delphinus Medical Technologies, Inc
Naveen Murthy, MS, Plymouth, MI (*Abstract Co-Author*) Employee at Delphinus Medical Technologies
Neb Duric, PhD, Detroit, MI (*Abstract Co-Author*) Officer, Delphinus Medical Technologies, Inc
Mary W. Yamashita, MD, Los Angeles, CA (*Abstract Co-Author*) Research Grant, Delphinus Medical Technologies, Inc
Rachel F. Brem, MD, Washington, DC (*Abstract Co-Author*) Board of Directors, iCAD, Inc; Board of Directors, Dilon Technologies, Inc; Stock options, iCAD, Inc; Stockholder, Dilon Technologies, Inc; Consultant, Dilon Technologies, Inc; Consultant, ClearCut Medical Ltd; Consultant, Delphinus Medical Technologies, Inc

For information about this presentation, contact:

gsandhu@delphinusmt.com

PURPOSE

Ultrasound tomography (UST) provides quantitative whole breast imaging that may improve the specificity of breast cancer screening and diagnoses by combining reflection (REF), attenuation (ATT) and speed of sound (SS) imaging. We assessed whether multiple image analyses of radiomics could improve discrimination of benign from malignant masses.

METHOD AND MATERIALS

This HIPAA compliant, IRB approved trial accrued 115 patients with 161 breast masses. Sequential coronal REF images and quantitative transmission imaging of SS (m/sec) and ATT (dB/cm/MHz) were generated at 2mm spacing. For each mass, an experienced breast radiologist characterized tumor-peritumoral regions on a 5-point BIRADS-like margin boundary (MB) score ranging from well circumscribed to highly spiculated. Masses were outlined by a hand-drawn vs. simple ellipse ROI that generated an intra-tumoral (iT) and an outer radial peri-tumoral (pT) ROI (see Figure). Extensive radiomics parameters were analyzed to address quantitative and textural differences between benign and malignant masses and their iT:pT comparisons. Supervised learning techniques were applied to generate classifier models.

RESULTS

68 cancers, 55 fibroadenomas and 38 cysts were analyzed. Cancers had more irregular margins (N=47/68 with MB>=4) than cysts or fibroadenomas (0 total with MB>=4)(p<0.0001). Using only the radiologist's MB score with a cut-point of MB >= 3, a sensitivity (SEN) of 82%, specificity (SPE) of 91%, and a positive predictive value (PPV) of 88% was noted. 520 radiomic features were reduced to 47 with the greatest information gain, of which more pT than iT metrics were preserved. Morphological metrics from the hand-drawn contour gave similar results to the MB. Combing radiomics from the elliptical ROI and MB data using a support vector machine classifier gave SEN=82%, SPE=95%, and PPV=97%.

CONCLUSION

Radiomics and supervised learning techniques can improve radiologists' discrimination of breast masses by quantifying iT and pT textural detail to potentially improve biopsy PPV for an ongoing UST screening trial .

CLINICAL RELEVANCE/APPLICATION

A rapidly implemented ROI tool during future breast cancer screening by whole breast UST can gather sufficient radiomics data to support reductions in call-backs and biopsies. UST radiomics requires validation by a large number of breast masses.

SSG01-04 Associations Between the Ultrasound Features of Invasive Breast Cancer and Breast Cancer Specific Survival

Tuesday, Nov. 28 11:00AM - 11:10AM Room: E451A

Participants
Brooke Lawson, MD, Dundee, United Kingdom (*Presenter*) Nothing to Disclose
Jane Macaskill, Dundee, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Patsy Whelehan, MSc, Dundee, United Kingdom (*Abstract Co-Author*) Research Grant, Siemens AG; Collaboration, VolparaSolutions Ltd.
Kim Thomson, Dundee, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Sarah J. Vinnicombe, MRCP, FRCR, Dundee, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Yee Ting Sim, MBBCh, FRCR, Dundee, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Andrew Evans, MRCP, FRCR, Dundee, United Kingdom (*Abstract Co-Author*) Research Grant, SuperSonic Imagine; Speakers Bureau, SuperSonic imagine

For information about this presentation, contact:

brookelawson@nhs.net

PURPOSE

Pre-operative prognostic information is useful when treating women with breast cancer especially with regard to assessing the appropriateness of neoadjuvant chemotherapy. The aim of this study is to identify associations between the ultrasound (US) features of invasive breast cancer and breast cancer specific survival (BCSS).

METHOD AND MATERIALS

287 consecutive women within a single breast service (mean age 63 yrs) with US visible invasive breast cancers were documented prospectively between January 2010 and December 2012. The US features of the lesions were evaluated retrospectively from the recorded images according to the BI-RADS US lexicon by a breast radiologist blinded to outcomes. Survival, including cause of death, was ascertained from local and national sources. Kaplan-Meier survival curves were generated and statistical significance ascertained using the Log-Rank test.

RESULTS

Twenty seven breast cancer deaths and 31 non-breast cancer deaths occurred in the sample. Mean follow-up in those alive is 5.5 years. Distal acoustic enhancement was associated with a 72% 5 year BCSS compared to 93% and 97% for those with distal shadowing or no distal effect (p<0.0001). Skin involvement (either direct invasion or skin thickening over the mass) was associated with 78% 5 year BCSS compared to 94% in women without skin involvement (p=0.0001). Women in the highest tertile of US lesion diameter had a 5 year BCSS of 83% compared to 96% for women in the middle and smallest tertiles (p=0.0004). Mass shape, echogenicity and margin characteristics, orientation or BIRADS score were not associated with BCSS.

CONCLUSION

The presence of distal acoustic enhancement and skin involvement at US have strong associations with breast cancer death and these factors should be taken into account along with lesion size and other conventional prognostic features when considering management of women with invasive breast cancer. Our study is limited by a small sample size and relatively short follow-up. Further studies evaluating larger number of patients to assess patient outcomes will be of value.

CLINICAL RELEVANCE/APPLICATION

Distal acoustic enhancement and skin involvement at US seem to be poor prognostic factors strongly associated with breast cancer death, meriting consideration in initial management of breast cancer.

SSG01-05 Optoacoustic Imaging Detects Changes in Breast Parenchyma in Relation to Hormonal Status of Healthy Female Volunteers: An Important Step in Clinical-Translation

Tuesday, Nov. 28 11:10AM - 11:20AM Room: E451A

Participants
Oshaani Abeyakoon, MBBS, FRCR, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose
Stefan Morscher, Munchen, Germany (*Abstract Co-Author*) Employee, iThera Medical GmbH
Nina I. Malchus, PhD , Munich, Germany (*Abstract Co-Author*) Employee, iThera Medical GmbH
Steven Ford, PhD, Munich, United Kingdom (*Abstract Co-Author*) Employee, iThera Medical GmbH
Iosif A. Mendichovszky, MD, PhD, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Matthew G. Wallis, MD, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Penelope L. Moyle, MBChB, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Roido Manavaki, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

James Joseph, MSc,PhD, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Isabel Quiros Gonzalez, MSc,PhD, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Sarah Bohndiek, MSc,PhD, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Fiona J. Gilbert, MD, Cambridge, United Kingdom (*Abstract Co-Author*) Research Grant, Hologic, Inc; Research Grant, General Electric Company; Research Grant, GlaxoSmithKline plc

For information about this presentation, contact:

oshi.creativity@googlemail.com

PURPOSE

Optoacoustic imaging (OPUS) is an emerging clinical imaging modality that allows the assessment of tissue oxygenation through surrogate measures of oxy/deoxy and total hemoglobin. One of the first steps in establishing the clinical utility of an imaging technique is to evaluate its technical ability to depict the appearances of normal tissue and the impact of normal physiology on the imaging readout. The aim of our study was to evaluate the ability of OPUS to detect tissue oxygenation and vascularity changes in relation to hormonal status.

METHOD AND MATERIALS

Following IRB approval this prospective study was performed between January and July 2016. 22 pre-menopausal and 8 post-menopausal volunteers were recruited. Pre-menopausal volunteers were scanned using OPUS (700, 800 and 850 nm wavelengths) in the proliferative/follicular (day 5-14) and secretory phases (day 21-28) of the menstrual cycle. Repeatability data was available in 16 volunteers. Regions of interest for quantitative analysis were drawn on the most superficial region of fibroglandular tissue as determined by ultrasound in the left breast. Statistical analysis of the mean signal intensity of the ROIs was performed in GraphPad Prism (annova, linear regression and t tests).

RESULTS

Optoacoustic intensity rose significantly at all wavelengths: the mean values at 700, 800 and 850nm rose from 14.45, 14.47, 13.14 in the proliferative phase to 18.37, 18.14, 17.18 in the secretory phase ($p<0.01$). Post-menopausal volunteers showed similar optoacoustic features and values to the proliferative/follicular phase. Our hand-held probe showed high test-retest correlation ($r = 0.72$-0.81).

CONCLUSION

OPUS shows comparable repeatability to other hand-held breast imaging modalities and sensitively detects the expected changes in breast parenchyma vascularity during the menstrual cycle in healthy volunteers.

CLINICAL RELEVANCE/APPLICATION

When developing a new technique to evaluate breast disease e.g. optoacoustic imaging, it is important to establish the base line variation of normal and use known physiological physiological changes and repeatability data to refine and validate quantification of image intensity.

SSG01-06 Shear Wave Velocity of the Lesion in Preoperative Breast Ultrasonography: Association with Disease-Free Survival of Patients with Primary Operable Invasive Breast Cancer

Tuesday, Nov. 28 11:20AM - 11:30AM Room: E451A

Participants
Youichi Machida, MD, PhD, Chuo Ward, Japan (*Presenter*) Nothing to Disclose
Akiko Shimauchi, MD, Sendai, Japan (*Abstract Co-Author*) Nothing to Disclose
Hidemi Okuma, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Eisuke Fukuma, Kamogawa, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the relationship between shear wave velocity (SWV) of the lesion in preoperative breast ultrasonography (US) and disease-free survival in patients with primary operable invasive breast cancer.

METHOD AND MATERIALS

This retrospective study was approved by our institutional review board. The requirement for informed consent was waived. A total of 195 consecutive newly diagnosed invasive breast cancer patients (age 33-83 years; mean 54.0 years) who had undergone preoperative breast US with SWV measurement of the lesion and surgery between May 2012 and May 2013 were identified. SWV was measured at the center and three marginal zone in breast lesions using a 5 × 5 mm region of interest, and the maximum value was used. For 35 patients who underwent primary systemic therapy (PST), the maximum SWV before PST was used. Cox proportional hazards modeling was used to identify the relationship between clinical-pathologic factors and disease-free survival.

RESULTS

Fourteen recurrences occurred at 6-47 months (mean 22.3 months) after surgery. Larger lesion size (hazard ratio [HR] = 1.034; 95% confidence interval [CI]: 1.002, 1.066; P = 0.037), negative estrogen receptor status (HR = 0.335; 95% CI: 0.112, 0.999, P = 0.049), negative progesterone receptor status (HR = 0.274; 95% CI: 0.095, 0.789, P = 0.016), overexpression of human epidermal growth factor receptor-2 (HR = 4.109; 95% CI: 1.375, 12.282, P = 0.011), positive PST (HR = 6.754; 95% CI: 2.342, 19.481, P < 0.001), and higher maximum SWV (HR = 1.616; 95% CI: 1.113, 2.348, P = 0.012) were associated with poorer outcomes at univariate analysis. At multivariate analysis, positive PST (HR = 6.502; 95% CI: 2.248, 18.802, P = 0.001) and higher maximum SWV (HR = 1.583; 95% CI: 1.102, 2.275, P = 0.013) were associated with poorer disease-free survival.

CONCLUSION

Higher maximum SWV in preoperative US was significantly associated with poorer disease-free survival of patients with invasive breast cancer.

CLINICAL RELEVANCE/APPLICATION

SWV in preoperative US of primary operable invasive breast cancer could be useful for assessing disease-free survival after surgery

SWV in preoperative US of primary operable invasive breast cancer could be useful for assessing disease-free survival after surgery.

SSG01-07 Breast Ultrasound Utilization in the Emergency Setting: Can We Do Better?

Tuesday, Nov. 28 11:30AM - 11:40AM Room: E451A

Participants
Jessica H. Porembka, MD, Dallas, TX (*Presenter*) Nothing to Disclose
Pooja Sharma, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Lindsay Compton, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Lena A. Omar, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Haley R. Clark, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Richard W. Ahn, MD, PhD, Dallas, TX (*Abstract Co-Author*) Co-founder, ViXa LLC Stockholder, Vixa LLC
Ramapriya Ganti, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Yin Xi, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Travis Browning, MD, Dallas, TX (*Abstract Co-Author*) Consultant, McKesson Corporation
Jeffery Metzger, MD,MBA, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
John R. Leyendecker, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

jessica.porembka@utsouthwestern.edu

PURPOSE

To assess the clinical utility of breast ultrasound (US) performed in the emergency department (ED) for suspected breast abscess and to determine factors associated with confirmed abscess.

METHOD AND MATERIALS

Retrospective analysis of 581 consecutive breast US to evaluate for abscess in a large safety-net ED over a 15 month period was performed. Imaging results, demographics, laboratory data, and physical exam findings were reviewed. Breast abscess, defined by the presence of a fluid collection with clinical signs and symptoms of infection, was confirmed by a combination of US results, clinical findings, laboratory data, and when possible, the presence of purulent fluid.

RESULTS

Of the 581 US performed for suspected abscess, final diagnoses included: abscess (26%, n=150), malignancy (5%, n=27), granulomatous mastitis (5%, n=31), normal (21%, n=122) and other (including indeterminate, 43%, n=251). Clinical factors predictive of abscess on multivariable analysis included physical exam findings (induration, fluctuance, erythema, and drainage), smoking, and race. Based on these factors, the area under the curve (AUC) was 0.83 (CI 0.80-0.87) for the detection of abscess. The presence of temperature > 38 degrees Celsius and leukocytosis were not significant. Of 49 US performed for pain in the absence of additional physical exam findings, only 1 was positive for an abscess. Additional studies were recommended in 308 US, with 248 due to technical inadequacy or the need for mammographic evaluation. Six breast cancers were either not demonstrated or not diagnosed on US performed in the ED.

CONCLUSION

Breast US in the ED is overutilized and has limited clinical value given the low positivity rate, the need for repeat exams, and the risk of missed cancers. Use of both clinical findings and patient demographics can improve patient selection for and diagnostic utility of US to reduce unnecessary exams. Patients with a low likelihood of abscess should be imaged in a more optimal setting.

CLINICAL RELEVANCE/APPLICATION

This study will help clinicians better utilize emergent breast US services.

SSG01-08 Utility of Real-Time Breast Ultrasound Examination after Second Opinion Review of Submitted Studies in a Comprehensive Cancer Center

Tuesday, Nov. 28 11:40AM - 11:50AM Room: E451A

Participants
Joao V. Horvat SR, MD, New York, NY (*Presenter*) Nothing to Disclose
Donna D. D'Alessio, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Blanca Bernard-Davila, MPH,MS, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Danny F. Martinez, BSC,MSc, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Elizabeth A. Morris, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine if real-time diagnostic breast ultrasound evaluation after reinterpretation of submitted static ultrasound images at a comprehensive cancer center impacts clinical management, specifically by detecting additional cancer and preventing unnecessary biopsy.

METHOD AND MATERIALS

Retrospective HIPAA compliant IRB-approved review was performed of submitted breast ultrasound studies between January 2013 and May 2014 for 209 patients seeking second opinions for which real-time ultrasound re-evaluation (RTUR) at our institution was recommended to characterize lesions depicted on the submitted static images. Each case was evaluated for concordance between the original report and diagnostic RTUR. Second-opinion review and subsequent RTUR resulting in recommendation and performance of new biopsies was subdivided into benign, high-risk, and malignant based on histopathology obtained at our institution. Statistical analysis of new recommendations for biopsy and biopsies averted after RTUR was performed.

RESULTS

Mean patient age was 57 years (range,17-91). Average time between outside exam and RTUR was 31 days (range, 2-90). Following RTUR, 49 additional biopsies of lesions not originally recommended for biopsy were performed in 43/209 patients (20.1%; 95% CI

14.6-25.6%). 12/49 (24.5%) biopsies yielded cancer in 11/209 patients (5.3%; 95% CI 3.8-6.8%) and 4/49 (8.2%) high-risk lesions in 4/209 patients (1.9%; 95% CI 0-3.8%). 41 biopsies in 32 patients originally recommended were canceled after RTUR. One biopsy was subsequently performed due to ipsilateral multifocal carcinoma. Of 31/209 (14.8%; CI 10.0-19.6%) patients with biopsies averted, 20/31 (64.5%) had 1-year follow-up and 17/31 (54.8%) 2-year follow-up showing stability of RTUR findings. Overall, change in management after RTUR in 68/209 patients (32.5%; 95% CI 26.1-38.9%) yielded 12 additional cancers, 4 high-risk lesions and averted biopsy of 40 lesions.

CONCLUSION

RTUR after reinterpretation of submitted static ultrasound images at a comprehensive cancer center resulted in 49 additional biopsies, detecting 12 additional cancers, 4 high-risk lesions and averted 40 biopsies in 68 patients. RTUR led to a change in management in approximately 1/3 of patients.

CLINICAL RELEVANCE/APPLICATION

Real-time ultrasound re-evaluation after second opinion review of outside breast ultrasound studies can detect additional cancers and high-risk lesions and avert unnecessary biopsies.

SSG01-09 Shear Wave Elastography of the Breast Lesions: Quantitative Analysis of the Heterogeneous Elasticity Improves the Diagnosis Performance

Tuesday, Nov. 28 11:50AM - 12:00PM Room: E451A

Participants
Jian-Hua Zhou, MD, Guangzhou, China (*Presenter*) Nothing to Disclose
Yini Huang, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jing Han, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Fei Li, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jianwei Wang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Wei Zheng, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

zhoujh@sysucc.org.cn

PURPOSE

To evaluate whether addition of quantitative analysis of the heterogeneous elasticity (Ehetero) could improve the diagnosis performance of shear wave (SW) elastography in breast cancers.

METHOD AND MATERIALS

From October 2015 to February 2017, 239 patients with 255 breast lesions (126 benign, 129 malignant) were enrolled in this study. All lesions were evaluated with ultrasound Breast Imaging Reporting and Data System (BI-RADS) and VirtualTouch IQ shear wave elastography. Three region of interests (ROI) were placed over the highest stiffness or lowest stiffness area of the lesions to measure the SW velocity (SWV), respectively, and low SW quality area was avoided. Ehetero was determined as the difference between the averaged highest SWV and lowest SWV. The cut-off values for SWVmax and Ehetero were 5.06 m/sec and 1.44 m/sec, respectively. The diagnosis performances including area under the receiver operating characteristic curve (AUC), sensitivity, specificity, positive and negative likelihood ratio were determined for BI-RADS, SWVmax and Ehetero.

RESULTS

Ehetero showed the highest AUC (0.953; 95% confidence interval [CI]: 0.924 - 0.983), which was significantly higher than SWVmax (0.938; 95% CI: 0.908 - 0.968) (P<0.001) and BI-RADS (0.705; 95% CI: 0.662 - 0.748) (P<0.001), with a positive likelihood ratio of 19.53 (95% CI: 8.9 - 42.7) and a negative likelihood ratio of 0.07 (95% CI: 0.04 - 0.10). The sensitivity of Ehetero was 93.02% (95% CI: 87.2% - 96.8%), which was significant higher than SWVmax (83.72%, 95% CI: 76.2% - 89.6%) (P<0.001), while there was no significant difference for the specificity between Ehetero (95.24%, 95% CI: 89.9 - 98.2) and SWVmax (92.86%, 95% CI: 86.9 - 96.7) (P=0.375). Twelve of the Ehetero positive cancers were misdiagnosed by SWVmax and none of the SWVmax positive cancers was misdiagnosed by Ehetero. When to downgrade BI-RADS category 4a lesions, 3 of 12 malignancies would be misdiagnosed by using SWVmax along, while only 1 would be misdiagnosed by using Ehetero.

CONCLUSION

Quantitative analysis of the heterogeneous elasticity can improve SW elastography sensitivity in breast cancer detection, without losing of specificity.

CLINICAL RELEVANCE/APPLICATION

When using elastography to downgrade BI-RADS categoray 4a breast lesions, addition of quantitative analysis of the heterogeneous elasticity could decrease misdiagnosis.

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SSJ02

Breast Imaging (Ultrasound Advanced Applications)

Tuesday, Nov. 28 3:00PM - 4:00PM Room: E450A

BR US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants

Ellen B. Mendelson, MD,MA, Chicago, IL (*Moderator*) Medical Advisory Board, Delphinus Medical Technologies, Inc; Research support, Siemens AG; Speaker, Siemens AG; Consultant, Quantason LLC; Scientific Advisory Board, Seno Medical Instruments, Inc; ; ;
Regina J. Hooley, MD, New Haven, CT (*Moderator*) Consultant, Hologic, Inc

Sub-Events

SSJ02-01 Predictive Models for Contrast-Enhanced Ultrasound of the Breast: Is it Feasible, Does it Improve Imaging Reporting Performance and Data System Evaluation for Critical Breast Lesions? Primary Analysis from a Multi-Center Prospective Study

Tuesday, Nov. 28 3:00PM - 3:10PM Room: E450A

Participants
Jun Luo, MD, Chengdu, China (*Presenter*) Nothing to Disclose
Qin Chen, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose
Li Na Tang, Fuzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yijie Chen, Fuzhou, China (*Abstract Co-Author*) Nothing to Disclose
Lichun Yang, Kunming, China (*Abstract Co-Author*) Nothing to Disclose
Xiaomao Luo, Kunming, China (*Abstract Co-Author*) Nothing to Disclose
Ehui Han, Huangshi, China (*Abstract Co-Author*) Nothing to Disclose
Yinrong Chen, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose
Lijun Yuan, Xian, China (*Abstract Co-Author*) Nothing to Disclose
Yong Yang, MD, Xi'an, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

milton-lj@hotmail.com

PURPOSE

To determine whether a predictive model for contrast-enhanced ultrasound (CEUS) of the breast can improve the precision of breast imaging reporting and data system (BI-RADS) categorization.

METHOD AND MATERIALS

A total of 730 patients with 742 solid breast lesions classified as BI-RADS 4 or 5 on conventional ultrasound and mammography were evaluated. CEUS was performed before core needle biopsy or surgical resection and a revised BI-RADS classification was assigned based on six predictive models for CEUS of malignant and benign breast lesions analyzed on 10 enhancing patterns. Receiver operating characteristic curve analysis was conducted to evaluate the diagnostic performance of CEUS-based BI-RADS assignment with pathological examination as reference criteria.

RESULTS

The CEUS-based BI-RADS evaluation classified 262/742 (35.31%) lesions into category 3, 43 (5.79%), 27 (3.64%), and 47 (6.33%) lesions into categories 4A, 4B and 4C, respectively, and 363 (48.92%) into category 5, compared with 276/742 (37.19%), 199 (26.82%), 93 (12.53%), and 172 (23.18%) in BI-RADS 4A, 4B, 4C, and 5 based on conventional ultrasound and mammography. Selecting CEUS-based BI-RADS category 3 as an appropriate cutoff resulted in accuracy, sensitivity, specificity, and positive and negative predictive values of 80.05%, 98.26%, 64.32%, 70.42%, and 97.71%, respectively, for the diagnosis of malignant disease. The cancer-to-biopsy yield was 64.3% with CEUS-based BI-RADS 3 selected as the biopsy threshold compared with 46.42% otherwise, while the biopsy rate was only 72.2% compared with 100% otherwise. Overall, only 1.74% of invasive cancers were misdiagnosed as BI-RADS 3, the category we use nowadays.

CONCLUSION

In our patient cohort, evaluation of BI-RADS 4 or 5 breast lesions with CEUS results in reduced biopsy rates and increased cancer-to-biopsy yield.

CLINICAL RELEVANCE/APPLICATION

CEUS can improve the BI-RADS with reduced biopsy rates and increased cancer-to-biopsy yield.

SSJ02-02 Correlation of Quantitative and Qualitative US Indexes of Tumor Vascularity with Histologic Vascular Parameters in Breast Masses: Superb Microvascular Imaging (SMI) and Contrast-enhanced US

(CEUS)

Tuesday, Nov. 28 3:10PM - 3:20PM Room: E450A

Participants
Myoung-ae Kwon, Ansan-si, Korea, Republic Of (*Presenter*) Nothing to Disclose
Bo Kyoung Seo, MD, PhD, Ansan, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Toshiba Medical Systems Korea Co.,Ltd and Guerbet;
Eun Kyung Park, MD,PhD, Ansan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ah Young Park, MD, Ansan , Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jaehyung Cha, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ok Hee Woo, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kyu Ran Cho, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

kwon4715@gmail.com

PURPOSE

To investigate the correlation between quantitative and qualitative ultrasound (US) indexes of tumor vascularity on Superb Microvascular Imaging (SMI) and contrast-enhanced ultrasound (CEUS) and histologic vascular parameters in breast masses.

METHOD AND MATERIALS

This prospective study was approved by the institutional review board and written informed consent was obtained. Ninety-eight suspicious solid breast masses (57 benign and 41 malignant) were examined by SMI and CEUS prior to biopsy. We used Aplio 500 US equipment (Toshiba Medical Systems Corporation, Japan) and SonoVue contrast agent (Bracco, Italy). Two radiologists analyzed quantitative and qualitative vascularity indexes of SMI (vascular index, vessel morphology, distribution, and penetrating vessel) and CEUS (time intensity curve parameters and enhancement pattern). Histological vascular parameters, including microvessel density and diameter, were measured. Histological parameters according to tumor type, grade, and hormone receptor were compared using t- and Mann-whitney test. Correlations analysis was performed between US indexes and histologic parameters using spearman's correlation and Kruskal-Wallis test with Bonferroni correction.

RESULTS

Microvessel density was significantly higher in malignant masses than benign masses and malignant masses with negative estrogen receptor or high grade had higher microvessel density than those with positive estrogen receptor or low grade ($P<.05$). Microvessel diameter was not different between benign and malignant masses ($P>.05$). Quantitative US indexes including peak intensity ($r=0.546$), slope ($r=0.462$) and area ($r=0.574$) on CEUS and vascular index ($r=0.634$) on SMI were correlated with microvessel density ($P<.01$ for all). Qualitative US indexes including enhancement degree, enhancement order, penetrating vessel, perfusion defect on CEUS and vessel morphology, distribution, penetrating vessel were significantly correlated with microvessel density ($P<.01$ for all).

CONCLUSION

Quantitative and qualitative US indexes of tumor vascularity on SMI and CEUS are significantly correlated with histologic microvessel density in the corresponding tumor region.

CLINICAL RELEVANCE/APPLICATION

US vascularity indexes on SMI and CEUS could be used as surrogate markers representing histologic tumor microvessel density and may be used for predicting tumor angiogenesis in the preintervention period.

SSJ02-03 Optoacoustic Imaging of the Breast: Down-classification and Up-classification of Suspicious Breast Masses

Tuesday, Nov. 28 3:20PM - 3:30PM Room: E450A

Participants
Gisela d. Menezes, BArch, Utrecht, Netherlands (*Presenter*) Nothing to Disclose
Ruud Pijnappel, MD, PhD, Groningen, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Carla Meeuwis, Arnhem, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Bob Bisschops, Dordrecht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Jeroen Veltman, MD, Hengelo, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Philip T. Lavin, PhD, Framingham, MA (*Abstract Co-Author*) Research Consultant, Seno Medical Instruments, Inc
Marc van de Vijver, Amsterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Ritse M. Mann, MD, PhD, Nijmegen, Netherlands (*Abstract Co-Author*) Research agreement, Siemens AG; Research agreement, Seno Medical Instruments, Inc; Research agreement, Identification Solutions Inc; Research agreement, Micrima Limited; Scientific Advisor, ScreenPoint Medical BV

For information about this presentation, contact:

g.delimagomesdemenezes@umcutrecht.nl

PURPOSE

Optoacoustics (OA/US) imaging is a new technology based on laser light excitation. Combined with gray scale ultrasound, it enables simultaneous assessment of functional and anatomical information that may improve distinction between benign and malignant masses of the breast. The aim of this study was to assess OA/US's sensitivity, specificity and its ability to downgrade benign masses and upgrade malignant masses in terms of probability of malignancy (POM) and BI-RADS category.

METHOD AND MATERIALS

In this prospective, multi-center study, compliant with ISO14155 and applicable laws and regulations, we report results of 209 patients with 215 breast masses classified as BI-RADS 4a or 4b by conventional diagnostic ultrasound (CDU). Patients were enrolled

between 2015 and 2016. Institutional review board approval and written informed consent were obtained. All masses were evaluated with OA/US prior to biopsy. For each mass, the radiologist scored 5 OA/US features, and then adjusted the POM and BI-RADS category. OA/US sensitivity, specificity, BI-RADS downgrade and upgrade percentages were assessed with the contribution from an estimator.

RESULTS

OA/US specificity improvement over CDU was 41.1%. OA/US sensitivity was 95.5%. With OA/US, 41.1% of benign masses classified as BI-RADS 4a or 4b were downgraded to BI-RADS 3 or 2 and 49.2% of malignant masses were upgraded in BIRADS category.

CONCLUSION

OA/US improves the distinction between benign and malignant masses compared to CDU alone. Benign masses (particularly those classified as BI-RADS 4a) may be downgraded to BI-RADS 3 or 2 with OA/US, potentially decreasing negative biopsies and short interval follow-up imaging exams.

CLINICAL RELEVANCE/APPLICATION

With OA/US, many benign masses classified as BI-RADS 4a with CDU may be downgraded to BI-RADS 3 or 2, offering the potential to decrease biopsies of benign lesions and short interval follow-up imaging exams.

SSJ02-04 Targeted Axillary Dissection: Challenges with Axillary Lymph Node Clip Placement, Clip Identification, and Clip Retrieval post Neoadjuvant Therapy

Tuesday, Nov. 28 3:30PM - 3:40PM Room: E450A

Participants
Hee Jung Moon, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Abigail S. Caudle, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Henry M. Kuerer, MD, Houston, TX (*Abstract Co-Author*) Editor, NEJM Group; Editor, The McGraw-Hill Companies; Speakers Bureau, Physicians' Education Resource, LLC; Research funded, Genomic Health, Inc
Beatriz E. Adrada, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Rosalind P. Candelaria, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Wei T. Yang, MD, Houston, TX (*Presenter*) Consultant, General Electric Company; Advisory Board Member, Seno Medical Instruments Inc; Royalties, Reed Elsevier;
Lumarie Santiago, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Savitri Krishnamurthy, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Wei Wei, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

ywang@mdanderson.org

PURPOSE

Clinically node-positive breast cancer patients often receive neoadjuvant chemotherapy (NAC) which eradicates nodal disease in 40-70% of patients. Clip placement in biopsy-confirmed metastatic lymph nodes (LNs) allows for selective removal in addition to sentinel node removal after NAC as part of targeted axillary dissection (TAD). We report success rates of clip placement, clip identification, and clip retrieval in metastatic axillary nodes to facilitate TAD.

METHOD AND MATERIALS

A retrospective institutional review board approved study was performed of 2 cohorts of patients: 223 LNs in 222 patients with clip placement from October 1, 2011 to December 30, 2015 [cohort 1]; 100 LNs in 100 patients from January 1, to November 30, 2016 [cohort 2; changes were made to the ultrasound image capture protocol for the documentation of clipped lymph nodes after the first 5 years of performing this procedure that included measurement of distance from clip to skin in transverse and longitudinal planes at the time of placement]. Success rates of clip placement, clip identification, and clip retrieval, were compared with clinico-pathologic features in cohort 1, and also between the 2 cohorts.

RESULTS

Overall, clip placement failure occurred in 14/323 LNs (4.3%) and 9/310 (2.9%) clips were not identified on follow-up ultrasound. Of 223 clipped LNs that underwent radioactive seed placement, the clip and seed were successfully retrieved in the same LN in 215 (96.4%). In cohort 1, failure in clip identification was associated with larger number of abnormal lymph nodes at diagnosis, perinodal clip placement, thinner cortex after neoadjuvant therapy, and greater distance of node from skin. Clip location in the cortex was a significant predictor for clip retrieval. Cohort 2 had a higher rate of successful clip placement (99% vs 94.2%, p=.07) and clip identification (100% vs 90.1%, p=.0004) than cohort 1.

CONCLUSION

Optimal techniques for clip placement, that include location within the cortex and detailed imaging after placement, help to improve the ability to identify and retrieve clipped axillary nodes after NAC.

CLINICAL RELEVANCE/APPLICATION

While there are clinico-pathologic features (clip location in cortex) that impact clip placement, clip identification, and clip retrieval success, appropriate training in clip documentation at diagnosis can mitigate against these challenges.

SSJ02-05 Cancer Detection in Breast Ultrasound Using an Industrial Grade Deep Learning Image Analysis Software

Tuesday, Nov. 28 3:40PM - 3:50PM Room: E450A

Participants
Anton S. Becker, MD, Zurich, Switzerland (*Presenter*) Nothing to Disclose
Michael Muller, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose

Elina Stoffel, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Magda Marcon, MD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Soleen Ghafoor, MD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Andreas Boss, MD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To train a generic deep learning software (DLS) for the diagnosis of breast cancer in ultrasound images and to compare the performance to human readers with variable breast imaging experience.

METHOD AND MATERIALS

In this IRB-approved, HIPAA compliant, retrospective study, all breast ultrasound examinations from one year were reviewed. Patients with scars, initially indeterminate, or malignant lesions with histological diagnoses or 2-year follow-up were included. The DLS was trained with 70% of the images, the remaining 30% were used to validate the performance. Three readers with variable expertise also evaluated the validation set (radiologist, resident, medical student). Diagnostic accuracy was assessed with a receiver operating characteristic (ROC) analysis. Interreader agreement was measured with the concordance correlation coefficient (CCC).

RESULTS

Eighty-two patients with malignant and 550 with benign lesions were included. Time needed for training was 7 minutes (DLS). Evaluation times were 3.7 seconds (DLS) and 28, 22 and 25 minutes for human readers (decreasing experience). ROC analysis revealed non-significant differences in the area under the curve of 0.84 (DLS), 0.88 (experienced and intermediate readers) and 0.79 (inexperienced reader). Interreader agreement was best between the two more experienced readers (0.56, 95% CI 0.45-0.67) and the DLS and the reader with intermediate experience (0.49, 0.38-0.59), respectively.

CONCLUSION

DLS can diagnose cancer in breast ultrasound images with an accuracy comparable to radiologists. DLS learns substantially better and faster than a human reader with no prior experience given the same amount of training data.

CLINICAL RELEVANCE/APPLICATION

Real-time heatmaps embedded in an ultrasound examination could increase the radiologists sensitivity to subtle or atypical cancerous lesions.

SSJ02-06 Quantitative Analysis of Contrast-Enhanced Ultrasound of Lymph Nodes: A Novel Technique to Detect Early Metastasis

Tuesday, Nov. 28 3:50PM - 4:00PM Room: E450A

Participants
Naoko Mori, MD, PhD, Sendai, Japan (*Presenter*) Nothing to Disclose
Minoru Miyashita, Sendai, Japan (*Abstract Co-Author*) Nothing to Disclose
Tetsuya Kodama, Sendai, Japan (*Abstract Co-Author*) Nothing to Disclose
Kei Takase, MD, PhD, Sendai, Japan (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

naokomori7127@gmail.com

PURPOSE

To evaluate whether quantitative analysis of contrast-enhanced ultrasound (CE-US) can predict early lymph node (LN) metastasis in clinically node-negative breast cancer.

METHOD AND MATERIALS

This prospective study was approved by the institutional review board and informed consent was obtained from participants. In total, 56 patients who had no swelling LN using conventional CT, MR or US imaging underwent CE-US before surgery. Microbubble (Sonazoid; 0.015 mL/kg) was injected as a bolus with a 10-mL saline flush and continuous 75 s DICOM images were obtained. Time intensity-curve analysis was used to quantitatively analyze CE-US images. A region of interest (ROI) was placed within each LN where the highest signal increase was observed on CE-US images to obtain the peak intensity of the maximum enhanced area (PImax). A ROI was placed where the lowest signal increase was observed to obtain peak intensity of the minimum enhanced area (PImin). To evaluate heterogeneity of enhancement in LNs, the PIratio was calculated: PIratio = PImax / PImin. For visual analysis, the presence of a perfusion defect in LNs was evaluated. PI ratios and visual analyses were compared between pathological positive- and negative-metastasis groups in breast cancer patients.

RESULTS

Fifteen patients were diagnosed histologically with positive LN metastases (median 4, range 2.5-12 mm) and the remaining 41 as negative. The PIratio was significantly higher in the positive-metastasis than in the negative-metastasis group ($p = 0.0073$). ROC analysis revealed that the most effective threshold of PIratio was 1.52 and the area under the curve was 0.74. Using this threshold, the sensitivity, specificity, PPV, and NPV were 53%, 93%, 73%, and 84%, respectively. No statistically significant difference was found in visual assessments between negative- and positive-metastasis groups ($p = 0.09$).

CONCLUSION

The PIratio in quantitative analysis of CE-US imaging may be useful for detecting the presence of early LN metastasis in clinically node-negative breast cancer.

CLINICAL RELEVANCE/APPLICATION

Quantitative analysis of CE-US imaging may be useful for detecting the presence of early lymph node metastasis and is recommended in the initial evaluation of lymph node status.

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SSJ21

Physics (Ultrasound)

Tuesday, Nov. 28 3:00PM - 4:00PM Room: S403A

PH US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Jaydev K. Dave, PHD, Philadelphia, PA (*Moderator*) Research Grant, Koninklijke Philips NV; Equipment support, Lantheus Medical Imaging, Inc; Equipment support, General Electric Company
Timothy J. Hall, PhD, Madison, WI (*Moderator*) Equipment support, Siemens AG; Technical support, Siemens AG

Sub-Events

SSJ21-01 How to Identify Optimum Incident Acoustic Output for Utilizing Subharmonic Amplitude from Ultrasound Contrast Microbubbles for Pressure Measurements: A Solution for Real-Time Clinical Applications

Tuesday, Nov. 28 3:00PM - 3:10PM Room: S403A

Participants
Cara Esposito, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Flemming Forsberg, PhD, Philadelphia, PA (*Abstract Co-Author*) Equipment support, Toshiba Medical Systems Corporation; Research Grant, Toshiba Medical Systems Corporation; Equipment support, Siemens AG; In-kind support, General Electric Company; In-kind support, Lantheus Medical Imaging, Inc
Kris Dickie, Burnaby, BC (*Abstract Co-Author*) Employee, Clarius Mobile Health Corp
Jaydev K. Dave, PHD, Philadelphia, PA (*Presenter*) Research Grant, Koninklijke Philips NV; Equipment support, Lantheus Medical Imaging, Inc; Equipment support, General Electric Company

For information about this presentation, contact:

Jaydev.Dave@jefferson.edu

PURPOSE

At optimum incident acoustic output (IAO), subharmonic aided pressure estimation (SHAPE), based on subharmonic signals from microbubbles, is useful for estimating clinical pressures. However, real-time SHAPE application is impeded because the optimum IAO level varies on a case-by-case basis. Purpose of this work was to address this problem by identifying the optimum IAO for SHAPE in real-time.

METHOD AND MATERIALS

The SHAPE algorithm was developed to sequentially step through each available IAO level, extract the subharmonic amplitude, perform a spline fit (subharmonic amplitude vs. IAO), and identify the IAO level with maximum derivative as the optimum IAO. This algorithm was implemented using a customized interface on a SonixTablet scanner (BK Ultrasound, Peabody, MA) using C/C++ and Qt libraries (The Qt Company, Oslo, Norway). In vitro tests were conducted using a closed-loop flow system with activated Definity (Lantheus Medical Imaging, N Billerica, MA, USA; 0.1 mL) mixed in 750 mL isotonic diluent. A pressure catheter (Millar Inc., Houston, TX) provided ambient pressure values. A pulsed Doppler gate was placed within the lumen of the vessel in the flow system, then the SHAPE algorithm was initiated (ftransmit: 5.6 MHz; chirp down transmit pulse in pulse inversion mode). Catheter pressure and subharmonic data were acquired simultaneously at, below and above the optimum IAO level (10secs; n=3), then a linear correlation was performed between the subharmonic and catheter data using Matlab (MathWorks, Natick, MA, USA).

RESULTS

Correlation coefficient values between SHAPE and the pressure catheter data at, below and above the optimum IAO level were -0.73±0.1, -0.55± 0.2, and -0.70±0.1, respectively, confirming best correlation occurring at the identified IAO level. At the optimum IAO, the sensitivity of the subharmonic signal to the ambient pressure was 13.5±1.0 mmHg/dB. Occasionally at relatively higher IAO levels (2.9 MPap-p), correlation coefficients as high as -0.9 were also noted, presumably due to bubble destruction.

CONCLUSION

Identification of optimum IAO (in real-time) for insonating microbubbles to be utilized for SHAPE has been demonstrated; this will pave the way for real-time clinical applications.

CLINICAL RELEVANCE/APPLICATION

Real-time implementation to determine optimum IAO for insonating microbubbles for SHAPE has been demonstrated and verified; this paves the way for real-time SHAPE applications.

SSJ21-02 Contrast-Enhanced Ultrasound Assisted Percutaneous Nephrostomy: A Technique to Increase Success Rate for Patients with Non-dilated Renal Collecting System

Tuesday, Nov. 28 3:10PM - 3:20PM Room: S403A

Participants
Baoxian Liu, Guangzhou, China (*Presenter*) Nothing to Disclose
Xioahua Xie, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Guangliang Huang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Xiaoyan Xie, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

xian_1121@163.com

CONCLUSION

CEUS assisted PCN in patients with nondilated renal collecting system is valuable with high technical success rate and acceptable complications.

Background

For percutaneous nephrostomy (PCN), lack of proper guidance system may lead to hazardous results, especial for these patients with nondilated renal collecting systems. The purpose of our study is to report our single-center experience of contrast-enhanced ultrasound (CEUS) assisted PCN for patients with nondilated renal collecting system.

Evaluation

From November 2011 to September 2015, 47 patients(mean age, 51.9±16.2 years; range, 11-80 years) with clinical necessity to urinary drainage, urinary diversion, or provision of access to the collecting system and with nondilated renal collecting system were performed 48 CEUS assisted PCNs. Ultrasound contrast agent was injected through the puncture needle and the drainage catheter to confirm successful PCN. The technical success rate was 100%(47/47, 95%CI: 93.8%, 100%) per patient and 100% (48/48, 95%CI: 94.0%, 100%) per kidney. For each kidney, the mean number of needle passes was 1.4 ± 0.5 (rang, 1-3). The mean duration of the complete procedure was 18.9±4.8 min (range, 8-30 min). The mean dose of contrast-enhanced agent was 12.9 ± 3.2 ml (range, 8-25 ml). No major complication was observed. Only 4 patients (4/47, 8.5%, 95%CI: 2.37%, 20.4%) had minor complications, including perirenal hematoma last 9 days on ultrasound images in 1 and transitant macroscopic hematuria last about 1-2 days in 3.

Discussion

Several modalities are considered to assist PCN in a nondilated collecting system. CEUS is known to have exclusive advantages including real-time scanning, no radiation, and easy operation, which is also recommended for intracavitary administration. Although PCN in the nondilated collecting system is a technical challenging, our results displayed that CEUS assisted PCN showed comparable success rate with conventional PCN placement in patients with dilated collecting systems.

SSJ21-03 Comparison of Computerized Analysis for Uniformity Assessment in Ultrasound QA

Tuesday, Nov. 28 3:20PM - 3:30PM Room: S403A

Participants
Zhimin Li, PhD, Brookfield, WI (*Presenter*) Software support, Cablon Medical BV
James A. Zagzebski, PhD, Madison, WI (*Abstract Co-Author*) Researcher, General Electric Company; Equipment support, Analogic Corporation; Research agreement, Siemens AG

For information about this presentation, contact:

zhiminli@wisc.edu

zhiminli@wisc.edu

CONCLUSION

The MBCA method with the mean image shows good sensitivity for UA compared to UiQ, although this is a limited cohort of data available. We will enlarge our sample pool by acquiring cine loops routinely to facilitate this analysis for all probes.

Background

Performing uniformity assessment (UA) and detecting transducer defects of concern is an important component of Ultrasound QA testing. Although visual inspections of acquired phantom images are most frequently done, there is an increasing trend toward computerized analysis of cine files acquired during QC. It is important to understand performance differences between various computerized analysis methods for UA.

Evaluation

We developed a Matlab-based computerized analysis (MBCA) program for UA. It creates a mean image of frames in a cine loop acquired while a transducer is translated over a phantom. Element dropout defects are recognized as "shadows" emanating from the transducer surface. The code calculates a defect cutoff threshold (DCT) based on 3 standard deviations below the data's mean or 3 Median absolute deviations (MAD) below the data's median by utilizing only the ring-down portion of the phantom images. The detection performance was compared with that of a commercial program, UltraiQ(UiQ) that analyzes image data from a ROI having a 12 mm axial extent in the gray scale image. The comparisons were done for linear array transducers (LTA) and GE Logiq scanners evaluated during annual tests during the past year. Nine probes were judged defective, and three of these had recorded cine loops. Seven defects had been visually identified in this data set. Using the cutoff threshold described, the MBCA program applied to the mean image detected all 7 dropout areas (visually identified) from the 3 transducers with no false positive detection. On the other hand, the UiQ only detected four of the dropout areas with three false detections.

Discussion

Our MBCA currently works for LTAs but can be modified to analyze curvilinear arrays. The improved performance over UiQ can be related to a high signal to noise ratio in the ring-down part of the image and to the minimal spread of the defect shadow in this area.

SSJ21-04 Freehand 3D Ultrasound Construction via Preoperative MRI Co-Registration for Spine Needle Interventions

Tuesday, Nov. 28 3:30PM - 3:40PM Room: S403A

Participants
Tharindu De Silva, PhD, Baltimore, MD (*Presenter*) Nothing to Disclose
Ali Uneri, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Joshua Punnoose, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Xiaoxuan Zhang, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Runze Han, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Joseph Goerres, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Matthew W. Jacobson, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Sebastian Vogt, PhD, Monument, CO (*Abstract Co-Author*) Employee, Siemens Medical Solutions USA Inc.; Stockholder, Siemens AG
Gerhard Kleinszig, Salzburg, Austria (*Abstract Co-Author*) Employee, Siemens AG
Daniel M. Sciubba, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jeffrey H. Siewerdsen, PhD, Baltimore, MD (*Abstract Co-Author*) Research Grant, Siemens AG; Research Grant, Carestream Health, Inc; Advisory Board, Siemens AG; Advisory Board, Carestream Health, Inc; License agreement, Carestream Health,Inc; License agreement, Precision X-Ray, Inc; License agreement, Elekta AB; ; ;

PURPOSE

Ultrasound (US)-guided spine needle interventions have limited clinical adoption due to confounding visualization of deep bony anatomy. Image registration between previously acquired MRI and real-time US could provide useful anatomical context to accurately guide needles toward target locations. Registration of MRI with an initially acquired, baseline 3D US image facilitates the mapping of anatomy in MRI to intraoperative US imaging space. This work proposes a method to register a 2D US image sequence to MRI and simultaneously construct a MRI-aligned, 3D US volume to be subsequently used for real-time navigation.

METHOD AND MATERIALS

Within the registration framework, US images were simulated from MRI using a US wave propagation model that incorporated reflection, refraction, and attenuation properties. Acoustic impedances were derived from T1-weighted MR values using a non-linear mapping function with relevant values for vertebra, CSF, fat, muscle, and intervertebral disc. Simulated US was compared with each actual US image using normalized cross-correlation metric and optimized using Powell's method to compute the best corresponding slice from MRI. Registered slices were interpolated in a volumetric grid to construct the 3D volume. Experiments were performed by acquiring axial slices of a lumbar puncture phantom using a 2D, linear, 128-element array probe at 5 cm depth. For comparison, 3D US image was constructed by optically tracking the calibrated 2D US probe.

RESULTS

The error between corresponding anatomical distances between US volumes constructed from the two methods (registration vs tracking) was found to be 1.3 ± 1.2 (mean ± std) mm. Registration accuracy measured as the point-based distance between corresponding anatomical locations from MRI and US was 4.5 ± 5.9 (median ± iqr) mm. Deformation due to applied US probe pressure contributed substantially to this error and it will be incorporated to the simulation model in ongoing work to improve accuracy.

CONCLUSION

Registration between actual and simulated US images could provide a useful method to yield MR-aligned 3D US volume for navigation in spine pain procedures.

CLINICAL RELEVANCE/APPLICATION

The proposed method could provide 3D US images registered to MRI to facilitate accurate needle targeting during spine needle interventions.

SSJ21-05 Can Speed of Sound Be Better Than Conventional Elastography for Breast Characterization?

Tuesday, Nov. 28 3:40PM - 3:50PM Room: S403A

Participants
Sergio J. Sanabria, Zurich, Switzerland (*Presenter*) Nothing to Disclose
Marga B. Rominger, MD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Corin F. Otesteanu, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Farrukh I. Sheikh, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Volker Klingmueller, Giessen, Germany (*Abstract Co-Author*) Nothing to Disclose
Orcun Goksel, PhD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare a novel speed of sound (SoS) method and conventional elastography (strain ratio SR and shear wave velocity SWV) in breast with respect to tissue compression and differentiation.

METHOD AND MATERIALS

A healthy volunteer (42 yr) was repeatedly assessed with SoS and SWV at five different compression levels in order to identify non-linearity confounders. The examinations were performed in the cranio-caudal view and retromammillar segment for both non-diseased breasts. Also, five women with biopsy proven lesions (3 invasive ductal carcinoma IDC, 1 fibroadenoma FA, 1 cyst) were tested to identify differences between SoS, SR and SWV. Ultrasound examination was performed with a commercially available ultrasound system (SonixTouch, Ultrasonix, Richmond, Canada). B-mode imaging was used for lesion localization. Hand-held SoS images were generated for lesion characterization. A flat passive plexiglass reflector positioned opposite to a linear probe was used as a timing reference for the ultrasound signals transmitted through the lesions. Synthetic aperture data was acquired and average SoS values across the lesions were measured with an accuracy of <0.7%. Elastography (SWS and SR) was performed with a GE Logiq E9 machine.

RESULTS

Breast compression was 60 to 25 mm. SWV correlates with breast compression (R2>0.5) while SoS does not show a significant correlation (R2<0.2). The average SoS value was 1465 m/s (SD 7 m/s) and the average SWS value 2.5 m/s (SD 0.2 m/s). The SoS increments in the lesions were [cyst = 0.9%, FA = 0.8%, IDC [2.7-3.0%], while for SWS [cyst = 2.5 m/s, FA = 5.4 m/s, IDC = 4.1-3.95%] and SR [cyst = 1.6, FA = 5.0, IDC 2.8]. While all lesions could be correctly classified with a single SoS threshold, both SE and SWS failed to differentiate FA from IDC.

CONCLUSION

Hand-held speed of sound showed less dependency on compression than SWS and a better differentiation in an exemplary population of benign and cancerous lesions. Further studies are needed to confirm its utility.

CLINICAL RELEVANCE/APPLICATION

A hand-held SoS add-on to conventional ultrasound system provides additional information (Bulk Modulus) to conventional elastography (Young Modulus) for multi-parametric tissue characterization. SoS may reduce operator dependency and outperform conventional elastography in selected clinical scenarios. This novel technique can be implemented on a standard ultrasound machine.

SSJ21-06 Acoustic Lens-Based Photoacoustic-Ultrasound System for Noninvasive Thyroid Imaging

Tuesday, Nov. 28 3:50PM - 4:00PM Room: S403A

Participants
Francis Kalloor, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Bhargava K. Chinni, MS, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Zichao Han, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Navalgund A. Rao, PhD, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Vikram S. Dogra, MD, Rochester, NY (*Presenter*) Editor, Wolters Kluwer nv;

For information about this presentation, contact:

vikram.Dogra54@gmail.com

Vikram.Dogra54@gmail.com

CONCLUSION

A combined non-invasive PA and US imaging system, with functional and structural capability can be a potential alternate for FNAB.

Background

Among thyroid cancer screening techniques, ultrasound (US) is the most widely used modality followed by invasive fine needle aspiration biopsy (FNAB). Approximately 5% of FNAB results are inconclusive and are compromised by insufficient sampling. The US (being a structural imaging method) can depict thyroid cysts and nodules clearly but lacks the ability to differentiate between cancerous and benign nodules. We propose a hybrid multispectral photoacoustic (PA) and ultrasound imaging system for non-invasive. With the combined functional nature of PA imaging capturing physiologic changes and structural image from US image high specificity is expected. This estimate can be depicted as an image that can be used to detect, characterize, diagnose, and monitor suspect lesions in thyroid disease management.

Evaluation

The proposed PA probe consists of a light delivery system, acoustic lens and US transducers that enable real-time frontal plane imaging of the tissue. A fast Fourier-based image formation is considered for volume image formation. Axial and lateral resolution of the probe was evaluated to be 0.3 millimeters (mm) and 1.6 mm. Ex-vivo thyroid studies demonstrated high specificity greater than 96%. A circular scanning stage obtains images from multiple angles using the probe, which improves system signal to noise ratio and a fivefold improvement in lateral resolution. A polyvinylidene fluoride (PVDF) film used as a US source can provide impedance image of the tissue. Adding US imaging to PA will add value co-registering with functional information in locating the nodules.

Discussion

PA absorption image of deoxy and oxyhemoglobin shows a clear distinction between cancerous and benign. The ex-vivo studies suggest that thyroid disease classification accuracy was comparable to that of FNAB. Characterization of the proposed prototype in phantoms with human thyroid geometry are in progress. With multiple view of the target tissue a minimum detectable cancer region of 0.3 mm with high specificity is expected.

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RC410

Renal Ultrasound, Doppler, and Contrast

Tuesday, Nov. 28 4:30PM - 6:00PM Room: E352

GU US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Sub-Events

RC410A Ultrasound Evaluation of Renal Masses and Parenchymal Disease

Participants
Michael D. Beland, MD, Providence, RI (*Presenter*) Research Grant, Toshiba Medical Systems Corporation

LEARNING OBJECTIVES

1) Recognize the imaging features of a variety of etiologies of renal masses and understand the potential overlap between malignancy, non-malignant mass-like lesions and pseudomasses. 2) Recognize the potential limitations of ultrasound in the identification of renal masses and learn to maximize technique. 3) Demonstrate the wide range of appearances of parenchymal diseases on ultrasound and develop an approach to evaluation.

RC410B Renal Doppler: What You Need to Know

Participants
John S. Pellerito, MD, Manhasset, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jpelleri@northwell.edu

LEARNING OBJECTIVES

1) Apply techniques and protocols for the renal Doppler evaluation. 2) Analyze diagnostic criteria for renal artery stenosis and occlusion. 3) Utilize Doppler for the evaluation of renal artery stents. 4) Compare Doppler to other imaging modalities used to evaluate renal vascular disease.

ABSTRACT

In this presentation, we will discuss the many applications of Doppler imaging for the evaluation of renal vessels. Evaluation for renal artery patency and stenosis will be discussed. We will also review the evaluation of renal artery stents. In addition, we will review the signs associated with renal vein thrombosis. There will also be a brief discussion of renal masses, renal injuries including fistula and pseudoaneurysm and renal infarct.

RC410C Contrast Evaluation of Renal Masses

Participants
Dirk-Andre Clevert, MD, Muenchen, Germany (*Presenter*) Speaker, Siemens AG; Speaker, Koninklijke Philips NV; Speaker, Bracco Group; Speaker, Samsung Electronics Co, Ltd;

LEARNING OBJECTIVES

1) Ultrasound visualization of renal lesions using B-mode sonography, contrast enhanced ultrasound and image fusion is explained. This includes the characterization of renal cysts. 2) The Bosniak classification is explained with the five different categories of characterization of renal cysts; a common finding are non-complicated solitary lesions Bosniak type I. 3) The main differential diagnoses are explained with an emphasis on the renal cell carcinoma.

ABSTRACT

Ultrasound is the most used interdisciplinary non-ionizing imaging technique in clinical routine. Therefore, ultrasound has a special value in the diagnosis and monitoring of cystic renal lesions, which can be classified as non-complicated or complicated and by means of occurrence as solitary or multifocal lesions. The Bosniak classification (I-IV) classifies renal cysts in 5 different categories with the help of ultrasound and computed tomography image criteria and is used for decisions of further clinical treatment. Additionally to normal native B-mode sonography, several new methods are in clinical use to improve diagnostic accuracy of unclear cases. Contrast enhanced ultrasound and MRI/CT are able to find and characterize difficult pathologies. In contrast to mullislice-CT (MS-CT), ultrasound image fusion is a real-time imaging technique that can be used in combination with other cross-sectional imaging techniques.This course explains the most important pathologies of cystic lesions of the kidney and stresses the different imaging methods of native B-mode sonography and the new techniques of contrast enhanced ultrasound.

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RC452

Techniques for Interventional Sonography and Thermal Ablation (Hands-on)

Tuesday, Nov. 28 4:30PM - 6:00PM Room: E264

US IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants

Veronica J. Rooks, MD, Tripler AMC, HI (*Presenter*) Nothing to Disclose
Patrick Warren, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Stephen C. O'Connor, MD, Boston, MA (*Presenter*) Nothing to Disclose
Corrie M. Yablon, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Kristin M. Dittmar, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Kal Dulaimy, MD, Springfield, MA (*Presenter*) Nothing to Disclose
Mahesh M. Thapa, MD, Seattle, WA (*Presenter*) Nothing to Disclose
John M. Racadio, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
Hisham A. Tchelepi, MD, Los Angeles, CA (*Presenter*) Research Grant, General Electric Company Research Grant, Roper Industries, Inc
Christian L. Carlson, MD, MS, Jbsa Ft Sam Houston, TX (*Presenter*) Nothing to Disclose
Adam S. Young, MD, MBA, Boston, MA (*Presenter*) Nothing to Disclose
Linda J. Warren, MD, Vancouver, BC (*Presenter*) Shareholder, Hologic, Inc
Christopher A. Molvar, MD, Chicago, IL (*Presenter*) Nothing to Disclose
James W. Murakami, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Leah E. Braswell, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Jeremiah J. Sabado, MD, Kennett Square, OH (*Presenter*) Nothing to Disclose
Brian H. Ching, DO, Tripler Army Medical Center, HI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Stephen.o'connor@bhs.org

brian.h.ching.civ@mail.mil

LEARNING OBJECTIVES

1) Identify basic skills, techniques, and pitfalls of freehand invasive sonography. 2) Discuss and perform basic skills involved in thermal tumor ablation in a live learning model. 3) Perform specific US-guided procedures to include core biopsy, abscess drainage, vascular access, cyst aspiration, soft tissue foreign body removal, and radiofrequency tumor ablation. 4) Incorporate these component skill sets into further life-long learning for expansion of competency and preparation for more advanced interventional sonographic learning opportunities.

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/ Corrie M. Yablon, MD - 2017 Honored Educator

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103rd Scientific Assembly and Annual Meeting
November 26 to December 1
McCormick Place, Chicago
Explore Invent Transform

SPSC40

Controversy Session: Imaging of the Pelvis: When is Ultrasound Enough?

Wednesday, Nov. 29 7:15AM - 8:15AM Room: E350

GU US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

Participants
Carol B. Benson, MD, Boston, MA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Utilize ultrasound as the primary imaging modality for diagnosing of a variety of gynecologic abnormalities. 2) Understand which gynecologic findings on ultrasound are adequate to make a specific diagnosis and do not require further imaging. 3) Recognize which sonographic findings in the pelvis require further investigation with other imaging modalities and which do not.

Sub-Events

SPSC40A Imaging of the Pelvis: Ultrasound is Enough

Participants
Beryl R. Benacerraf, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

SPSC40B Imaging of the Pelvis: Ultrasound is Not Always Enough

Participants
Deborah Levine, MD, Boston, MA (*Presenter*) Editor with royalties, UpToDate, Inc; Editor with royalties, Reed Elsevier;

For information about this presentation, contact:

dlevine@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Illustrate adenxal masses where MR adds additional information that can alter decision to perform surgery. 2) Discuss how MR can be utilized in pre-procedure planning for women with fibroids. 3) Discuss use of MR in pregnancy when additional information is needed regarding complex uterine pathology.

ABSTRACT

Ultrasound is first line imaging for the female pelvis. However, there are instances where additional imaging is needed for further assessment. MRI can frequently add additional information that can alter patient care. Examples include: the indeterminate adnexal mass, where findings could alter the decision to perform surgery; precise delineation of size and location of fibroids when this information is needed prior to surgery or other intervention; and assessment of complex uterine pathology during pregnancy.

RC510

Gynecologic Ultrasound Including 3D

Wednesday, Nov. 29 8:30AM - 10:00AM Room: E350

GU US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

LEARNING OBJECTIVES

1) Review findings of the 'First International Consensus Report on Adnexal Masses: Management Recommendations which is to be published in 2017. 2) Assess the potential of risk prediction models to improve practice patterns. 3) Improve knowledge of the malignant potential of various sonographic biomarkers. 4) Integrate these findings into daily practice with goal of reducing excess surgery for benign masses while improving triage to gynecology-oncology in women with suspicious adnexal masses. 5) Recognize the varied appearance of the uterus and endometrium throughout a woman's life. 6) Improve sonographic visualization of the endometrium utilizing some technical tips and tricks. 7) Recite a basic differential diagnosis for uterine/cervical masses and endometrial thickening. 8) Apply appropriate terminology when describing abnormal bleeding, location of myomas and mullerian duct anomalies. 9) Understand the controversies, cutoffs and considerations in the context of the role of US in postmenopausal bleeding. 10) Define clinical and epidemiological aspects of endometriosis. 11) Define the importance of imaging mapping for deeply infiltrative endometriosis before clinical counseling. 12) Apply the most appropriate technique to investigate endometriosis. 4) Define the bowel preparation required for the transvaginal ultrasound to investigate endometriosis. 13) Apply the imaging algorithm to map deeply infiltrative endometriosis. 14) Assess the ultrasonographic findings of deeply infiltrative endometriosis in the most common sites such as bladder, vesicouterine pouch, retrocervical space, vagina, ureters, appendix and rectosigmoid colon. 15) To discuss the multiplanar reconstruction technique in scanning the pelvis, including the usefulness of looking at the coronal view of the uterus to evaluate the endometrium and uterine shape. 16) To discuss the use of 3D ultrasound to look for causes of pelvic pain. 17) To discuss the use of 3D ultrasound when evaluating a potential hydrosalpinx.

SAM

New in 2017: PLEASE NOTE - All courses designated for SAM credit at RSNA 2017 will require attendees bring a personal device e.g. phone, iPad, laptop to complete the required test questions during the live session.

Sub-Events

RC510A Ovarian Cysts & Masses - Evidence Based Guidelines 2017

Participants
Phyllis Glanc, MD, Toronto, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review findings of the 'First International Consensus Report on Adnexal Masses: Management Recommendations which is to be published in 2017. 2) Assess the potential of risk prediction models to improve practice patterns. 3) Improve knowledge of the malignant potential of various sonographic biomarkers. 4) Integrate these findings into daily practice with goal of reducing excess surgery for benign masses while improving triage to gynecology-oncology in women with suspicious adnexal masses.

ABSTRACT

The goal of this session is to review strategies which may aid in the reduction of excess surgery for benign masses while improving triage to gynecology-oncology in women with suspicious adnexal masses. The recently published 'First International Consensus Report on Adnexal Masses: Management Recommendations ' has focused on these two goals and we will review the analysis and recommendations from this report.

RC510B Uterus and Endometrium: A Primer with Pearls to Perfect Your US Performance

Participants
Loretta M. Strachowski, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the varied appearance of the uterus and endometrium throughout a woman's life. 2) Improve sonographic visualization of the endometrium utilizing some technical tips and tricks. 3) Recite a basic differential diagnosis for uterine/cervical masses and endometrial thickening. 4) Apply appropriate terminology when describing abnormal bleeding, location of myomas and mullerian duct anomalies. 5) Understand the controversies, cutoffs and considerations in the context of the role of US in postmenopausal bleeding.

Active Handout:Loretta M. Strachowski

http://abstract.rsna.org/uploads/2017/17000102/Active RC510B.pdf

RC510C Ultrasound for Deeply Infiltrative Endometriosis

Participants
Luciana P. Chamie, MD, PhD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

luciana@chamie.com.br

luciana@chamie.com.br

LEARNING OBJECTIVES

1) Define clinical and epidemiological aspects of endometriosis. 2) Define the importance of imaging mapping for deeply infiltrative endometriosis before clinical counseling. 3) Apply the most appropriate technique to investigate endometriosis. 4) Define the bowel preparation required for the transvaginal ultrasound to investigate endometriosis. 5) Apply the imaging algorithm to map deeply infiltrative endometriosis. 6) Assess the ultrasonographic findings of deeply infiltrative endometriosis in the most common sites such as bladder, vesicouterine pouch, retrocervical space, vagina, ureters, appendix and rectosigmoid colon.

ABSTRACT

Endometriosis is a very common gynecological disease affecting millions of women in their reproductive life, often causing pelvic pain and infertility. Clinical history and physical examination may suggest endometriosis, but imaging mapping is necessary to identify the disease and mandatory for clinical couseling and surgical planning. Transvaginal ultrasound after bowel preparation is the best imaging modality as the first-line technique to evaluate patients suspected of endometriosis. The bowel preparation is relatively simple and includes the day before and the day of the examination. This method is highly accurate to identify intestinal endometriosis and to determine which layers of the bowel wall are affected. In addition, it provides better assessment of small peritoneal lesions of the retrocervical space, vagina and bladder. Pelvic adhesions can also be evaluated during the exam.

URL

http://chamie.com.br/download

RC510D 3D Ultrasound in Gynecology

Participants
Beryl R. Benacerraf, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To discuss the multiplanar reconstruction technique in scanning the pelvis, including the usefulness of looking at the coronal view of the uterus to evaluate the endometrium and uterine shape. 2) To discuss the use of 3D ultrasound to look for causes of pelvic pain. 3) To discuss the use of 3D ultrasound when evaluating a potential hydrosalpinx.

ABSTRACT

NA

RC513

Pediatric Series: Pediatric Radiology

Wednesday, Nov. 29 8:30AM - 12:00PM Room: E352

PD US

AMA PRA Category 1 Credits ™: 3.25
ARRT Category A+ Credits: 3.75

FDA Discussions may include off-label uses.

Participants
Teresa Chapman, MD, MA, Seattle, WA (*Moderator*) Nothing to Disclose
M. Beth McCarville, MD, Memphis, TN (*Moderator*) Consultant, General Electric Company
Harriet J. Paltiel, MD, Boston, MA (*Moderator*) Nothing to Disclose
Sara M. O'Hara, MD, Cincinnati, OH (*Moderator*) Author, Reed Elsevier; Speakers Bureau, Toshiba Medical Systems Corporation; Medical Advisory Board, Toshiba Medical Systems Corporation

For information about this presentation, contact:

teresa.chapman@seattlechildrens.org

Sub-Events

RC513-01 Pediatric Liver Doppler

Wednesday, Nov. 29 8:30AM - 8:50AM Room: E352

Participants
Sara M. O'Hara, MD, Cincinnati, OH (*Presenter*) Author, Reed Elsevier; Speakers Bureau, Toshiba Medical Systems Corporation; Medical Advisory Board, Toshiba Medical Systems Corporation

For information about this presentation, contact:

s.ohara@cchmc.org

LEARNING OBJECTIVES

1. Learn tips for optimizing liver Doppler exams in pediatric patients. 2. Improve understanding and application of newest ultrasound technologies to liver Doppler. 3. Recognize common and uncommon pediatric disease states diagnosed with liver Doppler.

LEARNING OBJECTIVES

1) Learn tips for optimizing liver Doppler exam in pediatric patients. 2) Improve understanding and application of newest ultrasound technologies to liver Doppler. 3) Recognize common and uncommon pediatric disease states diagnosed with liver Doppler.

RC513-02 Monitoring Pediatric Liver Transplantation: Comparison of B-Flow Sonography with Color Doppler Sonography to Assess Detectability of the Hepatic Artery

Wednesday, Nov. 29 8:50AM - 9:00AM Room: E352

Participants
Leonhard A. Steinmeister, Hamburg, Germany (*Presenter*) Nothing to Disclose
Michael Groth, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Lutz Fischer, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Gerhard B. Adam, MD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Jochen Herrmann, MD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Ultrasound plays a decisive role in the postoperative monitoring of pediatric liver transplantation. Detectability of the hepatic artery (HA) and portal vein (PV) is important to rule out early vascular complications. We evaluated whether B-Flow Sonography (BFS) is superior to Color Doppler Sonography (CDS) for the detectability of the hepatic artery.

METHOD AND MATERIALS

Standardized postoperative ultrasound examinations of 37 consecutive children (mean age 6.5 years, range 1 month - 22 years) who underwent liver transplantation between November 2015 and November 2016 were retrospectively evaluated. Freehand horizontal BFS and CDS cine sweeps produced with a curved array (GE Logiq 9 ultrasound system, GE Medical Systems, Milwaukee, WI, USA) were visually rated. The degree of detectability of the HA was assessed at an extrahepatic, neohilar and segmental location: (0) HA not detectable; (1) HA discontinuously detectable, not separable from the PV; (2) HA discontinuously detectable, separable from the PV, or HA continuously detectable, but not separable from the PV; (3) HA continuously detectable and completely separable from the PV. Wilcoxon paired sample rank-sum test was performed to compare both methods.

RESULTS

Assessment of cine sweeps demonstrated a significantly higher degree of detectability of the HA using BFS compared with CDS

technique at the neohilum (2.2 ± 0.97 vs. 1.1 ± 0.83; p < 0.0001) and at the segmental location (2.8 ± 0.63 vs. 0.6 ± 0.77; p < 0.0001). No difference was noted at the extrahepatic level (1.3 ± 1.2 vs. 1.2 ± 0.94). The portal vein was similarly detectable by both methods.

CONCLUSION

Substantially improved delineation of the hepatic artery in pediatric liver transplants can be achieved with BFS compared with CDS technique. By documenting cine sweeps, vascular integrity can be reassessed offline and thus allowing for improved transplant monitoring.

CLINICAL RELEVANCE/APPLICATION

With BFS substantially better vessel delineation can be achieved in pediatric liver transplants thus increasing the degree of certainty to rule out vascular complications.

RC513-03 Avaliation of Intima-Media Thickness of the Carotid and Brachial Artery Intraluminal Diameter as Cardiovascular Risks in Children and Adolescents

Wednesday, Nov. 29 9:00AM - 9:10AM Room: E352

Participants
Alessandra C. Ribeiro, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Eduardo F. Fleury, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Cristiane Kochi, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Correlate anthropometric, laboratory and ultrasonographic intima-media thickness of the carotid and brachial intraluminal diameter data in obese adolescents with cardiovascular risk predictors.

METHOD AND MATERIALS

Retrospective study of 77 pubertal overweight patient, with the mean (SD) chronological age of 12.9 (2.5) years. Weight, height (to calculate BMI), waist circumference (WC), percentage of abdominal fat by bioelectrical impedance (BIA), serum total cholesterol (TC) and fractions, triglycerides (TG) and glucose oral tolerance test with glucose and insulin dosages were evaluated as cardiovascular risk predictors. BMI was expressed in SDS score (BMI SDS-WHO) and the ratios WC/Height, TG/HDL-C, HOMA-IR and sum of insulin values were made. The image data were obtained through the ultrasound to obtain the intima-media thickness (IMT) of the carotid artery and in the longitudinal axis of the brachial artery. We also evaluated the arterial blood velocity of the brachial artery in the first 15 seconds of reactive hyperemia after inflating the cuff on the patient's arm up to 30 mmHg above their systolic BP for 5 minutes.

RESULTS

The mean BMI SDS was +2.5 (0.7), the WC/height 0.6 (0.05) and the percentage of fat (BIA) of 38% (6.6). We found 36.4% of inadequacy values of TC, 72,7% of HDL, 36,4% of LDL and 53,2% of TG. The mean (SD) fasting insulin was 20 (10.9) and carotid IMT = 0.5 (0.08). None of the patients have diabetes mellitus type 2 and four were intolerant to glucose. There was a positive correlation between the TG/HDL-C ratio with the sum of insulin (r = 240, p <0.036) and the zIMC with carotid IMT (r = 0.226, p <0.049). There was an inverse correlation between the arterial blood velocity rate and the sum of insulin (r = - .297, p <0.009).

CONCLUSION

Our results demonstrate that the average carotid IMT was above the threshold value, and the higher the BMI, the greater the IMT, suggesting that this population may be at cardiovascular risk.

CLINICAL RELEVANCE/APPLICATION

The relation between TG/HDL-c and the sum of insulin values suggests that it can be used as a marker of insulin resistance.The negative correlation between brachial artery blood velocity rate with the sum of insulin shows the change of the response of the endothelium to vasoconstriction (mediated by nitric oxide) in patients with insulin resistance.

RC513-04 A New and Simple Method to Estimate Weight and Gestational Age in Critically Ill Newborns: The Return Journey of Chest X-Ray

Wednesday, Nov. 29 9:10AM - 9:20AM Room: E352

Participants
Joan Albert Prat-Matifoll, MD , Barcelona, Spain (*Presenter*) Nothing to Disclose
Joaquim Piqueras, PhD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Albert Prats-Uribe, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Carmen Parra-Farinas, MD , Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Shelagh C. Dyer, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Cesar Augusto A. Ortiz Andrade SR, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Joan Carles Carreno, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

joanalbertpratrx@gmail.com

PURPOSE

The purpose is to describe a reliable method to estimate the weight and gestational age by measurements taken in A-P chest x-ray exams of newborns admitted to a neonatal intensive care unit (NICU)

METHOD AND MATERIALS

This is a cross-sectional study of 376 plain chest films of 284 newborns. Patient characteristics: This study includes full-term, critically ill and premature newborns admitted to NICU between September 2014 and September 2015. This scientific exhibit divides

newborns into 3 main groups: pre-term, term and post-term. The preterm group was subdivided in extremely, very and moderate/late preterm. Chest x-ray assessment: One chest x-ray was assessed in 216 (76%) newborns; two chest x-rays were assessed in 48 (17%) newborns during the first two consecutive days of life and three in 16 newborns during the first three consecutive days. Three simple measures were taken from chest A-P exams: -Dorsal spine length: A straight line from the superior rim of D1 to the lower rim of D12 -Right pulmonary length: From the right pulmonary apex to the center of the right diaphragmatic dome -Transversal chest width: Between the outer margins of the ribs at the maximum transverse diameter (9th rib) Other relevant variables: Weight, assessed prematurity, small for gestational age, multiple pregnancy, persistent ductus arteriosus, congenital malformations, metabolopathies, and maternal complications.

RESULTS

Multiple threshold measures were obtained in order to establish an optimal value to classify newborns.The threshold values obtained were: One key measure to differentiate preterm from term and postterm newborns -Dorsal Spine length:90mm Three key measures to differentiate between extremely and very preterm from late preterm and term newborns -Dorsal Spine length:80mm -Right pulmonary length:47mm -Transversal chest width:93mm The triple combination of 3 measures, helps to improve the PPV for differentiating extremely/very preterm from late/term newborns: PPV: 93.1% / NPV: 82.1%

CONCLUSION

Dorsal Spine, Right Pulmonary, and Chest width measurements, and their combinations, are quick and reliable estimates of weight and gestational age in preterm and full-term newborns

CLINICAL RELEVANCE/APPLICATION

Pediatric radiologists often report initial chest x-ray of critically ill newborns without clinical information. Fast estimation of gestational age and weight may contribute to more accurate diagnoses

RC513-05 Marginal Diagnostic Yield from Double Reading Initial Skeletal Surveys versus Follow-Up Skeletal Surveys for Suspected Non-Accidental Trauma

Wednesday, Nov. 29 9:20AM - 9:30AM Room: E352

Participants
Sarah M. Bahouth, MD, Houston, TX (*Presenter*) Nothing to Disclose
Robert Orth, MD,PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
James E. Crowe, MD, Kansas City, MO (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

rcorth@texaschildrens.org

PURPOSE

We hypothesize that double reading initial SSs decreases the number of new fractures identified on follow-up SSs. The purpose of this study is to compare the marginal diagnostic yield of double reading initial SSs performed for suspected non-accidental trauma to the marginal diagnostic yield of follow-up SSs following single reading of initial exams.

METHOD AND MATERIALS

All SSs (initial and follow-up) performed between February 2, 2013, and March 23, 2015 for suspected non-accidental trauma at a large children's hospital were double-read by a non-blinded pediatric radiologist within 72 hours of primary interpretation. Fractures detected on the primary and secondary (double reading) interpretations of initial SSs and primary interpretations of follow-up SSs were recorded. The number of additional fractures identified by double-reading initial SSs to the number of additional fractures identified on follow-up SSs was compared via McNemar's test.

RESULTS

During the study period, 1056 initial SSs were performed (M:F=616:440; 13.2 months +/-13.9 months; age range 0.1-108 months), of which 293/1056 (28%) had follow-up SSs. Of cases with follow-up exams, primary and secondary interpretations of initial exams were concordant in 263/293 (90%) with follow-up SSs showing additional fractures in 32/263 (12%) and no additional fractures in 231/263 (88%). In 30/293 (10%) initial SSs, fractures were identified on the secondary (double-reading) interpretations that were not identified on primary interpretation with follow-up SSs showing additional fractures in 5/30 (17%) not identified on either the primary or secondary interpretations and no additional fractures in 25/30 (83%). The difference between the marginal diagnostic yield of secondary interpretations (10%) and follow-up SSs for initial exams not double-read (13%) was not statistically significant (0.43)

CONCLUSION

Both double reading initial SSs and follow-up increased diagnostic yield, but the comparative diagnostic yield was not statistically different. These results show the benefit of double-reading initial skeletal surveys and indicate the need for further studies to determine if double reading initial SSs can obviate the need for follow-up exams in select cases.

CLINICAL RELEVANCE/APPLICATION

The increased diagnostic yield from double reading skeletal surveys may decrease the need for follow-up exams and strengthen the confidence in the diagnosis of nonaccidental trauma.

RC513-06 Centile Charts for Cranial Sutures Under One Year of Life Based on Ultrasound Measurements

Wednesday, Nov. 29 9:30AM - 9:40AM Room: E352

Participants
Katya Rozovsky, MD, Winnipeg, MB (*Presenter*) Nothing to Disclose
Nick Barrowman, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose
Elka Miller, MD, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

katro70@yahoo.com

PURPOSE

To provide reference for normal ultrasound measurements of cranial sutures during the first year of life.

METHOD AND MATERIALS

All children 0 to 12 months referred from March 2011 to September 2013 for radiographic evaluation of the cranial sutures were approached for a prospective cranial ultrasound (CUS). CUS was performed with a 12-MHz linear transducer in supine or semi-sitting position. Sagittal, coronal, lambdoid, and metopic sutures were evaluated. Two radiologists independently measured cranial sutures by locating the PACS measurement tool between the hyperechoic bone edges. Values of sutural width were obtained in 3 points of the sagittal suture (anterior, middle and posterior), and the middle point for the metopic, each coronal and lambdoid sutures. The readers were blinded to clinical indications and previous reports.

RESULTS

150 children met the study inclusion criteria. 21 parents did not consent to the CUS study. 129 children underwent CUS, 3 patients were excluded due to poor cooperation, and 11 due to closed cranial sutures (craniosynostosis). 115 children (75 females, 40 males; mean age 5.6 month (standard deviation 2.7)) became the study group with normal cranial sutures. Each suture demonstrated significant decrease in size with age ($p<0.001$). During the first year of life the metopic suture decreased rapidly, while the lambdoid sutures demonstrated a slowest closure. There were no statistically significant differences in age related suture size in male and female patients.

CONCLUSION

Centile charts of normal ultrasound measurements of cranial sutures during the first year of life are presented. Defining normal size of the sutures and the changes over the first year of life is necessary to determine abnormality, particularly synostosis or diastatic sutures. This normative ultrasound data will help the radiologist recognizing normal and abnormal sutures.

CLINICAL RELEVANCE/APPLICATION

1. Cranial ultrasound is a radiation free technique that can be used as a first line imaging modality for evaluation of the cranial sutures in children under 1 year of life (Rozovsky et al, Pediatrics 2016) 2. Potential indications for cranial sutures ultrasound measurments include conditions associated with premature closure of cranial sutures (craniosynostosis) as well as widening or delayed closure of main cranial sutures. The provided normal measurements can be used by radiologists as a reference tool in clinical practice.

RC513-07 Abdominal Complications in Pediatric Oncology

Wednesday, Nov. 29 9:40AM - 10:00AM Room: E352

Participants
M. Beth McCarville, MD, Memphis, TN (*Presenter*) Consultant, General Electric Company

For information about this presentation, contact:

beth.mccarville@stjude.org

LEARNING OBJECTIVES

1) To review the common abdominal complications associated with the treatment of childhood cancers. 2) To discuss the imaging features of a variety of abdominal complications resutling from the treatment of pediatric malignancies. 2) To discuss the most appropriate imaging modalities to diagnose and monitor abdominal comlications of childhood cancer therapy.

LEARNING OBJECTIVES

1) Learn the most common abdominal complications of cancer therapy in children and conditions that predispose patients to their development. 2) Understand the indications for and role of imaging in the diagnosis and management of these patients. 3) Recognize the imaging features that suggest the diagnosis of abdominal complications.

RC513-08 Sonography of Vascular Anomalies

Wednesday, Nov. 29 10:20AM - 10:40AM Room: E352

Participants
Harriet J. Paltiel, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be able to discuss the ISSVA classification of vascular anomalies. 2) List the most important lesions presenting in the prenatal and neonatal periods. 3) Identify the differential diagnostic features of these entities.

RC513-09 Differentiation of Benign and Malignant Lymph Nodes in Pediatric Patients on Ferumoxytol-Enhanced PET/MR

Wednesday, Nov. 29 10:40AM - 10:50AM Room: E352

Participants
Anne M. Muehe, MD , Stanford, CA (*Presenter*) Nothing to Disclose
Ashok Joseph Theruvath, MD, Mainz, CA (*Abstract Co-Author*) Nothing to Disclose
Samantha Holdsworth, PhD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Jarrett Rosenberg, PhD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Sandra Luna-Fineman, MD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Heike E. Daldrup-Link, MD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Accurate detection of malignant lymph nodes is important for cancer staging of pediatric patients. Previous studies reported distinct iron oxide nanoparticle enhancement patters of benign and malignant lymph nodes in adult patients. The purpose of our study was to compare imaging characteristics of benign and malignant lymph nodes in pediatric patients on ferumoxytol-enhanced PET/MR.

METHOD AND MATERIALS

12 children (11-18 years) with malignant tumors underwent PET/MR imaging at 4 hours or at 24 hours after intravenous injection of the iron oxide nanoparticle compound ferumoxytol. MR sequences included T1-weighted LAVA, T2-weighted FSE, DWI, and T2*-weighted multi-echo IDEAL sequences. Follow up imaging for at least 6 months and/or histopathology served as the standard of reference. Different morphologies of 154 benign and 87 malignant lymph nodes on T2-FSE sequences were compared with the gold standard using McNemar's test. In addition, ADC-values, SUVmax and T2*-relaxation times of benign and malignant lymph nodes were compared with t-tests.

RESULTS

On T2-FSE images, benign lymph nodes showed a T2-hypointense hilum, surrounded by a T2-hyperintense parenchyma, while malignant lymph nodes showed loss of the hilum signal. This difference in morphologies was significant ($p = 0.02$). Benign lymph nodes showed mean diameters of 5.5 mm and malignant lymph nodes showed mean diameters of 11.3 mm. There was no significant difference in quantitative data within experimental groups at 4 and 24 hours post ferumoxytol. Benign and malignant lymph nodes with diameters > 1 cm showed mean T2* relaxation times of 5.4 ms and 10.4 ms, mean SUVmax values of 3.6 and 9.2 and mean ADC values of 894 x 10-6 mm2/s and 1852 x 10-6 mm2/s, respectively. These differences were significant with p values of 0.014, < 0.001 and 0.027. Benign and malignant lymph nodes with diameters < 1 cm showed mean T2* relaxation times of 10.6 ms and 9.8 ms. Mean SUV values of 1.5 and 6.2 and mean ADC values of 1351 x 10-6 mm2/s and 1991 x 10-6 mm2/s, resulting in significant differences with p values of <0.001 respectively..

CONCLUSION

Benign and malignant lymph nodes in pediatric patients show specific imaging characteristics on ferumoxytol-enhanced PET/MR.

CLINICAL RELEVANCE/APPLICATION

Lymph nodes of pediatric patients can show different imaging patterns on ferumoxytol-enhanced PET/MR compared to lymph nodes of adult patients.

RC513-10 Evaluation of a New Computer Aided Diagnosis (CAD) System for Automated Bone Age Assessment in Children compared with the Greulich Pyle Atlas Method: A Multireader Study

Wednesday, Nov. 29 10:50AM - 11:00AM Room: E352

Awards
Student Travel Stipend Award

Participants
Christian Booz, MD, Frankfurt am Main, Germany (*Presenter*) Nothing to Disclose
Julian L. Wichmann, MD, Frankfurt, Germany (*Abstract Co-Author*) Speaker, General Electric Company; Speaker, Siemens AG
Sabine Boettger, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Ahmed Al Kamali, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Simon S. Martin, MD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Boris Bodelle, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Doris Leithner, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Lukas Lenga, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Moritz H. Albrecht, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Jan-Erik Scholtz, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

boozchristian@gmail.com

PURPOSE

To investigate a new computer aided diagnosis (CAD) system (BoneXpert) for bone age assessment in children compared with the Greulich Pyle (GP) atlas method.

METHOD AND MATERIALS

This study was approved by the institutional review board, and the requirement to obtain informed consent was waived. Data from clinically indicated hand and wrist radiographs of 305 pediatric patients were included. Total bone age, the bone age of left distal radius and the bone age of carpal bones were analyzed by three different radiologists with varying levels of experience independently using the GP atlas method. In comparison, total bone age and the bone age of the left distal radius of each patient were analyzed using the CAD system. Pearson product-moment correlation coefficient, Bland-Altman plot and further regression analyses were evaluated for correlation analysis. Inter-reader correlation was assessed with weighted κ.

RESULTS

A total of 305 radiographs of left hands were analyzed in all 305 patients (mean age, 10.2 years; range, 1-18 years), further divided into 172 male (mean age, 10.6 years; range, 1-18 years) and 133 female patients (mean age, 9.6 years; range, 1-18 years). Mean total bone age was 9.76 years determined by CAD and 9.81 years determined by the GP atlas method. There was very high correlation between both approaches (r=0.985). Mean bone age of the left distal radius was 9.5 years determined by CAD and 9.82 determined by the GP atlas method (r=0.963). Mean bone age of carpal bones assessed by three radiologists was 9.94 years. The correlation analysis demonstrated significantly higher correlation between total bone age values and bone age values of the left distal radius (r=0.969) than between total bone age values and bone age values of carpal bones (r=0.923).

CONCLUSION

The evaluated CAD system (BoneXpert) is feasible for automated bone age assessment and shows very high correlation with the GP

The evaluated CAD system (BoneXpert) is feasible for automated bone age assessment and shows very high correlation with the GP atlas method. A method assessing bone age of the left distal radius may be more accurate than methods analyzing the carpal bones for bone age assessment.

CLINICAL RELEVANCE/APPLICATION

A new CAD system (BoneXpert) is feasible for automated bone age assessment and shows very high correlation with the Greulich Pyle atlas method.

RC513-11 AI Increases Accuracy and Decreases Variance of Bone Age Assessment by Radiologists

Wednesday, Nov. 29 11:00AM - 11:10AM Room: E352

Awards
Trainee Research Prize - Resident

Participants
Shahein H. Tajmir, MD, Boston, MA (*Presenter*) Nothing to Disclose
Hyunkwang Lee, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Randheer Shailam, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Heather I. Gale, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jie C. Nguyen, MD,MS, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Sjirk J. Westra, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Ruth Lim, MD, Boston, MA (*Abstract Co-Author*) Consultant, Alexion Pharmaceuticals, Inc; Officer, New England PET Imaging System
Michael S. Gee, MD, PhD, Jamaica Plain, MA (*Abstract Co-Author*) Nothing to Disclose
Synho Do, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

shahein@stajmir.com

PURPOSE

Radiographic bone age assessment (BAA) is commonly used in the evaluation of pediatric endocrine and metabolic disorders. We previously developed a fully automated deep learning pipeline to perform BAA using convolutional neural networks. In this experiment, we compared the performance of a cohort of pediatric radiologists at performing BAA with and without AI assistance.

METHOD AND MATERIALS

6 board certified, subspecialty trained pediatric radiologists interpreted 280 age and gender matched bone age radiographs ranging from 5 to 18 years, viewed the automated BAA results, and gave their final interpretation of the bone age. Bone age accuracy, Root mean squared error (RMSE), and variance were used as measures of comparison. Mean cohort rating in years was considered the reference standard.

RESULTS

AI BAA accuracy was 63.6% overall and 97.1% within 1 year, and the 6 reader cohort accuracy was 61.1% and 97.9% when compared to the original clinical reports. Mean AI interpretation time was 0.54 seconds. When compared to mean cohort rating, AI RMSE was 0.649 years and single-reader RMSE averaged 0.656 years, (0.524-0.802). For the radiologists who utilized AI, pooled RMSE decreased from 0.645 to 0.548 years, all individually decreasing (0.524 to 0.504, $p = 0.290$; 0.802 to 0.595, $p < e\text{-}5$; 0.576 to 0.541, $p = 0.041$). Mean variance also decreased from 0.270 to 0.155, all individually decreasing (0.193 to 0.139, $p < e\text{-}3$; 0.366 to 0.170, $p < e\text{-}10$; 0.250 to 0.155, $p < e\text{-}8$). Combined AI + radiologist interpretation resulted in lower RMSE and variance than AI alone or the 6 reader cohort mean.

CONCLUSION

AI improves radiologist's interpretation by decreasing the variance and RMSE while decreasing interpretation time. The utilization of AI by radiologists improves performance compared to AI alone, a radiologist alone, or a pooled cohort of experts. This suggests that AI may optimally be utilized as an adjunct to radiologist interpretation of imaging studies.

CLINICAL RELEVANCE/APPLICATION

AI is likely to decrease variability and speed interpretation time for BAA. This suggests a model for how AI can be used in imaging settings.

RC513-12 Dose Reduction Impact in Pediatric Plain Radiography: The Importance of an Optimization Program

Wednesday, Nov. 29 11:10AM - 11:20AM Room: E352

Participants
Graciano N. Paulo, PhD,PhD, Coimbra, Portugal (*Presenter*) Nothing to Disclose
Joana Santos, PhD , Coimbra, Portugal (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

graciano@estescoimbra.pt

PURPOSE

Radiation doses to paediatric patients from plain radiography are relatively low, but because of the high frequency of these procedures, their optimisation is important for the radiology practice.The main objective of optimisation of radiological procedures is to adjust imaging parameters and implement measures in such a way that the required image is obtained with the lowest possible radiation dose and maximised benefit.

METHOD AND MATERIALS

To analyse the relationship between exposure factors, the use of technical features and dose, experimental tests were made using

two anthropomorphic phantoms.The new exposure criteria for each age group were defined according to the results obtained from the anthropomorphic phantoms tests and by reviewing the exposure criteria published in the literature and the outcome of several group meetings held with radiographers and radiologists working at the radiology department.

RESULTS

Using the post optimisation exposure criteria led to a significant reduction in exposure time, ESAK and KAP values, indicating a lower patient dose exposure.Using the post optimisation exposure criteria for chest plain radiography reduced the KAPP75 values by 22 to 60%. The KAPP75 reduction was highest in age group 5-<10. The ESAKP75 values were reduced by 7 to 31%, with the highest reduction in age group <1 .Using the post optimisation exposure criteria for abdomen plain radiography reduced the KAPP75 values by 35 to 87%. The KAPP75 reduction was highest in age group 10-<16. The ESAKP75 values were reduced by 17 to 87%, with the highest reduction in age group 10-<16.Using the post optimisation exposure criteria for pelvis plain radiography reduced the KAPP75 values by 7 to 89%. The KAPP75 reduction was highest in age group 16-<=18. The ESAKP75 values were reduced by 12 to 86%, with the highest reduction in age group 16-<=18.

CONCLUSION

Considering the post optimisation data analysis one can conclude that the two major benefits that were expected: a) a harmonisation of practice; b) a significant reduction of ExT, KAP and ESAK values with the post optimization results for chest, abdomen and pelvis were achieved.

CLINICAL RELEVANCE/APPLICATION

This work allowed proposing new and harmonised exposure parameters for chest, abdomen and pelvis plain radiography, facilitating dose reduction by up to 94%.

RC513-13 Ultrasound Assessment of Corpus Callosum in Normal Neonates

Wednesday, Nov. 29 11:20AM - 11:30AM Room: E352

Awards
Student Travel Stipend Award

Participants
Chetankumar M. Mehta, MBBS,MD, Vadodara, India (*Presenter*) Nothing to Disclose
Chandni D. Wadhwani, MD, Vadodara, India (*Abstract Co-Author*) Nothing to Disclose
Deepa R. John, MBBS, MD, Vadodara, India (*Abstract Co-Author*) Nothing to Disclose
Shubhangi T. Girbide II, MBBS, Vadodara, India (*Abstract Co-Author*) Nothing to Disclose
Ayaz J. Dabivala, MBBS, Vadodara, India (*Abstract Co-Author*) Nothing to Disclose
Bhumika P. Suthar, MD, MBBS, Baroda, India (*Abstract Co-Author*) Nothing to Disclose
Niyati Parmar, MD, Vadodara, India (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

drchetan_mehta@yahoo.com

PURPOSE

To measure the parameters of corpus callosum in sagital and coronal section of neonatal brain. To correlate the corpus callosum dimensions with gestational age(Preterm vs term), weight(Low birth weight vs normal) and gender (female and male).

METHOD AND MATERIALS

The measurements were taken with a Philips IU22 ultrasound system using C8-5 neonatal brain probe The AP diameter of genu was taken in coronal plane and length, thickness of genu, body and splenium in sagital plane through the anterior fontanelle .Statistical analysis was carried out by calculating the mean and standard deviation for the corpus callosum dimensions and applying unpaired t tests for two groups using MEDCALC software and calculating p values. A value of $p < 0.05$ was considered statistically significant.

RESULTS

Measurements of 300 neonates included the anteroposterior diameter of the genu(coronal) (2.65 ± 0.43 mm) and in mid-sagittal plane length(49.62 ± 6.3 mm),thickness of the genu (3.98 ± 1.48 mm),body (2.9 ± 0.54 mm)and splenium (3.68 ±0.9 mm). 300 neonates were divided into 2 different birth-weight groups: low birth weight< 2500 g (n =219) and normal >= 2 500 g (n = 81). A statistical significant difference at 95% and 99% confidence interval is noticed in the corpus callosum AP diameter and thickness of genu between the two groups with values of p=0.017 and p=0.001 respectively. There was no significant difference in the dimensions of corpus callosum body,splenium and length among them. An increase in the values of corpus callosum in term neonates >=37 weeks(n =187) was observed as compared to the pre-term neonates< 37weeks (n=113),however the difference was not statistically significant. Effect of gender :154 male and 146 female.No significant difference in the mean birth weight (P = 0.42) or mean gestational age (P = 0.49) between the two groups . This analysis revealed that there was no significant difference in all corpus callosum dimensions between male and female neonates (P > 0.05)

CONCLUSION

The increase in coronal and sagital genu between low and normal birth weight is statistically significant($p<0.05$) at 95 and 99% confidence interval respectively. There is no significant difference in the dimensions of corpus callosum with change in gestational age and gender of neonate.

CLINICAL RELEVANCE/APPLICATION

Ultrasound is a modality of choice for evaluation of corpus callosum in neonates.

RC513-14 What Does the Single Axial Rotation with 16cm Wide-Detector Bring in Imaging Infant Head? The Comparison of 256-Row CT with 64-Row CT

Wednesday, Nov. 29 11:30AM - 11:40AM Room: E352

Participants

Zhian Pi, Ankang, China (*Presenter*) Nothing to Disclose
Yanan Zhu, Ankang, China (*Abstract Co-Author*) Nothing to Disclose
Xianfeng Qu, Ankang, China (*Abstract Co-Author*) Nothing to Disclose
Faqing Lei, Ankang, China (*Abstract Co-Author*) Nothing to Disclose
Zhengjun Li, Ankang, China (*Abstract Co-Author*) Nothing to Disclose
Heping Zhou, MD, Ankang, China (*Abstract Co-Author*) Nothing to Disclose
Jianying Li, Beijing, China (*Abstract Co-Author*) Employee, General Electric Company

For information about this presentation, contact:

840252419@qq.com

PURPOSE

To explore the innovation of using a single axial rotation with 16cm wide-detector CT in imaging infant head.

METHOD AND MATERIALS

Prospectively enrolled 20 infants (Group 1) for non-enhanced head CT without sedation using a single axial rotation of 0.5s on a 16cm wide-detector Revolution CT scanner. Patients were scanned with tube current 120mAs and tube voltages of 100kVp. The preparation time, scanning time, radiation dose and image quality were compared with those of 18 infants in Group 2 who underwent a conventional axial scan with sedation using a 64-row VCT with 180mAs tube current and 120 kVp tube voltage. CT number and its standard deviation (SD) of the cerebellum and centrum ovale (used as background) were measured to calculate signal to noise ratio and artifact index (AI): AI = sqrt [SD2(cerebellum) - SD2(centrum ovale)]. The subjective image quality was evaluated by 2 board-certificated radiologists using a 3-point scoring system with equal or greater than 2 being acceptable. Radiation dose was recorded.

RESULTS

There was no statistical difference in preparation time, the artifact index as well as the measured occipital thickness between the two groups. The mean noise(in HU) , AI, SNR and CNR of the cerebellum and overall subjective image quality score between the two groups were also similar. However, compared with the conventional group (Group 2), Group 1 significantly reduced the scanning time by 92.2% (0.5 vs. 6.39±0.5S), and effective radiation dose by 53% (0.96±0.26 vs. 2.03±0.56 mSv) ($P<0.05$). Moreover, sedation was not used in Group 1 while most of the patients in Group 2 used a sedative.

CONCLUSION

The use of axial CT mode in a single rotation on a 16cm wide-detector for imaging infant head without sedation, provides same image quality as the conventional CT with sedation while effectively reduces the radiation dose and scanning time, avoids the complications and the potential risks of sedation, and optimizes scanning procedures.

CLINICAL RELEVANCE/APPLICATION

The use of single rotation, axial CT mode on a 16cm wide-detector for imaging infant head can avoid sedation, shorten scan time, provide good image quality and reduce dose.

RC513-15 Imaging of Pediatric Breast Masses

Wednesday, Nov. 29 11:40AM - 12:00PM Room: E352

Participants
Teresa Chapman, MD, MA, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Teresa.chapman@seattlechildrens.org

LEARNING OBJECTIVES

Recognize normal glandular tissue of the pediatric patient. Apply appropriate management recommendations to breast ultrasound findings of a girl with a palpable abnormality. Provide an appropriate differential diagnosis for a solid tissue finding in the pediatric breast.

Active Handout:Teresa Chapman

http://abstract.rsna.org/uploads/2017/17000786/Active RC513-15.pdf

RC517

Emerging Technology: Elastography - Opportunities and Challenges

Wednesday, Nov. 29 8:30AM - 10:00AM Room: S505AB

GI MR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Juergen K. Willmann, MD, Stanford, CA (*Moderator*) Research Consultant, Bracco Group Research Grant, Siemens AG Research Grant, Bracco Group Research Grant, Koninklijke Philips NV Research Grant, General Electric Company Advisory Board, Lantheus Medical Imaging, Inc Advisory Board, Bracco Group

For information about this presentation, contact:

Willmann@stanford.edu

LEARNING OBJECTIVES

1) To understand how elastography measurements are integrated into the management of patients with chronic liver disease. 2) To learn imaging techniques and protocols of ultrasound and MR elastography. 3) To compare US and MR elastography in assessing liver fibrosis. 4) To review emerging clinical indications of US and MR elastography. 5) To understand limitations of current elastography techniques.

Sub-Events

RC517A Elastography of the Liver: What the Clinician Wants to Know

Participants
Mindie Nguyen, MD, Stanford, CA (*Presenter*) Consultant, Intercept Pharmaceuticals, Inc; Consultant, Johnson & Johnson; Consultant, Gilead Sciences, Inc; Consultant, Alynam Pharmaceuticals, Inc; Consultant, Dynavax Technologies Corporation; Research Grant, Johnson & Johnson; Research Grant, Gilead Sciences, Inc; Research Grant, Bristol-Myers Squibb Company

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC517B Ultrasound Elastography: How and When?

Participants
Juergen K. Willmann, MD, Stanford, CA (*Presenter*) Research Consultant, Bracco Group Research Grant, Siemens AG Research Grant, Bracco Group Research Grant, Koninklijke Philips NV Research Grant, General Electric Company Advisory Board, Lantheus Medical Imaging, Inc Advisory Board, Bracco Group

For information about this presentation, contact:

Willmann@stanford.edu

LEARNING OBJECTIVES

1) Understand the clinical indications of ultrasound elastography (USE). 2) Learn about the various techniques and imaging protocols of USE. 3) Review the diagnostic accuracy of USE in the assessment of elasticity in liver fibrosis and other clincal applications in the body. 4) Compare USE with MR elastography. 5) Understand current limitations of USE.

ABSTRACT

Ultrasound elastography (USE) is a general term for various techniques available for objectively and quantitatively assessing tissue stiffness using ultrasonic techniques, creating noninvasive images of mechanical characteristics of tissues. Elastography is based on the fact that the elasticity of a tissue is changed by pathological or physiological processes. For example, cancer or fibrosis associated with various disease processes including chronic liver disease or chronic pancreatitis result in increased tissue stiffness.Recently, various USE techniques have been cleared by the FDA and all major ultrasound companies offer different approaches of measuring tissue stiffness on their ultrasound machines.The objective of this talk is to familiarize the audience with the clinical indications, imaging techniques and protocols, interpretation, diagnostic accuracy, and limitations of the various USE technique for assessment of tissue stiffness, with special focus on assessment of fibrosis in chronic liver disease.

RC517C MR Elastography: How and When?

Participants
Richard L. Ehman, MD, Rochester, MN (*Presenter*) CEO, Resoundant, Inc; Stockholder, Resoundant, Inc;

LEARNING OBJECTIVES

1) To be able to understand the basic physical principles of MR Elastography (MRE). 2) To be able to describe the clinical indications for MRE in liver disease. 3) To be able to describe published evidence on the diagnostic performance of MRE in assessing

liver fibrosis. 4) To be able to compare ultrasound based elastography to MRE. 5) To be able to describe the current limitations of MRE.

Honored Educators

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November 26 to December 1
McCormick Place, Chicago
Explore Invent Transform

RC550

Techniques of Musculoskeletal Interventional Ultrasound (Hands-on)

Wednesday, Nov. 29 8:30AM - 10:00AM Room: E260

MK IR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Patrick Warren, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Veronica J. Rooks, MD, Tripler AMC, HI (*Presenter*) Nothing to Disclose
James W. Murakami, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Carmen Gallego, MD, Madrid, Spain (*Presenter*) Nothing to Disclose
Stephen C. O'Connor, MD, Boston, MA (*Presenter*) Nothing to Disclose
Mabel Garcia-Hidalgo Alonso, MD, Majadahonda, Spain (*Presenter*) Nothing to Disclose
Michael A. Mahlon, DO, Tacoma, WA (*Presenter*) Nothing to Disclose
Paolo Minafra, MD, Pavia, Italy (*Presenter*) Nothing to Disclose
Paula B. Gordon, MD, Vancouver, BC (*Presenter*) Stockholder, OncoGenex Pharmaceuticals, Inc ; Scientific Advisory Board, Real Imaging Ltd; ;
Horacio M. Padua JR, MD, Boston, MA (*Presenter*) Nothing to Disclose
Ebonee Carter, MD, Honolulu, HI (*Presenter*) Nothing to Disclose
Ulises Barajas, MD, Juarez, Mexico (*Presenter*) Nothing to Disclose
Eric Royston, DO, MPH, Tripler Army Med Ctr, HI (*Presenter*) Nothing to Disclose
Peter L. Cooperberg, MD, Vancouver, BC (*Presenter*) Nothing to Disclose
Kathleen M. Boyer, DO, Honolulu, HI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Stephen.o'connor@bhs.org

Tarsomsn@hotmail.com

paolominafra@gmail.com

cgallego@salud.madrid.org

LEARNING OBJECTIVES

1) Identify basic skills, techniques, and pitfalls of freehand invasive sonography. 2) Define and discuss technical aspects, rationale, and pitfalls involved in musculoskeletal interventional sonographic care procedures. 3) Successfully perform basic portions of hands-on US-guided MSK procedures in a tissue simulation learning module, including core biopsy, small abscess drainage, cyst aspiration, soft tissue foreign body removal, and intraarticular steriod injection. 4) Incorporate these component skill sets into further life-long learning for expansion of competency and prepartaion for more advanced interventional sonographic learning opportunities.

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RC552

Carotid and Abdominal Doppler (Hands-on)

Wednesday, Nov. 29 8:30AM - 10:00AM Room: E264

GU VA US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Gowthaman Gunabushanam, MD, New Haven, CT (*Presenter*) Nothing to Disclose
Shweta Bhatt, MD, MBBS, Rochester, NY (*Presenter*) Nothing to Disclose
Wui K. Chong, MD, Houston, TX (*Presenter*) Advisory Board, Bracco Group;
Corinne Deurdulian, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Vikram S. Dogra, MD, Rochester, NY (*Presenter*) Editor, Wolters Kluwer nv;
Ulrike M. Hamper, MD, MBA, Baltimore, MD (*Presenter*) Nothing to Disclose
Davida Jones-Manns, Hampstead, MD (*Presenter*) Nothing to Disclose
Mark E. Lockhart, MD, Birmingham, AL (*Presenter*) Author, Oxford University Press; Author, JayPee Brothers Publishers; Deputy Editor, John Wiley & Sons, Inc
Margarita V. Revzin, MD, New Haven, CT (*Presenter*) Nothing to Disclose
Michelle L. Robbin, MD, Birmingham, AL (*Presenter*) Consultant, Koninklijke Philips NV;
Leslie M. Scoutt, MD, New Haven, CT (*Presenter*) Speaker, Koninklijke Philips NV
Ravinder Sidhu, MD, Rochester, NY (*Presenter*) Nothing to Disclose
Sadhna Verma, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
William D. Middleton, MD, St. Louis, MO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

drsadhnaverma@gmail.com

margarita.revzin@yale.edu

mrobbin@uabmc.edu

wkchong@mdanderson.org

leslie.scoutt@yale.edu

LEARNING OBJECTIVES

1) Describe the technique and optimally perform carotid Doppler ultrasound. 2) Describe the technique and optimally perform abdominal Doppler ultrasound. 3) Review qualitative and quantitative criteria for diagnosing abnormalities in carotid and abdominal 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): Carotid Doppler ultrasound: scanning technique, diagnostic criteria and interesting teaching cases. Abdominal 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, as needed, by faculty. Faculty will be able to offer feedback, help participants improve their scanning technique as well as answer any questions. Time permitting, faculty will also be available to answer general questions relating to all aspects of vascular ultrasound, not just limited to carotid and abdominal Doppler studies.

Honored Educators

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SSK13

Musculoskeletal (Intervention)

Wednesday, Nov. 29 10:30AM - 12:00PM Room: E353C

IR MR MK US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Luca Maria Sconfienza, MD, PhD, Milano, Italy (*Moderator*) Travel support, Bracco Group; Travel support, Esaote SpA; Travel support, ABIOGEN PHARMA SpA
Daria Motamedi, MD, Washington, DC (*Moderator*) Nothing to Disclose

Sub-Events

SSK13-01 CT Guided Pulsed Radiofrequency Treatment of the Lumbar Dorsal Root Ganglion in Patients with Acute Radicular Lower Back Pain

Participants
Alessandro Napoli, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Roberto Scipione, MD , Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Hans Peter Erasmus, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Cristina Marrocchio, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Susan Dababou, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

alessandro.napoli@uniroma1.it

PURPOSE

To determine the clinical impact of CT-guided Pulsed Radiofrequency in the management of patients with acute or sub-acute neuro-radicular pain from lumbar disc herniation, refractory to usual therapeutic strategies.

METHOD AND MATERIALS

Patients were eligible for this single-center prospective study if they presented acute or sub-acute neuro-radicular low back pain (EMG confirmed), refractory to usual treatments (drugs and injections), and if they could safely undergo Pulsed Radiofrequency procedure. Treatment was performed using a 22-20 G needle-electrode with probe tip directed to the symptomatic DRG under CT guidance; E-pulsed radiofrequency (Cosman G4) was administered for 10 min at 45V with constant local temperature of 42°C. Clinical evaluation was conducted with Visual Analogue Scale (VAS), Owestry Disability Index (ODI) and Roland-Morris (RM) score for quality of life assessment; all questionnaires were obtained at baseline and at 1-week, 1-month and 3-month follow-up. Analyses were performed on a per-protocol basis.

RESULTS

Over a 3-year period, 80 patients were treated with Pulsed RadiofrequencyMedian VAS scores decreased from 7.8 at baseline to 3.5 at 1week after treatment, to 2.6 at 1 month and 1.3 at 3 months; median ODI scores decreased from 78.0 at baseline to 12.5 at 1 week, to 6.0 at 1 month and 5.5 at 3 months; RM score decreased from 16 at baseline to 3 at 1 month and 1.5 at 3 months ($p<0.001$). Overall, 90.0% of patients reached a 0 VAS score within the first month after treatment; 97.5% of patients had a decrease of at least 20 points in ODI score in the same interval. There were 6 patients considered partial responders that required a second PRF session.

CONCLUSION

CT-guided Pulsed Radiofrequency has shown to be a minimally invasive, effective and repeatable percutaneous treatment option for patients with acute or sub-acute neuro-radicular low back pain.

CLINICAL RELEVANCE/APPLICATION

the results of this study are superior to those reported from literature for usual care strategies and injections and may avoid surgery for a substantial number of patients with sciatic disc compression.

SSK13-02 Effects of Allogeneic Human Chondrocytes Expressing TGF-ß1 (TG-C) On Structural Progression of MRI Features Of Knee Osteoarthritis: A Randomized Clinical Trial

Wednesday, Nov. 29 10:40AM - 10:50AM Room: E353C

Participants
Ali Guermazi, MD, PhD, Boston, MA (*Presenter*) President, Boston Imaging Core Lab, LLC; Research Consultant, Merck KGaA; Research Consultant, sanofi-aventis Group; Research Consultant, TissueGene, Inc; Research Consultant, OrthoTrophix, Inc; Research Consultant, AstraZeneca PLC; Research Consultant, General Electric Company; Research Consultant, Pfizer Inc

Gurdyal Kalsi, Rockville, MD (*Abstract Co-Author*) Officer, TissueGene, Inc
Michel D. Crema, MD, Boston, MA (*Abstract Co-Author*) Shareholder, Boston Imaging Core Lab, LLC
Ogden Copeland, Rockville, MD (*Abstract Co-Author*) Director, TissueGene, Inc
Moon J. Noh, Rockville, MD (*Abstract Co-Author*) Vice President, TissueGene, Inc
Frank W. Roemer, MD, Erlangen, Germany (*Abstract Co-Author*) Chief Medical Officer, Boston Imaging Core Lab LLC; Director of Research, Boston Imaging Core Lab LLC; Shareholder, Boston Imaging Core Lab LLC; ;

For information about this presentation, contact:

guermazi@bu.edu

PURPOSE

To determine effects of allogeneic human chondrocytes expressing TGF-ß1 (TG-C) on structural progression of MRI features of knee osteoarthritis over a 1 year period.

METHOD AND MATERIALS

This phase II randomized controlled trial of TG-C included patients with moderate to advanced osteoarthritis. Patients were randomized to receive an intraarticular 3:1 mixture of non-transduced allogeneic human chondrocytes and TG-C or placebo. 3T MRI was acquired for all patients at baseline and follow-up (3, 6 and 12 months). MRIs were assessed using the WORMS system including cartilage damage, bone marrow lesions (BMLs), meniscal damage/extrusion, Hoffa-, effusion-synovitis, and osteophytes. Analyses were performed on a whole knee level, compartmental level, and subregional level. Binary logistic regression with Generalized Estimating Equation was used to compare risks of progression, adjusting for baseline age and gender. Mann-Whitney-Wilcoxon tests were used to assess differences for continuous variables.

RESULTS

57 Patients were included in the TG-C group and 29 in the placebo group. At 12 months, knees in the TG-C group showed less progression of cartilage damage compared to placebo on a whole knee level (34.6% vs. 47.9%; adjusted RR 0.7, 95%CI [0.5-1.1], p=0.077). Less progression of Hoffa-synovitis and effusion-synovitis was observed in the TG-C group compared to placebo (9.6% vs. 21.1%, adjusted RR 0.5, 95%CI [0.2,1.2], p=0.115). No statistically significant differences were seen for BMLs, meniscal damage and osteophytes.

CONCLUSION

Intraarticular treatment with TG-C showed fewer patients in the treated group with progression in structural OA features and other MRI-defined inflammatory markers such as Hoffa-synovitis and effusion-synovitis. However, no differences were observed in regard to progression of BMLs and meniscal damage, or hypertrophic osteophyte formation.

CLINICAL RELEVANCE/APPLICATION

Intraarticular treatment with TG-C may potentially show benefits on delayed progression of cartilage damage and MRI markers of inflammation in osteoarthritis.

Honored Educators

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SSK13-03 MR Guided High Intensity Focused Ultrasound (MRgFUS) for the Treatment of Oligometastatic Prostate Cancer Bone Metastasis: Can Soundwaves Downstage Cancer Spread?

Wednesday, Nov. 29 10:50AM - 11:00AM Room: E353C

Participants
Carola Palla, MD , Rome, Italy (*Presenter*) Nothing to Disclose
Alessandro Napoli, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Cristina Marrocchio, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Lorenzo Chiurchioni, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Fabrizio Andrani, MD , Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

With improvements in diagnostic modalities such as functional imaging, oligometastatic prostate cancer is being diagnosed with greater frequency than ever before. Our aim was to determine MRgFUS ability to downstage patients with oligometastatic bone disease with single session of non-invasive metastasis-directed therapy.

METHOD AND MATERIALS

The study was designed with intention-to-treat metastatic bone lesions. Patients were enrolled if they had accessible bone metastasis and could safely undergo MRgFUS (InSightec, Israel). Baseline measurable characteristics included dynamic contrast enhanced MRI study (Gd-BOPTA, Bracco; GE 750 3T magnet) with semiquantitative perfusion analysis, PSA level (ng/ml) and choline PET (SUV). Measurable variables were obtained at treatment time, 3 months, 12 months and 24 months follow-up.

RESULTS

18 patients fulfilled the inclusion criteria and safely underwent MRgFUS procedure of metastatic bone ablations. Lesions were located in the pelvis (11), scapula (3) and long bones (4). At baseline all lesions showed a significant DCE perfusion (highly vascular) with mean perfusion reduction of 88% at 3 months follow-up (CI: 100-50; $p<0.001$) stable at subsequent follow-up scans. Similarly PSA levels decreased from a mean baseline of 19 (ng/ml) to 7.1, 2.9 and 2.1, at 3-12 and 24 moths respectively. SUV values showed similar trend with reduction from baseline (mean 8.9 to 3.0, 2.3 and 1.7: $p<0.001$). In all patients single MRgFUS session was appropriate without any major or minor adverse events reported.

CONCLUSION

MRgFUS is a totally non-invasive procedure that can obtain nearly complete bone ablation in patients with oligometastatic prostate disease. The technique features a radiation-free approach that can be of incremental value in long-survivor subset on oncological patients, significantly reducing risk of toxic effects.

CLINICAL RELEVANCE/APPLICATION

MRgFUS could be routinely introduced as a treatment option for oligometastatic bone disease non responding to conventional treatment.

SSK13-04 Image-guided Spine Injections: Paradoxical Particle Formation of Ropivacaine and Non-Particulate Dexamethasone Poses a Risk for Spinal Cord Infarction Events

Wednesday, Nov. 29 11:00AM - 11:10AM Room: E353C

Participants
Brandon Childers, MD, Baltimore, MD (*Presenter*) Nothing to Disclose
Il Minn, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jace Jones, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Maureen Kane, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jan Fritz, MD, Baltimore, MD (*Abstract Co-Author*) Research Grant, Siemens AG; Scientific Advisor, Siemens AG; Scientific Advisor, Alexion Pharmaceuticals, Inc; Speaker, Siemens AG

PURPOSE

Image-guided epidural steroid injections are frequently performed radiologic procedures using local anesthetics and steroids. Because particulate steroids can embolize into the arterial system and cause rare cord infarction events, non-particulate steroids are now recommended. However, we have observed paradoxical particulation when mixing the non-particulate steroid dexamethasone and the local anesthetic ropivacaine, posing a risk for cord infarction events despite using recommended non-particulate injectables. Therefore, we investigated the occurrence of particulation between different local anesthetics and non-particulate dexamethasone formulations, as well as the mechanism of action.

METHOD AND MATERIALS

We evaluated clinically relevant dilution series (1:1 - 1:10) of commercially available ropivacaine (2), lidocaine (2) and bupivacaine (1) formulations mixed with three different commercially available dexamethasone formulations. The outcome variables were the pH of the native drugs and mixtures as well as the presence of precipitation using macroscopic inspection and microscopic photography. Mass spectroscopy was used to analyze the composition of ropivacaine-dexamethasone precipitate.

RESULTS

The pH of the native formulations and mixtures were acidic for ropivacaine, and near neutral for bupivacaine, lidocaine, and dexamethasone. All mixtures were pH neutral. Both ropivacaine formulations demonstrated particulation at all concentrations when combined with two dexamethasone formulations, whereas only minimal particulation occurred at concentrations of 1:1-2 of ropivacaine and the third dexamethasone formulation. Bupivacaine showed minimal, wall-adherent crystal formation with only one dexamethasone formulation at concentrations of 1:1-2. Lidocaine did not form any particles. Mass spectroscopy identified the particles as pure ropivacaine precipitate.

CONCLUSION

Ropivicaine precipitates out of solution and forms particles when combined with dexamethasone, owing to a change from acidic to neutral pH. However, the degree of particulation varies based upon the commercially-available formulations, suggesting that other factors may also play a role.

CLINICAL RELEVANCE/APPLICATION

The combination of non-particulate ropivacaine and non-particulate dexamethasone formulations should be avoided when performing epidural steroid injections to prevent particle formation and minimize the risk of embolic cord infarction events.

SSK13-05 Greater Occipital Nerve Infiltration under MR Guidance: Feasibility Study and Preliminary Results

Wednesday, Nov. 29 11:10AM - 11:20AM Room: E353C

Participants
Adrian I. Kastler, MD,PhD, Grenoble, France (*Abstract Co-Author*) Nothing to Disclose
Romain Perolat, Grenoble, France (*Presenter*) Nothing to Disclose
Bruno A. Kastler, MD, PhD, Besancon, France (*Abstract Co-Author*) Nothing to Disclose
Jan Fritz, MD, Baltimore, MD (*Abstract Co-Author*) Research Grant, Siemens AG; Scientific Advisor, Siemens AG; Scientific Advisor, Alexion Pharmaceuticals, Inc; Speaker, Siemens AG
Caroline Maindet, Grenoble, France (*Abstract Co-Author*) Nothing to Disclose
Stephan Chabardes, Grenoble, France (*Abstract Co-Author*) Nothing to Disclose
Alexandre Krainik, MD, PhD, Grenoble Cedex, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the feasibility of greater occipital nerve (GON) intermediate site infiltration with MRI guidance

METHOD AND MATERIALS

Eleven consecutive patients suffering from chronic refractory cranio-facial pain who underwent 16 GON infiltrations between November 2016 and January 2017 were included in this prospective study. All of the procedures were performed on an outpatient basis in the research facility of our institution, equipped with a widebore 1.5T scanner. The fatty space between inferior obliquus and semispinalis muscles at C1-C2 level was defined as the infiltration target. Technical success was defined as the ability to accurately inject the products in the pre-defined target, assessed by post procedure axial and sagittal proton density weigthed sequences. Clinical success was defined as a 50% pain decrease at one month follow up.

RESULTS

Technical success as defined above was 100%. GON was depicted in 6 of 11 cases on planning MRI sequences. Mean duration of procedure was 22.5 minutes (range-16-41). Clinical success as previously defined was obtained in 7 of 11 included patients (63.6%) with a mean self reported improvement of 78%.

CONCLUSION

Interventional MR guidance for GON infiltration is a feasible technique offering similar results to an already established effective procedure. It may appear as a useful tool in specific populations, such as young patients and repeat infiltrations, and should be considered in these settings.

CLINICAL RELEVANCE/APPLICATION

• MR guidance for GON infiltration is a feasible technique • Preliminary results are in agreement with other guidance modalities • MR guidance may be seen as a useful tool in specific populations

SSK13-06 Cementoplasty of Pelvic Bone Metastases: Lesion Filling and Other Factors Influencing the Therapeutic Response

Wednesday, Nov. 29 11:20AM - 11:30AM Room: E353C

Participants
Thomas Moser, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Marta Onate Miranda, MD, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose
Katia Achour, MD, Laval, QC (*Abstract Co-Author*) Nothing to Disclose
Veronique Freire II, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

thomas.moser@umontreal.ca

PURPOSE

To determine the parameters likely to influence the therapeutic response in cementoplasty of pelvic metastases.

METHOD AND MATERIALS

We retrospectively reviewed a series of pelvic bone cementoplasties performed for symptomatic metastatic involvement in the last 7 years. In addition to demographics, primary tumor and associated treatments, we collected information on the lesion treated: localization, dimensions, cortical destruction graded 0-6, soft tissue mass and pathological fracture; and procedural information: number of needles, cement volume, filling percentage and extra-osseous leakage. The pain scores were evaluated on a visual analog scale before treatment and at the 1 month follow-up visit.

RESULTS

We included 44 procedures in 40 patients (21 females and 19 males, mean age 63 years). The primary tumor was lung (n = 15), breast (n = 9), kidney (n = 7), thyroid (n = 2) or other (n = 7). There were 38 osteolytic and 6 mixed lesions. Localization was acetabular (n = 30), iliac (n = 11) or sacral (n = 3). The maximal lesion diameter was on average 43 mm. The cortical destruction was on average 2.4 / 6 with soft tissue extension in 7/35 and pathological fracture in 7/35. The number of needles was one in 32/44, two in 10/44 and three in 2/44. The volume of cement injected was on average 10 ml with an average filling of 55%. A cement leak was minimal in 11/44, moderate in 9/44. Pain relief was observed in 74% of patients with an average score of 84/100 before the procedure and 46/100 after. The pain relief did not appear correlated to lesion volume (p = 0.2), presence of pathological fracture (p = 0.3), soft tissue extension (p = 0.21), filling percentage (p =0,42), cement leak (p = 0,26), or previous radiation therapy (p = 0,8).

CONCLUSION

Cementoplasty of pelvic bone metastases provides pain relief in a majority of patients. The lesion filling can be optimized by injection through multiple needles but this parameter does not appear correlated with the therapeutic response.

CLINICAL RELEVANCE/APPLICATION

Cementoplasty is a valuable adjunct in the management of symptomatic pelvic bone metastases.

SSK13-07 Hip Steroid/Anesthetic Injections: Is there an Increased Incidence of Hip Osteoarthritis Progression, Femoral Head Osteonecrosis and Collapse?

Wednesday, Nov. 29 11:30AM - 11:40AM Room: E353C

Participants
Frank J. Simeone, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Joao Rafael T. Vicentini, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Susan V. Kattapuram, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Connie Y. Chang, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cychang@mgh.harvard.edu

PURPOSE

To evaluate incidence of osteoarthritis progression, femoral head osteonecrosis and articular surface collapse in hip steroid/anesthetic injection patients.

METHOD AND MATERIALS

Our study was IRB-approved and HIPAA compliant. A total of 123 hip steroid/anesthetic(40 mg triamcinolone, 4 mL 0.5%

preservative free ropivicaine) injections were performed from 01/2014 to 07/2015. Inclusion criterion was follow-up radiography of the native hip 3-9 months after the injection. Two musculoskeletal radiologists performed retrospective, blinded reviews of the pre- and post-injection radiography of hip injection patients (HIPs) and 2 demographic and follow-up duration matched control groups: 1, patients undergoing hip x-rays without injection; 2, glenohumeral joint injection patients. Groups were compared with Fisher exact test.

RESULTS

There were 102 HIPs (age 65 ± 13 (range 19-92) years; 62 F, 40 M; 41 L, 61 R), who were followed for 26 ± 10 (12-66) weeks. For Reader 1, 38/102 (37%) of HIPs had increased osteoarthritis after steroid injection, compared with 27/102 (26%) of hip controls and 14/44 (32%) of shoulder injection patients. For Reader 2, 42/102 (41%) of HIPs had increased osteoarthritis after steroid injection, compared with 20/102 (20%) of hip controls and 10/44 (23%) of shoulder injection patients. There was no significant difference between these groups (P>0.05). For Reader 1, 24/102 (24%) of HIPs had new osteonecrosis and 15/102 (15%) had new collapse after the steroid injection, compared with 9/102 (9%) and 4/102 (4%) of hip controls and 2/44 (5%) and 1/44 (2%) of shoulder injection patients. There was significantly more osteonecrosis and collapse in HIPs, compared with hip controls (P=0.001 and 0.01) and shoulder injection patients (P = 0.005 and 0.04). For Reader 2, 22/102 (22%) of HIPs had new osteonecrosis and 17/102 (17%) had new collapse after the steroid injection, compared with 9/102 (9%) and 4/102 (4%) of hip controls and 2/44 (5%) and 1/44 (2%) of shoulder injection patients. There was significantly more osteonecrosis and collapse in HIPs, compared with hip controls (P=0.01 and 0.01) and shoulder injection patients (P = 0.03 and 0.005).

CONCLUSION

Hip injection patients have a greater incidence of osteonecrosis and collapse compared with hip controls and shoulder injection patients.

CLINICAL RELEVANCE/APPLICATION

Further evaluation of hip injectates and the injection population is warranted, given these findings.

SSK13-08 MRI-Guided High Intensity Focused Ultrasound: A New First-Line Technique in the Treatment of Osteoid Osteoma?

Wednesday, Nov. 29 11:40AM - 11:50AM Room: E353C

Awards
Trainee Research Prize - Resident

Participants
Roberto Scipione, MD , Rome, Italy (*Presenter*) Nothing to Disclose
Alessandro Napoli, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Alberto Bazzocchi, MD, Bologna, Italy (*Abstract Co-Author*) Nothing to Disclose
Andrea Leonardi, MD , Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Susan Dababou, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

roberto.scipione@uniroma1.it

PURPOSE

to demonstrate that completely non-invasive radiation-free ablation of osteoid osteoma with MRI-guided high intensity focused ultrasound (MRgFUS) is a safe, effective and durable treatment option.

METHOD AND MATERIALS

Patients with typical clinical and radiological diagnostic findings of osteoid osteoma (non-vertebral), suitable for MRgFUS and anaesthesia, were enrolled in this dual-centre prospective observational study. Vertebral locations were excluded as considered inaccessible. MrgFUS was performed using InSightec ExAblate 2100 system. Safety (rate of complications), clinical effectiveness (Visual Analogue Scale [VAS] pain score reduction) and durability (stability of results over time) of MRgFUS were evaluated as primary outcomes; tumour control (nidus ablation) at dynamic contrast enhanced MR imaging (Discovery 750, GE; Gd-BOPTA, Bracco) was considered as secondary outcome. All patients underwent a minimum follow-up period of 4 years.

RESULTS

Out of 50 subjects screened for recruitment, 45 were enrolled and submitted to MRgFUS. No treatment-related complications were observed. A complete and durable response was achieved in 80% of cases. Median VAS pain score dropped from 8 (IQR 7-9) to 0 at 1-week, and at all subsequent follow-up check points (1 month, 6, 12, 24, 36 and 48 months). Scores evaluating interference of pain with sleep, physical and daily activities showed similar improvement after treatment. Among subjects with partial response (20%), 4 received a second treatment (3 with CT-guided Radiofrequency Ablation, 1 with MRgFUS), and 5 did not need any other treatment. All re-treated patients achieved 0 VAS score. Overall, 87% of patients after MRgFUS treatment reached and maintained a stable 0 VAS score during follow-up. At 3-year MRI osteoid osteoma showed no vascularization in 32/42 patients (76%) treated with MRgFUS alone.

CONCLUSION

MRgFUS is a safe, effective and durable option in the treatment of non-spinal osteoid osteoma.

CLINICAL RELEVANCE/APPLICATION

This technique provides relevant advantages in the treatment of this impairing disease affecting mostly young population: no ionizing radiation, no incisions or needles, and, so far, no complications. Our results support the role of MRgFUS as first-line treatment option for accessible osteoid osteoma.

SSK13-09 Imaging and Clinical Risk Factor Correlation with Rate of Conversion to Surgery Following Fluoroscopically Guided Facet Cyst Rupture

Wednesday, Nov. 29 11:50AM - 12:00PM Room: E353C

Participants
Andrew J. Hill IV, MD, Charlottesville, VA (*Abstract Co-Author*) Nothing to Disclose
Michael Hadeed, MD, Charlottesville, VA (*Abstract Co-Author*) Nothing to Disclose
Adam Shimer, MD, Charlottesville, VA (*Abstract Co-Author*) Speaker, Stryker Corporation; Consultant, NuVasive, Inc; Royalties, NuVasive, Inc
Wendy Novicoff, PhD, Charlottesville, VA (*Abstract Co-Author*) Nothing to Disclose
Nicholas C. Nacey, MD, Charlottesville, VA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hillaj1@gmail.com

PURPOSE

Facet cysts may be encountered at magnetic resonance imaging (MRI) in patients with back pain and radicular symptoms. The purpose of this study was to evaluate the conversion rate to surgery following cyst rupture, and to assess associated clinical, imaging and procedural variables.

METHOD AND MATERIALS

A retrospective review was completed of all patients who underwent fluoroscopically guided facet cyst rupture through access of the inferior facet recess from 2000-2016. Primary outcome was conversion to surgery. Secondary outcomes included clinical, MRI, and procedural variables possibly associated with conversion. Clinical variables included sex, age, # of comorbidities, symptoms (pain, motor, sensory), pain laterality, and if pain involved the leg, back or both. MRI variables included cyst size, shape, internal signal, rim signal, spine level, laterality, spondylolisthesis, canal or lateral recess stenosis, presence of facet fluid +/- unilateral vs. bilateral, bone edema and erosion. Procedural variables included cyst opacification, successful epidural rupture and pre vs. post procedure pain.

RESULTS

49 patients met the inclusion criteria. 4 were excluded because they had either no clinical notes or no MRI available for review. 13/45 (29%) of patients converted to surgery. Successful epidural rupture was observed fluoroscopically in 33/45 (73%), of whom 7/33 (21%) converted to surgery. No epidural rupture was seen in 12/45 (27%), of whom 6/12 (50%) converted to surgery. The average interval to surgery was 95 days and average follow up was 889 days after cyst rupture. Of the clinical, imaging and procedural variables evaluated, only the number of comorbidities was significantly associated with conversion to surgery ($p = 0.03$).

CONCLUSION

Facet cysts have been recognized as a cause of spinal stenosis. Fluoroscopically guided facet cyst rupture may be attempted prior to surgery, though 29% our patients eventually required surgery. No significant correlation was found between facet cyst features at MRI and conversion rate to surgery to aid in determining which patients may be benefit from intervention.

CLINICAL RELEVANCE/APPLICATION

Fluoroscopic guided facet cyst rupture is a minimally invasive procedure worth attempting in symptomatic patients as it has a high rate of technical success, with most patients avoiding surgery.

MSCU41

Case-based Review of Ultrasound (An Interactive Session)

Wednesday, Nov. 29 1:30PM - 3:00PM Room: S406A

US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Deborah J. Rubens, MD, Rochester, NY (*Director*) Nothing to Disclose

For information about this presentation, contact:

Deborah_rubens@urmc.rochester.edu

LEARNING OBJECTIVES

1) Recognize the diverse applications of ultrasound throughout the body and identify those situations in which it provides the optimal diagnostic imaging choice. 2) Understand the fundamental interpretive parameters of ultrasound contrast enhancement and its applications. 3) Know the important factors to consider when choosing ultrasound 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 and elastography as diagnostic techniques. The selection of ultrasound for interventional guidance will be addressed, as will the unique applications of ultrasound to emergency imaging including obstetrics and pediatrics.

Sub-Events

MSCU41A Ultrasound Advances: Elastography and Contrast

Participants
Richard G. Barr, MD, PhD, Campbell, OH (*Presenter*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Toshiba Medical Systems Corporation; Research Grant, Esaote SpA; Research Grant, BK Ultrasound; Research Grant, Hitachi, Ltd

LEARNING OBJECTIVES

1) Review the clinical uses of elastography in routine practice. 2) Discuss the advantages and disadvantages of elastography. 3) Review the uses of ultrasound contrast - on label and off label. 4) Discuss how CEUS can be incorporated into a routine practice. 5) Review the materials need to develop a CEUS program.

ABSTRACT

This course will review the clinical uses of ultrasound elastography and contrast enhanced ultrasound. The course will review the uses of ultrasound elastography in routine clinical practice. The advantages and disadvantages of elastography will be discussed on various organ systems. A brief overview of how to develop a CEUS program will be presented. Both on label and off label uses of CEUS will be reviewed. How to incorporate a CEUS program into routine clinical practice will be presented.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/ Richard G. Barr, MD, PhD - 2017 Honored Educator

MSCU41B Vascular Ultrasound

Participants
Leslie M. Scoutt, MD, New Haven, CT (*Presenter*) Speaker, Koninklijke Philips NV

For information about this presentation, contact:

leslie.scoutt@yale.edu

LEARNING OBJECTIVES

View Learning Objectives under main course title

ABSTRACT

Case based review of vascular ultrasound

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

MSCU41C Obstetric Ultrasound-Urgent and Emergent Cases

Participants
Phyllis Glanc, MD, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Phyllis.Glanc@sunnybrook.ca

LEARNING OBJECTIVES

View Learning Objectives under main course title

ABSTRACT

This course will present cases related to obstetrics that involve either urgent or emergent care for mother and/or her fetus. This will includes events which may occur in the early post-partum state.

URL

phyllisglanc.com

Active Handout:Phyllis Glanc

http://abstract.rsna.org/uploads/2017/17000491/Active MSCU41C.pdf

MSCU41D Abdominal Ultrasound

Participants
Jason M. Wagner, MD, Oklahoma City, OK (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jason-wagner@ouhsc.edu

LEARNING OBJECTIVES

1) Use Doppler to diagnose hepatic diseases. 2) Recognize common sonographic pitfalls in the diagnosis of gallbladder and kidney conditions. 3) Diagnose abdominal wall abnormalities with ultrasound.

ABSTRACT

Case based review of abdominal ultrasound.

SSM10

Genitourinary (Gynecology and Genitourinary Ultrasound)

Wednesday, Nov. 29 3:00PM - 4:00PM Room: E351

GU US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Harris L. Cohen, MD, Memphis, TN (*Moderator*) Nothing to Disclose
Mary C. Frates, MD, Sharon, MA (*Moderator*) Nothing to Disclose

Sub-Events

SSM10-01 Impact of Contrast-Enhanced Ultrasound in the Secondary Prevention of Testicular Tumors

Wednesday, Nov. 29 3:00PM - 3:10PM Room: E351

Participants
DARIO DE ROSA, MD, NAPOLI, Italy (*Abstract Co-Author*) Nothing to Disclose
Pietro Gisonni, Napoli, Italy (*Abstract Co-Author*) Nothing to Disclose
Giuseppina Dell'Aversano Orabona, MD, NAPOLI, Italy (*Presenter*) Nothing to Disclose
Maria Chiara Imperato, Napoli, Italy (*Abstract Co-Author*) Nothing to Disclose
Martina Caruso, Napoli, Italy (*Abstract Co-Author*) Nothing to Disclose
Dolores Ferrara, Napoli, Italy (*Abstract Co-Author*) Nothing to Disclose
Arturo Brunetti, MD, Naples, Italy (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

darioderosa18@gmail.com

PURPOSE

This study evaluated the role of contrast-enhanced ultrasound CEUS in the secondary prevention of testicular tumours.

METHOD AND MATERIALS

Forty patients (median age 25 years, range 18-36 yrs) with a focal testicular lesion underwent B-mode ultrasound (US), Doppler and CEUS.Then all patients underwent orchiectomy and the histological exam of the mass was performed.Histological features and ultrasound images were recorded and compared for each patient.

RESULTS

The medium diameter of the lesions was 12 mm (range 3- 29 mm). 30 of 50 patients had malignant tumours (75%), 5 had benign tumours (12,5%) and 5 non-neoplastic lesions (12,5%).B-mode US detected neoplastic characteristics only in 9 of the 35 tumoural lesions; with color-Doppler techniques in 10 of 35 tumours was found intralesional hypervascularization (B-mode and color-Doppler US findings suggestive of neoplastic disease were irregular margins and internal hypervascularization).On qualitative CEUS evaluation 34 of the 35 neoplastic lesions showed intense enhancement; on quantitative CEUS all tumours showed different kinetics from the surrounding parenchyma, according to a rapid wash in and wash out for malignant tumours and rapid wash-in but delayed wash-out for benign tumours (CEUS findings suggestive of neoplastic disease were intense enhancement of contrast, rapidity of wash-in and wash-out and peak characteristics).

CONCLUSION

In this study, we confirmed the CEUS high accuracy in the differentiation between malignant and benign small lesions and its utility in the early diagnosis of testicular cancer.Conventional US revealed in all patients the presence of a solid testicular mass and color-Doppler revealed presence of increased blood flow signal, but in small testicular tumours it did not show vascularization and only CEUS was able to do a differential dignosis.Using CEUS, the temporal perfusion dynamics of the contrast enhancement help in the differentiation between malignant and benign tumours; the intensity of contrast enhancement helps in the differentiation between neoplastic and non-neoplastic lesions.Therefore, CEUS is useful in the secondary prevention of small testicular masses with an ambiguous color-Doppler pattern and permits, rapidly and without damage, to predict the lesion nature.

CLINICAL RELEVANCE/APPLICATION

CEUS can add relevant information for surgical decision making in small testicular lesions.

SSM10-02 Utility of Ultrasound Elastography (Acoustic Radiation Force Impulse Imaging) in Differentiating Ovarian Endometriomas from Hemorrhagic Ovarian Cysts; In Correlation with Histopathology

Wednesday, Nov. 29 3:10PM - 3:20PM Room: E351

Participants
Jayasudha Sambedu, MBBS,DMRD, Chennai, India (*Presenter*) Nothing to Disclose

Meera Krishnakumar, MD, Chennai, India (*Abstract Co-Author*) Nothing to Disclose
Natesan Chidambaranathan, MD, PhD, Chennai, India (*Abstract Co-Author*) Nothing to Disclose
Sudhakar H. K., DMRD, MD, Chennai, India (*Abstract Co-Author*) Nothing to Disclose
Kapali Sunder, MD, DMRD, Chennai, India (*Abstract Co-Author*) Nothing to Disclose
Sooraj Prasannakumar, MBBS, Chennai, India (*Abstract Co-Author*) Nothing to Disclose
Sandhya Gh JR, MBBS, Chennai, India (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

jayasudha.sambedu@gmail.com

PURPOSE

To study the usefulness of ARFI in the differentiation of ovarian endometriomas and hemorrhagic ovarian cysts.

METHOD AND MATERIALS

It is a prospective observational study conducted in the department of radiodiagnosis of our institution from january to december 2016. The study population consisted of 35 women(n=40, 5 women with bilateral lesions) of reproductive age group (20-45 y) presenting to the department of radiodiagnosis with unilateral or bilateral adnexal cystic lesions with homogenous internal echoes, diagnosed by grey scale ultrasound.Cystic lesions with mural nodules/solid components/ internal vascularity were excluded from the study. Measurements were performed with SIEMENS ACUSON S 2000 ultrasound system enabled with virtual touch quantification software.Grayscale ultrasound with full bladder was performed on all the patients to clearly define the pelvic anatomy and the lesion position. The lesion was identified and a region of interest (1x0.5cm box within the lesion) within the lesion was selected. The stiffness was measured well within the capsule of the lesion. Five succesful measurements were taken for ARFI shear wave velocity, measured in meters per second and the median value was calculated.Histopathology results, post surgery were obtained for all the 40 lesions and correlated with the SWV values.

RESULTS

Ultrasound elastography (ARFI)was performed on all the 40 lesions and the median shear wave velocities(SWV) were calculated.The definitive diagnosis was made by post operative histopathological examination results and the SWV values were correlated. Out of the 40 cystic lesions, 23 lesions were endometriomas and 17 lesions were hemorrhagic cysts. All the lesions histopathologically proven as endometriomas had higher SWV values compared to those proven as hemorrhagic ovarian cysts.A cut-off value of 2.85m/s was established, concluding the lesions with SWV values above 2.85m/s were more likely to be endometriomas and those below 2.85m/s were more likely to be hemorrhagic cysts with a sensitivity and specificity of 94% and 100% respectively.

CONCLUSION

ARFI imaging is a feasible technique for pre-operative discrimination of ovarian endometriomas and hemorrhagic ovarian cysts.

CLINICAL RELEVANCE/APPLICATION

With the use of this modality clear preoperative diagnosis of the two lesions can be established and the existing diagnostic dilemma leading to unnecessary surgeries can be avoided.

SSM10-03 Quantitative Shear-Wave Elastography of the Testicle: Normal Values and Assessment of the Common Pathological Conditions on a Large Cohort

Wednesday, Nov. 29 3:20PM - 3:30PM Room: E351

Participants
Pierre De Marini, Strasbourg, France (*Presenter*) Nothing to Disclose
Aissam Labani, MD, Strasbourg, France (*Abstract Co-Author*) Nothing to Disclose
Quentin Minault, Strasbourg, France (*Abstract Co-Author*) Nothing to Disclose
Mickael Ohana, MD, PhD, Strasbourg, France (*Abstract Co-Author*) Nothing to Disclose
Herve Lang Sr, MD, Strasbourg, France (*Abstract Co-Author*) Nothing to Disclose
Catherine Roy, MD, Strasbourg, France (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

catherine.roy@chru-strasbourg.fr

PURPOSE

Shear wave elastography (SWE) is the last development in ultrasonic assessment of the tissue elasticity. Our aim was to evaluate the values of the stiffness in normal parenchyma and in common pathologies in order to determine a threshold value for diagnosis.

METHOD AND MATERIALS

This prospective study recorded 235 patients (mean age 43.2±17.2 years, range 17-90) using a Toshiba AplioTM 500 (Toshiba Medical Systems, Japan).Young modulus(YM) values were recorded by mean of a circular ROI over the color map. The cohort was divided into two groups according the grey scale aspect : a normal group of 110 patients with 902 values (67 bilateral, 43 unilateral+125controlateral -3 localizations (superior, mid , inferior) - including microlithiasis and hydrocele) and a pathological group of 125 patients with 375 values (87 lesions up to 5mm, 38 diffuse abnormalities). Final diagnosis was done by clinical findings, follow up or histological analysis. For statistical analysis a Mann-Whitney test was used and the optimal cut off value was calculated from the ROC curves analysis. A P value below 0.05 was considered as significant.

RESULTS

The YM values of free lesion testicle was 4.56±1.53kPa, median = 3.85kPa.There was no significant difference concerning the side, the localization, the presence of hydrocele or stage I or II microlithiasis. There was a significant higher mean value stiffness with age (>60 years: 4.97kPa; p<0.001), stage III microlithiasis (6.27kPa; p<0.001) and in case of contralateral tumor (5.60kPa; p<0.001). The stiffness values and cut off thresholds were for tumors (n= 48, mean = 21.31±7.01kPa, median =19.60kPa , p<0.001) and 16.1kPa(Se= 0.82 - CI95[0.48-0.98], Sp= 0.81 kPaCI95[0.74-0.86], AUC= 0.881), orchitis (n=43, mean = 9.48±3.91kPa, median =6.65kPa, p<0.001) and 5.7kPa (Se= 0.63 - CI95[0.49-0.76], Sp= 0.77 - CI95[0.70-0.83], AUC=0.764) and fibrosis (n=34, mean = 31.55±9.08kPa, median =25.20kPa, p<0.001) and 26.3kPa (Se= 0.82 - CI95[0.63-0.94], Sp= 0.85 -

CI95[0.79-0.90], AUC= 0.872), respectively. By analyzing the distributions between the different pathologies, the difference was statistically significant between orchitis and fibrosis (p= 0.002) and tumors and fibrosis (p<0.001).

CONCLUSION

SWE is a complementary tool to differentiate fibrosis from a tumoral process.

CLINICAL RELEVANCE/APPLICATION

Quantitative SWE is an efficient mean to differentiate a fibrous tissue from a tumoral process on a localized gray scale lesion.

SSM10-04 Clinical Significance of the Slope of the Increasing Pressure Curve When Injecting Ultrasound Contrast Agent during the Evaluation of the Fallopian Tubal Patency

Wednesday, Nov. 29 3:30PM - 3:40PM Room: E351

Participants
Ye Qiang, Nanjing, China (*Presenter*) Nothing to Disclose
Yiyun Wu, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose
Meimei Zhang, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

13913306601@139.com

PURPOSE

To explore the association between Fallopian tubal patency and the slope of the increasing pressure curve for ultrasound contrast agent.

METHOD AND MATERIALS

A total of 145 patients underwent hysterosalpingo contrast sonography (HyCoSy) between August 2015 and January 2016. HyCoSy was performed with the Voluson E8 ultrasound system (GE Healthcare, Zipf, Austria) equipped with an RIC5-9-D probe. The ultrasound contrast agent was injected and the pressure curve was recorded with a liquid-injecting machine (YLD YZ-800, Yi Lida Corp., Zhu Hai, China) that records the injection pressure in real time and automatically traces it as a pressure curve. We used SonoVue (Bracco International BV, Amsterdam, The Netherlands) as the ultrasound contrast medium. The statistical analysis was performed with SPSS Statistics, version 19 (IBM, Chicago, USA), and $P < 0.05$ was deemed statistically significant.

RESULTS

We divided the patients into three groups according to their different Fallopian tubal patency status: 71 patients (48.97%) in bilateral tubal patency group, 45 (31.03%) in unilateral tubal patency group (one side patent, and the other either passable or occluded), and 20 in bilateral tubal lesion group (both sides passable or occluded). The slopes of the increasing pressure curves for the three groups were 1.242 ± 0.572, 1.472 ± 0.638 and 2.068 ± 1.236 kpa/s, respectively. There was some correlation between the slope of the increasing pressure curve and tubal patency ($R = 0.287$, $P < 0.05$). The slopes differed significantly between the bilateral tubal patency group and the bilateral tubal lesion group ($P < 0.05$) and between the unilateral tubal patency group and the bilateral tubal lesion group ($P < 0.05$). However, the difference between the bilateral tubal patency group and the unilateral tubal patency group was not significant ($P > 0.05$).

CONCLUSION

The slope of the curve tracing the increase in the pressure of the injected contrast agent during HyCoSy is associated with the tubal patency.

CLINICAL RELEVANCE/APPLICATION

Therefore, it can be used as an objective index of tubal patency, and should have utility in both diagnosis and treatment.

SSM10-05 Vasectomy Related Changes in the Scrotum on Ultrasound

Wednesday, Nov. 29 3:40PM - 3:50PM Room: E351

Participants
Pramod K. Gupta, MD, Plano, TX (*Presenter*) Nothing to Disclose
Ann M. Mottershaw, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Vidisha V. Ghole, MD, Irving, TX (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

pramod.gupta@va.gov

PURPOSE

-Vasectomy is a popular method of male contraception, so that a signification proportion of men referred for scrotal sonography will have had a vasectomy. -The purpose of our study is to evaluate the sonographic changes in the scrotum after vasectomy and compare them with the sonographic appearance of non vasectomy patients.

METHOD AND MATERIALS

We performed a comparative study of 75 patients with a history of vasectomy and 75 patients without this history who were referred for scrotal sonography for various indications. Ultrasound findings in these two groups were tabulated and compared.

RESULTS

Certain ultrasonographic findings were more commonly observed in the patients with vasectomy than in non-vasectomy patients. These findings were:Thickened epididymides (41% versus 2%), Tubular ectasia of epididymis(57% versus 4%), both thickened epididymides and epididymal tubular ectasia together (36% versus 2%), sperm granulomas (21% versus 2%), tubular ectasia of rete

testis (29% versus 7%), mediastinal cysts (15% versus 4%), medial rotation of the testis in the scrotal sac which is determined by location of testis-epididymis complex (33% versus 3%). No significant difference was found in the incidence of epididymal cysts, varicoceles and hydroceles in the vasectomy and non vasectomy groups.

CONCLUSION

There was significantly higher incidence of thickened epididymides, epididymal tubular ectasia, sperm granulomas, tubular ectasia of rete testis and mediastinal cysts in the post vasectomy patients as compared to non vasectomy patients. These changes most likely occur due to postvasectomy obstruction, sperm statis and increased intraluminal pressure in the efferent ducts, epididymis and vas deferens. Medial rotation of the testis in the scrotal sac was also more common in the vasectomy group, which is likely due to iatrogenic changes in the structural support mechanism of the testis with resultant increased mobility of the testis within the scrotum.

CLINICAL RELEVANCE/APPLICATION

Familiarity with common ultrasound findings in vasectomy patients may help suggest post vasectomy status when history is not provided and in some cases may help avoid unnecessary intervention.

SSM10-06 Transvaginal Ultrasound (TVUS) Shear Wave Elastography (SWE) for the Evaluation of Benign Uterine Pathologies

Wednesday, Nov. 29 3:50PM - 4:00PM Room: E351

Awards
Student Travel Stipend Award

Participants
Man Zhang, MD,PhD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Ashish P. Wasnik, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
William Masch, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jonathan M. Rubin, MD, PhD, Ann Arbor, MI (*Abstract Co-Author*) Equipment support, General Electric Company; Equipment support, Siemens AG; Equipment support, Koninklijke Philips NV;
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Katherine E. Maturen, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

zhangman@gmail.com

PURPOSE

To evaluate myometrial stiffness using TVUS SWE in women with benign myometrial pathologies including adenomyosis and leiomyoma vs. normal myometrium, using pelvic MR as the reference standard.

METHOD AND MATERIALS

Between January 2015 to June 2016, premenopausal women without a history of gynecologic malignancy presenting with pelvic pain and/or bleeding were enrolled in this IRB-approved prospective study. TVUS was performed in SWE mode with multiple regions of interest (ROIs) (>=1 cm2) in the uterus. Multiple shear wave velocities (SWVs) were recorded in each location and averaged. Reference pelvic MR exams were performed with multiplanar T2WI, and T1WI pre and post IV gadolinium administration . MR exams were reviewed in consensus by two radiologists blinded to the US findings, and the presence or absence of adenomyosis and/or leiomyomata was assessed using published criteria. US images were reviewed in consensus by two different radiologists and SWV for each ROI tabulated by anatomic area. Continuous variables were analyzed using means, t-tests and ANOVA, assuming $p < 0.05$ for statistical significance.

RESULTS

34 premenopausal women (mean age 36.8 years, range 22-52) were enrolled with mean time between US and MR 11 days (±27, range 0-118). MR diagnosed adenomyosis in 6 women involving 12 uterine locations, and leiomyomata in 12 women involving 28 uterine locations. Mean SWV in 16 women with normal myometrium was 4.3 m/s (±1.7, range 1.8-9.4), compared with 5.7 m/s (±2.3, range 1.7-9.9) in 18 women with adenomyosis or leiomyomata ($p < 0.0002$, 95% CI of difference -2.2, -0.6).

CONCLUSION

Our pilot study demonstrated that myometrial SWVs were higher in women with adenomyosis or leiomyomata than in women with normal myometrium ($p < 0.0002$), indicating increased tissue stiffness associated with common benign myometrial diseases.

CLINICAL RELEVANCE/APPLICATION

Because women with benign myometrial conditions have increased myometrial stiffness, quantitative ultrasound SWE may be helpful in diagnosis and treatment response assessment for these disorders.

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/ Ruth C. Carlos, MD, MS - 2015 Honored EducatorKatherine E. Maturen, MD - 2014 Honored Educator

RSNA 2017 Explore. Invent. Transform.
103rd Scientific Assembly and Annual Meeting
November 26 to December 1
McCormick Place, Chicago
Explore Invent Transform

SSM14

Musculoskeletal (Ultrasound)

Wednesday, Nov. 29 3:00PM - 4:00PM Room: E353C

MR MK US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants

Mary M. Chiavaras, MD, PhD, Ancaster, ON (*Moderator*) Nothing to Disclose
Kenneth S. Lee, MD, Madison, WI (*Moderator*) Grant, General Electric Company; Research support, SuperSonic Imagine; Research support, Johnson & Johnson; Consultant, Echometrix, LLC; Royalties, Reed Elsevier

Sub-Events

SSM14-01 Ultrasound-Guided Treatment of Calcific Tendinitis of the Rotator Cuff: Efficacy of Percutaneous Lavage Using Sodium Hexametaphosphate (SHMP) in Comparison with Simple Saline

Wednesday, Nov. 29 3:00PM - 3:10PM Room: E353C

Participants
Federico Bruno, MD, L'Aquila, Italy (*Presenter*) Nothing to Disclose
Simone Quarchioni, Laquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Ester Cannizzaro, MD, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Silvia Mariani, MD, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesco Arrigoni, Coppito, Italy (*Abstract Co-Author*) Nothing to Disclose
Luigi Zugaro, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Antonio Barile, MD, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Masciocchi, MD, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

federico.bruno.1988@gmail.com

PURPOSE

To determine the efficacy of percutaneous US-guided needle lavage of symptomatic rotator cuff calcifications using a sodium hexametaphosphate (SHMP) solution (0.5%), in comparison with the same technique using simple saline

METHOD AND MATERIALS

We evaluated 24 calcifications (4 type A, 11 type B, 9 type C according to Gartner classification, mean size 24.7mm, range 9-31mm) in 24 patients (13 males, 11 females, mean age 34.8 years). Patients were divided into 2 groups and treated by percutaneous fragmentation and lavage using SHMP (Group 1, 12 patients) or simple saline (Group 2, 12 patients). Pre- and post-procedure (at 2 and 4 weeks follow-up) imaging evaluation was performed in all patients, including conventional radiography (RX) and ultrasound (US) examination to assess location, size and type of calcifications. Imaging findings after treatment were evaluated by two independent raters and defined as "partial" or "subtotal" dissolution. Pre- and post-procedure clinical evaluation (at 2 and 4 weeks follow-up) was assessed using the Constant Shoulder Score for functionality and the VAS Score for pain

RESULTS

The two study groups were homogeneous in terms of patient demographics, size and type of calcifications. 2 weeks after treatment in Group 1 we found subtotal dissolution of calcifications in 8 patients (66.7%) and partial dissolution in 4 (33.3%); of these, 2 (50%) showed subtotal dissolution at the 4 weeks follow-up. In Group 2 we found subtotal dissolution in 58.3% and partial in 41.7% ($p<=0.05$). 1 patient (20%) showed subtotal dissolution at the 4 weeks follow-up. Clinical evaluation showed significant improvement in VAS and Constant scores in 91.7% of patients of Group 1 and in 83.3% of Group 2 ($p<=0.05$). No major complications were reported in both groups.

CONCLUSION

The use of SHMP showed superior results in terms of imagingfindings and clinical improvement compared to the treatment with simple saline

CLINICAL RELEVANCE/APPLICATION

With its chemical action of calcium chelation and dissolution, besides the mechanical action, percutaneous lavage with SHMP is an effective procedure, suitable for different types of calcifications, providing a safe, valid and cost-effective alternative treatment management for calcific tendinitis

SSM14-02 Effect of Compression Stockings on the Development of Delayed-Onset Muscle Soreness: A Quantitative Assessment with 3T MRI, Contrast-Enhanced Ultrasound (CEUS) and Acoustic Radiation Force Impulse (ARFI) Elastography

Wednesday, Nov. 29 3:10PM - 3:20PM Room: E353C

Participants
Rafael Heiss, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Marion Kellermann, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Wolfgang Wust, MD, Erlangen, Germany (*Presenter*) Speakers Bureau, Siemens AG
Casper Grim, Osnabruck, Germany (*Abstract Co-Author*) Nothing to Disclose
Bernd Swoboda, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Uder, MD, Erlangen, Germany (*Abstract Co-Author*) Speakers Bureau, Bracco Group; Speakers Bureau, Siemens AG; Speakers Bureau, Bayer AG; Research Grant, Siemens AG;
Thilo Hotfiel, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the influence of commercially available sport compression garments on changes in muscle perfusion, muscle stiffness and the development of exercise induced intramuscular edema in the context of DOMS.

METHOD AND MATERIALS

DOMS was induced in fifteen healthy participants. They had to perform a standardized eccentric exercise of the calf muscles. After exercise a conventional sports compression sock (class I, 18-21 mmHg) was placed accordingly manufacturer's instructions at one randomized calf for 60h. MRI (normalized T2 signal intensity and T2-time), CEUS (Peak enhancement (PE) and Wash-in Area Under Curve (WIAUC)) and ARFI (shear wave velocities (SWV)) of the gastrocnemius muscle (GM), as well as creatine kinase activity, extension range of the ankle joint, calf circumference and muscle soreness were assessed at baseline and 60 h after exercise at both calves.

RESULTS

After exercise the normalized T2 signal intensity (1.0±0.30 vs. 1.94±1.05, p=0.008), the T2-time (37.52±9.67 vs. 55.64±12.72 ms, p=0.015) was significantly higher in the GM in the compressed calf; but no change for WIAUC (4322±521 vs. 11730±3536, p=0.88), PE (474±54 vs. 1185±345, p=0.51) and ARFI SWV (2.16±0.31 vs. 2.13±0.32, p=0.60) were observed. In the non-compressed calf all assessed parameters changed significantly: T2: 1.0±0.16 vs. 2.20±1.16, p=0.001; T2-time: 37.75±9.28 vs. 55.67±14.78 ms, p=0.005, WIAUC: 2461±660 vs. 5297±743, p=0.01, PE: 328±45 vs. 753±31, p=0.005, ARFI SWV: 2.2±0.26 vs. 1.78±0.24m/s, p=0.008. No significant difference was observed in normalized T2 signal intensity (p=0.397), T2-time value (p=0.953), WIAUC (p=0.93) and PE (p=0.730) in the GM comparing the compressed and non-compressed lower leg after exercise. Only ARFI SWV values in the same comparison revealed a statistically significant difference (p=0.001).

CONCLUSION

Our results indicate that wearing conventional sports compression socks after inducing DOMS may shorten the normalization of muscle stiffness, but have no significant effect on the degree of intramuscular edema or perfusion of the MGM. Furthermore, no effects on occurring muscle soreness or reduced range of motion were noticed.

CLINICAL RELEVANCE/APPLICATION

Muscle injuries are common sports injuries. Delayed onset muscle soreness (DOMS), an entity of ultrastructural muscle injury is one of the most common reasons for impaired muscle performance in professional and recreational athletes.

SSM14-03 Repeated Ultrasound-Guided Core Needle Biopsy of Musculoskeletal Lesions: Clinical Utility According to the Types of the Lesions

Wednesday, Nov. 29 3:20PM - 3:30PM Room: E353C

Participants
Kyungjun Min, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hye Won Chung, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sang Hoon Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Min Hee Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myung Jin Shin, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the clinical utility of repeated ultrasound-guided core needle biopsy(US-CNB) of musculoskeletal lesions according to the types of the lesions.

METHOD AND MATERIALS

We retrospectively reviewed 1996 consecutive US-CNBs performed for bone or soft-tissue lesions in 1914 patients during 10 years at a single institution. Repeated biopsy cases for the same lesion were enrolled in this study. The reasons for repeat biopsies were nondiagnostic results, different from clinical expectations, or negative culture results. The reference standard was culture result for infection and pathological diagnosis at excisional biopsy for others. Concordance rate of initial and repeat biopsies were compared according to the types of the lesions by tumors, infection, or others. McNemar's test were used for their statistical significance ($p < .05$).

RESULTS

Of the 30 cases of repeat biopsy, final pathologies were bone and soft tissue tumor, 18(60%); infection, 8(27%); and others, 4(13%). Among the 18 tumors, 16(89%) cases were soft tissue tumors and 14(78%) were malignancy. The overall concordance rate of initial biopsy was 23%(7/30) and that for repeat biopsy was 60%(18/30), which revealed significantly higher concordance for repeated biopsy (p=0.001). The initial and repeated concordance rates of bone and soft tissue tumor were 22%(4/18) and 72%(13/18), respectively. Repeated US-CNB for bone and soft tissue tumor increased diagnostic rate significantly compared to the initial biopsy (p=0.008). The pathogen concordance rates between the initial and repeated US-CNB for infectious cases were 0%(0/8) and 13%(1/8), which showed no significant difference (p=1.000).

CONCLUSION

Repeated US-CNB of musculoskeletal bone and soft tissue tumors can be useful for accurate diagnoses. However, in cases of

Repeated US-CNB of musculoskeletal bone and soft tissue tumors can be useful for accurate diagnoses. However, in cases of infection, repeated US-CNB may have limited clinical utility for pathogen determination.

CLINICAL RELEVANCE/APPLICATION

Repeated US-CNB can be useful for accurate diagnoses of musculoskeletal bone and soft tissue lesions. However, we should consider the types of the lesions. Although repeated CNB increased diagnostic rate for bone and soft tissue tumors, but did not increase the pathogen determination for infection.

SSM14-04 Adhesive Capsulitis of the Shoulder: Evaluation with US-Arthrography Using a Sonographic Contrast Agent

Wednesday, Nov. 29 3:30PM - 3:40PM Room: E353C

Participants
Man Lu, PhD, Chengdu, China (*Presenter*) Nothing to Disclose
Xueqing Chen, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

graceof@163.com

CONCLUSION

Consequently, US-arthrography was more effective method than US for assessment of AC. Filling defects of joint cavity and synovitis-like abnormality in the joint are characteristic US-arthrography findings for diagnosing AC.

Background

Adhesive capsulitis (AC) is a painful and disabling disorder, which caused restricted motion and chronic pain of shoulder. Intracavitary contrast-enhanced ultrasound has recently applied to assess obstructive bile duct diseases, tubal patency, vesicoureteric reflux and so on.

Evaluation

The aim of this study was to detect the value of US-arthrography by injecting the contrast agent SonoVue into glenohumeral joint compared with US in diagnosing AC.

Discussion

US and US-arthrography images of 45 patients with AC were compared with that of 45 control subjects without AC with MRI as a gold standard.Patients with AC had a significantly thickened CHL (3.1 mm) and inferior capsule (3.5 mm) on US, and a decreased volume of axillary recess (1.14 ml) on US-arthrography compared with the control subjects. Filling defect (91.1%) and synovitis-like abnormality (75.6%) in the joint on US-arthrography were more sensitive than that of rotator interval abnormality (71.1%), thickened CHL more than 3 mm (64.4%), thickened inferior capsule more than 3.5 mm (66.7%) on US respectively for diagnosis of AC.

SSM14-05 Contrast-Enhanced Ultrasound (CEUS) as a New Method in Diagnostic Imaging of Muscle Injuries: Systematic Comparison of Conventional Ultrasound, CEUS and Findings in MRI

Wednesday, Nov. 29 3:40PM - 3:50PM Room: E353C

Participants
Rafael Heiss, Erlangen, Germany (*Presenter*) Nothing to Disclose
Dane Wildner, Erlangen, Germany (*Abstract Co-Author*) Speaker, Bracco Group
Deike H. Strobel, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Kolja Gelse, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Casper Grim, Osnabruck, Germany (*Abstract Co-Author*) Nothing to Disclose
Bernd Swoboda, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Uder, MD, Erlangen, Germany (*Abstract Co-Author*) Speakers Bureau, Bracco Group; Speakers Bureau, Siemens AG; Speakers Bureau, Bayer AG; Research Grant, Siemens AG;
Thilo Hotfiel, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To emphasize the diagnostic value of contrast-enhanced ultrasound (CEUS) in imaging of muscle injuries with different degrees of severity by comparing findings to the established imaging modalities as conventional ultrasound and magnet resonance imaging (MRI).

METHOD AND MATERIALS

A total of 15 patients were examined after indirect muscular injuries on the lower extremity. Within 24 - 48 hours after injury, a conventional sonography and a CEUS were performed. Direct after the sonography, an MRI was performed as a 'gold standard' in order to graduate the lesion and to determine the spatial extent of the lesion as a reference variable. The classification was carried out according to the modified, four-stage Peetron classification described by Ekstrand et al..

RESULTS

All 15 injuries were identified on MRI and CEUS, whereas 10 injuries showed abnormalities in conventional ultrasound. The determination and measurement revealed significant differences between conventional ultrasound and CEUS depending on the injuries' severity. CEUS revealed an impairment of microcirculation in grade I lesions (corresponding to intramuscular edema observed in MRI), which were not detectable in conventional ultrasound.

CONCLUSION

Our results indicate that performing CEUS seems to be a sensitive additional diagnostic modality in the assessment of muscle injuries in the acute phase after injury. Our results provide advantages of CEUS in imaging of low grade lesions compared to

conventional ultrasound, as they show its superiority in the identifiability of intramuscular edema.

CLINICAL RELEVANCE/APPLICATION

Muscle injuries are frequently observed during recreational and professional sports and have been reported as one of the most common sports injuries. Diagnostic imaging is essential to provide a correct assessment of the injury's severity. So far MRI has shown its superiority over ultrasound examination and has been reported as the preferred modality providing detailed image analysis and characterization of an intramuscular lesion. In clinical practice, however, MRI is often reserved for high-level athletes or serious injuries in which a pronounced structural damage is expected. In conventional ultrasound diagnostic of low grade lesions (ultrastructural lesions and muscle strains), the concerned muscle tissue often appears normal. In this context CEUS may be a new investigative tool in the diagnostic imaging of low grade muscle lesions.

SSM14-06 Quantitative Assessment of Skin Stiffness in Localized Scleroderma Using Ultrasound Shear-Wave Elastography

Wednesday, Nov. 29 3:50PM - 4:00PM Room: E353C

Participants
Liyun Wang, Chengdu, China (*Presenter*) Nothing to Disclose
Li Qiu, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose
Feng Yan, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose
Yujia Yang, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose
Xi Xiang, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

liyunwang1992@qq.com

PURPOSE

The purpose of this study was to evaluate the usefulness of ultrasound shear-wave elastography (US-SWE) in characterization of localized scleroderma (LS), as well as in the disease staging.

METHOD AND MATERIALS

21 patients with 37 LS lesions were enrolled in this study. The pathological stage (edema, sclerosis or atrophy) of the lesions was characterized by pathological examination. The skin elastic modulus (E-values, including Emean, Emin, Emax and Esd) and thickness (h) was evaluated both in LS lesions and site-matched unaffected skins (normal controls) using US-SWE. The relative difference (ERD) of E-values was calculated between each pair of lesion and its normal control for comparison among different pathological stages.

RESULTS

Of the 37 LS lesions, 2 were in edema, 22 in sclerosis and 13 in atrophy. US-SWE results showed a significant increase of skin elastic modulus and thickness in all lesions ($p<0.001$ in sclerosis and $p< 0.05$ in atrophy) compared to the normal controls. The measured skin elastic modulus and thickness were greater in sclerosis than in atrophy. However, once normalized by skin thickness, the atrophic lesions, which were on average thinner, appeared significantly stiffer than those of the sclerosis (normalized ERD: an increase of 316.3% in atrophy vs. 50.6% in sclerosis compared to the controls, $p = 0.007$).

CONCLUSION

These findings suggest that US-SWE allows to quantitatively evaluate the skin stiffness of LS lesions in different stages; however, the E-values directly provided by US-SWE system alone do not distinguish between the stages, and the normalization by skin thickness is necessary. This non- invasive, real-time imaging technique is an ideal tool for assessing and monitoring LS disease severity and progression.

CLINICAL RELEVANCE/APPLICATION

Ultrasound shear-wave elastography can measure skin stiffness in LS patients which can be used to assesse and monitor LS disease severity and progression.

SSM19

Pediatrics (Interventional Radiology)

Wednesday, Nov. 29 3:00PM - 4:00PM Room: S102CD

IR PD US

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 1.00

FDA Discussions may include off-label uses.

Participants
Kamlesh U. Kukreja, MD, Bellaire, TX (*Moderator*) Nothing to Disclose
Anne Marie Cahill, MBBCh, Philadelphia, PA (*Moderator*) Nothing to Disclose

Sub-Events

SSM19-01 Pediatric Percutaneous Renal Biopsies: Comparison of Complications between Real-Time Ultrasound Guidance and Ultrasound Marking Techniques

Wednesday, Nov. 29 3:00PM - 3:10PM Room: S102CD

Participants
Shireen Hayatghaibi, MA, MPH, Houston, TX (*Presenter*) Nothing to Disclose
Daniel J. Ashton, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Robert Orth, MD,PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

sehayatg@texaschildrens.org

PURPOSE

To compare the complications from percutaneous renal biopsies performed using real time ultrasound-guidance versus pre-procedure ultrasound-aided skin marking in children.

METHOD AND MATERIALS

An a priori analysis yielded a sample size of 850 procedures required to detect a difference in complications between the two groups (power: 0.8). Consecutive patients who underwent a percutaneous renal biopsy at our tertiary care academic medical center were retrospectively identified. Demographic information, biopsy technique, and post-biopsy complications were recorded. Complications were categorized according to Society of Interventional Radiology (SIR) criteria. Complication rates were compared using Fisher's exact test.

RESULTS

The study population consisted of 850 renal biopsy procedures in 626 patients. Real-time ultrasound guidance was performed in 375 biopsies (age range: 0-29, mean: 12.1 yrs); 475 biopsies used pre-procedure ultrasound-aided skin marking (age range: 2-27, mean: 13.6 yrs). Diagnostic yield was obtained in all biopsies with real-time ultrasound (mean cores: 2.63+/-1.52) and in 471/475 (99.2%) of those using pre-procedure skin marking (mean cores: 2.64+/- 0.72; p=0.91). Overall, 283 (33.3% of biopsies) complications were detected in the study cohort; 60 (16% of biopsies) in the real-time ultrasound guidance group and 223 (47% of biopies) in the conventional skin marking group (p<0.001). In the real-time ultrasound group, 43 complications (11.5% of biopsies) were SIR A and 8 (2.1% of biopsies) SIR B. In the skin marking group, 156 (32.8%) biopsies resulted in SIR A complications and 54 (11.4%) SIR B. The groups were statistically different for both SIR A (p<0.001) and SIR B (p<0.001) complications. There was no detectable difference in major complications between the groups [p=0.83; real-time ultrasound guided: 6 (1.6%) SIR C and 3 (0.8%) SIR D; skin marking: 12 (2.5%) SIR C and 1 (0.2%) SIR D].

CONCLUSION

Patients who underwent real-time ultrasound-guided renal biopsies had significantly fewer minor complications, including those that required follow-up medical care (SIR B), compared to those who underwent pre-procedure ultrasound-aided skin marking.

CLINICAL RELEVANCE/APPLICATION

Patients with an ultrasound-guided renal biopsy required less additional medical care for complications. This is important in value based healthcare that pursues quality outcomes at controlled costs.

SSM19-02 Onyx Embolization in Pediatric Neuro-interventional Procedures

Wednesday, Nov. 29 3:10PM - 3:20PM Room: S102CD

Participants
Tahaamin Shokuhfar, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Anas Al-Smadi, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Sameer A. Ansari, MD,PhD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Michael C. Hurley, MBBCh, Dublin, Ireland (*Abstract Co-Author*) Nothing to Disclose

Ali Shaibani, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

tahaamin.shokuhfar@northwestern.edu

PURPOSE

Although AVMs are rare among pediatric population, nearly half of spontaneous intracranial hemorrhages in children are due to these malformations. Onyx, as an FDA approved embolizant for adults, has limited studies regarding its safety and efficacy among children. Here, we evaluate the safety and efficacy of Onyx embolization in pediatric neurointerventional procedures.

METHOD AND MATERIALS

In this study, all pediatric Onyx embolization of intracranial AVM cases are evaluated over a period of 10 years. Medical record and radiology imaging were reviewed for each patient regarding demographic data, clinical presentations, embolization procedure and related complications.

RESULTS

Seventy-two patients (female = 26 (36%)) with intracranial AVMs underwent total of 122 embolization procedures. Age of patients ranged between 1 month to 17 years with the mean of 10.2 years. Forty-four patients underwent a single embolization procedure and staged embolization was required for the remaining 28 patients prior to definitive treatment. Onyx embolization resulted in complete occlusion of the AVM in 10 patients (14%). A total of 66 patients underwent subsequent surgical treatment. Overall 13 complications occurred in total of 122 Onyx embolizations (10.6%) which resulted in 7 transient neurological deficits and 6 clinically silent complications (Table 1). None of the complications resulted in mortality or permanent morbidity. No significant demographic characteristic differences observed in patients with or without complications.

CONCLUSION

In this study we propose the safe and effective utilization of Onyx for embolization of pediatric cerebral AVMs. The relative low rate of complications (10.6%) along with no mortality or permanent morbidity, suggests the safe utilization of Onyx as a preoperative or primary embolization treatment of pediatric intracranial AVMs. However, specific attention should be considered for its indications and technical limitations according to the broad spectrum of complications.

CLINICAL RELEVANCE/APPLICATION

Onyx utilization can be feasible for preoperative or primary embolization in the treatment of pediatric AVMs. We report here the largest series of Onyx embolizations of brain AVMs in the pediatric population. The results, in terms of clinical and angiographic improvement, with a low rate of transient morbidity and no permanent morbidity or mortality, are encouraging.

SSM19-03 Magnetic Resonance-Guided Focused Ultrasound Surgery for Treatment of Osteoid Osteoma in Pediatric Patients Only: A Multicenter Experience

Wednesday, Nov. 29 3:20PM - 3:30PM Room: S102CD

Participants
Francesco Arrigoni, Coppito, Italy (*Presenter*) Nothing to Disclose
Alessandro Napoli, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Alberto Bazzocchi, MD, Bologna, Italy (*Abstract Co-Author*) Nothing to Disclose
Simone Quarchioni, Laquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Roberto Scipione, MD , Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Luigi Zugaro, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Antonio Barile, MD, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Masciocchi, MD, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

arrigoni.francesco@gmail.com

PURPOSE

To retrospectively evaluate the effectiveness and safety of MRgFUS of Osteoid Osteoma in paediatric patients (age <18 years) based on the experience of three university hospitals. Since OOs mostly affect patients in paediatric age, it is of paramount importance that the employed techniques be as minimally invasive as possible. MRgFUS aims to become the standard care, producing no skin lesion or damage to the soft tissues.

METHOD AND MATERIALS

Over a period of 4 years, we used MRgFUS on 33 patients (age <18 years, mean 13.8) affected by symptomatic non-spinal Osteoid Osteoma. Inclusion criteria were: (i) clinical diagnosis of osteoid osteoma (pain, more typically nocturnal, relieved by NSAIDs: mean pre-treatment VAS value: 7.5 (CI: 4-10)); (ii) positive imaging for OO with typical features; (iii) subperiosteal or cortical lesions only: a periosteal reaction or a cortical thickening (more than 6 mm) surrounding the lesion was considered as a technical contraindication for MRgFUS treatment. The outcomes were evaluated with clinical and imaging follow-up studies up to 5 and 3 years, respectively.

RESULTS

After treatment, absence of pain was observed in 31 patients (94% of complete success; VAS: 0), confirming the effectiveness of the procedure. One patient reported VAS: 1 during follow-up, but because the condition was considered satisfactory by the patient, an additional treatment was not deemed necessary. Only one patient was treated twice to obtain complete pain relief. Nor relapse or complications were observed. The long term imaging control showed a progressive restoration to the original condition of the bone segments without signs of treatment or residual inflammatory findings.

CONCLUSION

MRgFUS is safe and effective for treatment of selected localizations of osteoid osteoma; for superficial lesions it could be

MRgFUS is safe and effective for treatment of selected localizations of osteoid osteoma. For superficial lesions it could be considered the first and definitive choice for patients in paediatric age. The possibility of treating only subperiosteal or cortical lesions is a limit but non too notable, because the greater part of the osteoid osteomas belong to these two categories. This touch-less approach does not leave any sign of the procedure nor interference with the normal growth of the bone.

CLINICAL RELEVANCE/APPLICATION

This treatment could represent the less invasive step for the treatment of Osteoid Osteoma.

SSM19-04 Mynxgrip Vascular Closure Device Use in Pediatric Neurointerventional Procedures

Wednesday, Nov. 29 3:30PM - 3:40PM Room: S102CD

Participants
Tahaamin Shokuhfar, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Anas Al-Smadi, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Sameer A. Ansari, MD,PhD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Michael C. Hurley, MBBCh, Dublin, Ireland (*Abstract Co-Author*) Nothing to Disclose
Ali Shaibani, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The application of arterial closure devices has been broadly investigated and previously approved in adults but their feasibility and safety have not been approved in pediatric patients and any application of such devices in children is considered off-label. The decision to use the Mynxgrip in our practice has been made based on the low reported rate of complications in adults and the fact of no intra-luminal component regarding the usage of Mynxgrip.

METHOD AND MATERIALS

A Retrospective review of all pediatric patients undergoing diagnostic or interventional neurovascular procedures was conducted. Mynxgrip was applied to any pediatric patient with adequate depth of subcutaneous tissue and common femoral artery (CFA) diameter. Patients' demographic and procedural data was recorded. Hemostasis status and complication reassessment for outpatients and pre-operational inpatients were documented.

RESULTS

During the period of 36 months, a total of 83 Mynxgrip was deployed on 53 children (23 male and 30 female, mean age = 14.5 years) undergoing diagnostic/interventional neuro-endovascular procedures through common femoral artery access site. About 46% procedures were diagnostic angiography and the remaining were angiography with embolization. CFAs' diameter were ranged between 4mm to 8.5mm with the average diameter of 6.24 (SD± 1.16). Deployment of Mynxgrip was successful in 82 procedures (98.8%). There was a single (1.2%) device failure and no other immediate or delayed major complications were recorded.

CONCLUSION

Comparing with the manual compression as the current standard of care, the application of Mynxgrip in our practice brought immediate hemostasis at common femoral artery access site, along with earlier ambulation and shorter duration of hospitalization.

CLINICAL RELEVANCE/APPLICATION

To the best of our knowledge, current study is the first report of the application of Mynxgrip arterial closure device among pediatric population. We reported the feasibility of Mynxgrip as a safe and efficient way of hemostasis achievement at CFA arteriotomy site in children undergoing diagnostic or neuro-interventional procedures.

SSM19-05 Percutaneous Ablation of Malignant and Locally Aggressive Solid Tumor in Pediatric Patients

Wednesday, Nov. 29 3:40PM - 3:50PM Room: S102CD

Participants
Adrian J. Gonzalez, MD, New York, NY (*Presenter*) Nothing to Disclose
Majid Maybody, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Elena N. Petre, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Joseph P. Erinjeri, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Hooman Yarmohammadi, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Franz E. Boas, MD,PhD, New York, NY (*Abstract Co-Author*) Co-founder, Claripacs, LLC; In-kind support, Bayer AG; Investor, Labdoor; Investor, Qventus; Investor, CloudMedx; Investor, Notable Labs
Stephen B. Solomon, MD, New York, NY (*Abstract Co-Author*) Research Grant, General Electric Company

For information about this presentation, contact:

gonzala2@mskcc.org

PURPOSE

Present the oncologic outcomes of our series of pediatric patients treated with ablation for primary and metastatic cancers.

METHOD AND MATERIALS

Retrospective review of a HIPAA compliant prospectively maintained percutaneous ablation database. All ablations performed in patients younger than 18 years since 2002 were reviewed. RFA was performed using the the Cool-tip system (Covidien, Boulder, CO). Cryoablation was performed using the Endocare system (HealthTronics, Inc. Austin TX).Patients were watched for 4 hours after ablation and discharged home in the absence of complications. Patients were admitted for pain or other complications. CT and/or PET/CT scan was obtained 1 month after ablation. Subsequent imaging studies were obtained as indicated by the pediatric oncologist to assess for findings of local tumor progression (LTP). Patient and tumor characteristics were described and summarized. Survival end points of interest include overall survival (OS) and local tumor progression free survival (LTPFS) . Survival end points were analyzed using Kaplan-Meier method.

RESULTS

8 pediatric patients were identified in our database that includes 1471 patients treated with ablation since 2002. There were 4 males and 4 females. Mean age was 12.8 years (range 3 - 17). Mean weight was 49.5 kilos (15 - 60 kilos). These 8 patients underwent 12 ablations to treat 9 lesions. Mean lesion size was 3.4 cm (Range 0.8 -7.8 cm). Mean hospital stay was 2.1 days (median 2.3 days, range 0-4). There was one major complication (SIR classification D) in a patient with lung metastases from chondrosarcoma. He developed parenchymal bleeding that required intubation for less than 24 hrs. Mean follow up was 79 months. OS at 5 years was 75%. Median LTPFS was not reached. At the end of follow up 2 lesions developed LTP. LTPFS rates were 88% at 1 year and 77% at five years .

CONCLUSION

Ablation can be performed safely and effectively in a carefully selected group of pediatric patients with cancer. We consider that the use of these technologies should be used more often and in conjunction with other cancer treatments, always in the setting of multidisciplinary consensus.

CLINICAL RELEVANCE/APPLICATION

Ablation can be performed safely and with good results in pediatric patients.

SSM19-06 Transjugular Intrahepatic Portosystemic Shunts (TIPS): Safety and Efficacy in the Pediatric Population

Wednesday, Nov. 29 3:50PM - 4:00PM Room: S102CD

Awards
Student Travel Stipend Award

Participants
Zachary S. Jeng, MD, Houston, TX (*Presenter*) Nothing to Disclose
Raphael J. Yoo, MD,MS, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Daniel J. Ashton, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

jeng@bcm.edu

PURPOSE

To report the experience of a tertiary pediatric referral center with creation and revision of transjugular intrahepatic portosystemic shunts (TIPS) in children and adolescents.

METHOD AND MATERIALS

10 consecutive patients over a 10 year period with 9 undergoing TIPS creation and 1 undergoing TIPS revision (initially placed at an outside institution). 8 patients were under the age of 18: 2 infants (ages 9 and 10 mos), 5 children (ages ranging from 5 y, 11 mo to 12 y, 1 mo), and 1 adolescent (age 16 y, 6 mo). All had gastroesophageal variceal bleeding as the reason for TIPS creation/revision. Causes of liver dysfunction were biliary atresia in 5 patients, cystic fibrosis in 1, veno-occlusive disease secondary to chemotherapy in 1, and Ellis-van Creveld Syndrome in 1.

RESULTS

The technical success rate was 100%. 6 patients received Viatorr endografts while 1 patient received a Luminex endograft and a Wallstent. 4 TIPS were created using a 10 mm endograft, 2 using an 8 mm endograft, and 1 using a 2 cm endograft. The mean portosystemic pressure gradient was reduced from 19 mmHg to 8 mmHg. Flow was successfully restored in the patient undergoing TIPS revision. Primary patency during initial ultrasound follow-up performed 1 to 2 days post procedure was 100%. Follow-up imaging performed up to 23 months post procedure demonstrated 100% stent patency. There were no major complications or mortalities associated with TIPS creation. One patient continued to experience intermittent hemoptysis, though likely related to underlying cystic fibrosis, while one developed a single episode of transient hyperammonemia. One patient underwent balloon angioplasty 3 days post TIPS creation for decreased hemoglobin and concern for GI bleeding with no stenosis or thrombosis discovered on portal venogram. There were no other repeat interventions, shunt dysfunctions, or recurrent episodes of GI bleeding. 6 children have since received hepatic transplants with 3 children receiving transplants 23, 20, and 8 days post TIPS creation.

CONCLUSION

TIPS placement can be successfully performed in young pediatric patients with low complications rates and excellent initial and intermediate patency.

CLINICAL RELEVANCE/APPLICATION

TIPS is a well-documented method for treating portal HTN and its sequela in adults. With increasing use in the pediatric population, we wanted to determine its effectiveness and safety in children.

MSCU42

Case-based Review of Ultrasound (An Interactive Session)

Wednesday, Nov. 29 3:30PM - 5:00PM Room: S406A

US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
Deborah J. Rubens, MD, Rochester, NY (*Director*) Nothing to Disclose

For information about this presentation, contact:

deborah_rubens@urmc.rochester.edu

LEARNING OBJECTIVES

1) Recognize the diverse applications of ultrasound throughout the body and identify those situations in which it provides the optimal diagnostic imaging choice. 2) Understand the fundamental interpretive parameters of ultrasound contrast enhancement and its applications. 3) Know the important factors to consider when choosing ultrasound 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 and elastography as diagnostic techniques. The selection of ultrasound for interventional guidance will be addressed, as will the unique applications of ultrasound to emergency imaging including obstetrics and pediatrics.

Sub-Events

MSCU42A Gynecologic and Transvaginal Ultrasound

Participants
Mindy M. Horrow, MD, Philadelphia, PA (*Presenter*) Spouse, Employee, Merck & Co, Inc

For information about this presentation, contact:

horrowm@einstein.edu

LEARNING OBJECTIVES

1) Describe sonographic techniques and findings that are most useful in the diagnosis of tubal ectopic pregnancy. 2) Review the findings of retained products of conception. 3) Categorize the various non-gynecologic causes of acute pelvic pain that may be diagnosed with transvaginal imaging. 4) Describe the sonographic findings of acute ovarian torsion.

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/ Mindy M. Horrow, MD - 2013 Honored EducatorMindy M. Horrow, MD - 2016 Honored Educator

MSCU42B Ultrasound in Interventional Radiology

Participants
Devang Butani, MD, Rochester, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

devang_butani@urmc.rochester.edu

LEARNING OBJECTIVES

1) Understand the role of Ultrasound in Interventional Radiology (IR). 2) Learn how to avoid complications by using ultrasound. 3) Be aware about the limitations of ultrasound in IR.

ABSTRACT

Ultrasound is vital in the practice of Interventional Radiology, where it is used for screening, planning, targeting/guidance and evaluating effectiveness of interventions. A case based format is used to demonstrate the various roles.

MSCU42C Ultrasound of Pediatric Abdominal Emergencies

Participants
Harriet J. Paltiel, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List the most common gastrointestinal tract causes of an acute abdomen in children. 2) Discuss the appropriate imaging evaluation of patients based on age and clinical presentation. 3) Describe the sonographic features of these entities.

ABSTRACT

This case-based review will include a discussion of the sonographic imaging features of some of the most important pediatric gastrointestinal causes of an acute abdomen, including bowel atresia, necrotizing enterocolits, pyloric stenosis, midgut malrotation and volvulus, acute appendicitis, and intussusception.

MSCU42D Small Parts Ultrasound

Participants
Deborah J. Rubens, MD, Rochester, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Deborah_rubens@urmc.rochester.edu

LEARNING OBJECTIVES

1) Review some of the common pathologic entities involving superficial glands and structures. 2) Emphasize the unique technical parameters which are critical to optimize the imaging of small parts. 3) Test the attendant's knowledge of some critical decision pathways in superficial pathology.

ABSTRACT

High frequency ultrasound is a powerful tool to assess superficial structures including the neck (thyroid, parathyroid, other neck masses) chest and abdominal wall, extremities and the scrotum. Accurate performance requires optimizing scanning frequency for adequate tissue penetration and Doppler sensitivity to differentiate fluid collections from tumors, to assess organs for blood flow and to diagnose inflammatory conditions. Cases will be selected to emphasize thyroid, neck, testicular and scrotal pathology; particularly those cases requiring urgent intervention. Additional cases will include symptomatic lumps and bumps and the incidental lesions one commonly encounters in superficial scanning.

RC608

Emergency Ultrasound Pitfalls

Thursday, Nov. 30 8:30AM - 10:00AM Room: S402AB

ER GI GU PD US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Leslie M. Scoutt, MD, New Haven, CT (*Moderator*) Speaker, Koninklijke Philips NV

SAM

New in 2017: PLEASE NOTE - All courses designated for SAM credit at RSNA 2017 will require attendees bring a personal device e.g. phone, iPad, laptop to complete the required test questions during the live session.

Sub-Events

RC608A Hepatobiliary Ultrasound Pitfalls

Participants
Leslie M. Scoutt, MD, New Haven, CT (*Presenter*) Speaker, Koninklijke Philips NV

For information about this presentation, contact:

leslie.scoutt@yale.edu

LEARNING OBJECTIVES

1) Discuss common pitfalls encountered during US examination of the patient presenting with acute abdominal pain. 2) Discuss pitfalls in interpretation of common findings such as gallbladder wall thickening. 3) Review US diagnosis of some uncommon and easily overlooked causes of acute abdominal pain.

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

RC608B Pediatric Abdominal Sonography Pitfalls

Participants
Susan D. John, MD, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

susan.d.john@uth.tmc.edu

LEARNING OBJECTIVES

1) Plan safe and effective imaging protocols for pediatric gastrointestinal conditions using ultrasound. 2) Avoid pitfalls of US of the gastrointestinal tract in children by using best practices. 3) Recognize potentially confusing ultrasound findings of various pediatric abdominal conditions.

RC608C Non-obstetrical Gynecologic Ultrasound Pitfalls

Participants
Ana P. Lourenco, MD, Providence, RI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize gynecologic US pitfalls. 2) Describe strategies to avoid pitfalls.

RC608D First Trimester Sonographic Pitfalls

Participants
Mariam Moshiri, MD, Seattle, WA (*Presenter*) Grant, Koninklijke Philips NV; Author, Reed Elsevier

For information about this presentation, contact:

moshiri@uw.edu

LEARNING OBJECTIVES

1) Learn how to evaluate a fetus during first trimester imaging. 2) Learn which fetal abnormalities can be detected in the first trimester. 3) Learn pitfalls to avoid while imaging a first trimester pregnancy.

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/ Mariam Moshiri, MD - 2013 Honored EducatorMariam Moshiri, MD - 2015 Honored Educator

RC610

Superficial Ultrasound

Thursday, Nov. 30 8:30AM - 10:00AM Room: S103AB

GU US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

RC610A There is a Mass in the Scrotum: What Does it Mean?

Participants
Thomas C. Winter III, MD, Salt Lake City, UT (*Presenter*) Speakers Bureau, General Electric Company; ;

LEARNING OBJECTIVES

1) Describe the normal anatomy of the scrotum.2) Describe common mass-like pathologic conditions of the scrotum.3) Describe the significance and management of testicular microlithiasis.

ABSTRACT

This didactic lecture will review proper sonographic technique for scrotal examination, review normal anatomy of the scrotum as demonstrated by ultrasound, and will then progress to a description of the common pathologic and normal conditions that may present as a scrotal mass.N.B. Dr Benson is running this course, and there are 2 other presenters. Thus, please follow Dr. Benson's wishes and remove my objectives and abstract if she so desires and replace with whatever else she prefers. Thanks.

Active Handout:Thomas Charles Winter

http://abstract.rsna.org/uploads/2017/17000110/Active RC610A.pdf

RC610B Just Below the Surface

Participants
Howard T. Heller, MD, Boston, MA (*Presenter*) Stockholder, Baxter International Inc; Stockholder, The Cooper Companies, Inc

LEARNING OBJECTIVES

1) To understand and use the most current ultrasound examination techniques for imaging superficial soft tissue structures. 2) To recognize normal anatomy of soft tissue structures. 3) To appreciate the utility of high frequency ultrasound in detecting pathologic processes of the superficial soft tissues and formulate appropriate differential diagnoses.

RC610C Art of Diagnosing Subtle Groin Hernias: Simple Protocol, Pearls and Pitfalls

Participants
Girish Gandikota, MBBS , Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ggirish@med.umich.edu

LEARNING OBJECTIVES

1) Describe the sonographic technique/protocol of evaluating hernias. 2) Identify sonographic features which help differentiate direct, indirect and femoral hernias. 3) Understand some of the common pitfalls encountered when using sonography to evaluate groin hernias.

ABSTRACT

Groin hernias are common, often presenting with inguinal discomfort, pain and sometimes with a lump. Ultrasound is a useful means for making a definite diagnosis. Ultrasound is most helpful in diagnosing Subtle hernias which are often difficult to diagnose clinically. Understanding the sonographic anatomy of the inguinal canal and femoral triangle and dynamic evaluation using Valsalva, is the key to diagnosing different types of groin hernias. However, there are a number of concepts which help the practitioner maximize the utility of the technique, including understanding the relationship between the deep ring and the inferior epigastric artery, and being aware of the pitfalls like the 'thin man' pitfall and the normal movement of the spermatic cord, to name a few.

RSNA 2017 Explore. Invent. Transform.
103rd Scientific Assembly and Annual Meeting
November 26 to December 1
McCormick Place, Chicago
Explore Invent Transform

RC617

Emerging Technology: Contrast Enhanced Ultrasound— Opportunities and Challenges

Thursday, Nov. 30 8:30AM - 10:00AM Room: S505AB

GI GU US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Participants
David T. Fetzer, MD, Dallas, TX (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

David.Fetzer@UTSouthwestern.edu

LEARNING OBJECTIVES

1) Briefly introduce contrast-enhanced ultrasound (CEUS) imaging techniques, and the pharmacology of these unique agents. 2) Discuss how CEUS has been adopted by the ACR LI-RADS as a technique for the definitive diagnosis of HCC. 3) Examine the use of CEUS in trouble-shooting renal masses and in imaging of the genitourinary tract. 4) Explore how CEUS can enhance ultrasound-guided procedures, and may be used to monitor tumors following ablation. 5) Consider the major emerging clinical applications and where current research efforts may be directing these techniques into the future.

ABSTRACT

Contrast-enhanced ultrasound (CEUS) has been recognized world-wide as a robust tool that can be applied in a variety of clinical situations, particularly given its high safety profile. With the recent FDA approval of one agent for use in liver imaging in adults, and hepatic and urological imaging in pediatrics, there has been increased acceptance and use of these techniques throughout the country. However, CEUS is not limited to the liver-the use of ultrasound contrast in a range of pathologies and situations is also possible and with a variety of agents, off-label. This session will cover the opportunities and challenges in CEUS, including a brief introduction into these unique contrast agents and the imaging techniques utilized; how CEUS has been adopted by LI-RADS in the definitive diagnosis on HCC; the growing experience in renal mass characterization and collecting system imaging; how contrast may be used as a problem-solving tool and in ultrasound-guided procedures; and finally where CEUS techniques and agents may be headed in the future.

Sub-Events

RC617A CEUS: A Brief Introduction

Participants
David T. Fetzer, MD, Dallas, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

David.Fetzer@UTSouthwestern.edu

LEARNING OBJECTIVES

1) Briefly introduce ultrasound microbubble agent formulation and pharmacology. 2) Discuss the unique imaging techniques required for contrast-enhanced ultrasound (CEUS). 3) Highlight ultrasound contrast agent safety profile and contraindications.

RC617B CEUS: Liver Imaging & LI-RADS (Liver Imaging Reporting and Data System)

Participants
Yuko Kono, MD, PhD, San Diego, CA (*Presenter*) Equipment support, Toshiba Medical Systems Corporation; Equipment support, General Electric Company; Equipment support, Lantheus Medical Imaging, Inc

For information about this presentation, contact:

ykono@ucsd.edu

LEARNING OBJECTIVES

1) To learn CEUS LI-RADS will standardize technique, data collection interpretation and reporting of CEUS exams on patients at risk for HCC. 2) To learn how to apply CEUS LIRADS v2017 algorithm.

RC617C CEUS: Renal Mass and Collecting System Imaging

Participants
Stefanie Weinstein, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Stefanie,Weinstein@ucsf.edu

LEARNING OBJECTIVES

1) Review common indications and guidelines for performing renal CEUS. 2) Illustrate how CEUS can help troubleshoot and improve diagnosis of renal pathology. 3) Discuss the evolving role of CEUS beyond the kidney in the non-pediatric GU tract.

Active Handout:Stefanie Weinstein

http://abstract.rsna.org/uploads/2017/17001319/Active RC617C.pdf

RC617D CEUS: Procedure Guidance and Post-Ablation Assessment

Participants
Hisham A. Tchelepi, MD, Los Angeles, CA (*Presenter*) Research Grant, General Electric Company Research Grant, Roper Industries, Inc

LEARNING OBJECTIVES

1) To review clinical applications of contrast-enhanced ultrasound in interventional procedure guidance and post-ablation tumor monitoring.

RC617E CEUS: What Have We Learned and Where are We Heading

Participants
Robert F. Mattrey, MD, Dallas, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Robert.Mattrey@UTSouthwestern.edu

LEARNING OBJECTIVES

1) Recite the major accomplishments since the ultrasound contrast effort began. 2) Understand the dominant interaction of sound and ultrasound contrast media. 3) Understand the source of ultrasound contrast signal. 4) Current salient clinical applications. 5) Future direction and major research efforts.

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RC618

Tips, Tricks and Pitfalls in Body Oncological Imaging: Experts Tell All

Thursday, Nov. 30 8:30AM - 10:00AM Room: E353A

CT MR OI US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Dushyant V. Sahani, MD, Boston, MA (*Moderator*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc

For information about this presentation, contact:

dsahani@mgh.haravd.edu

LEARNING OBJECTIVES

1) Identify ultrasound features that differentiate between benign and malignant disease, particularly in the female pelvis. 2) Recommend specific scanning techniques and protocols for difficult cases. 3) Develop biopsy strategies for indeterminate masses that need tissue sampling for diagnosis. 4) To discuss newer MRI techniques that are now applied for body oncologic imaging that allows faster, better or more accurate disease diagnosis. 5) To highlight the applications and pitfalls of diffusion-weighted imaging for assessing upper abdominal cancers, peritoneal involvement, pelvic disease and bone marrow involvement (whole body MRI). 6) To survey the applications and limitations of motion insensitive radial-acquisition MR techniques for dynamic contrast enhanced imaging for cancer evaluation. 7) Review the statistics and incidence of common cancers in USA. 8) Discuss the role of CT in oncology practice and value of following optimal oral and IV contrast media protocols. 9) Offer pearls and solutions to overcome the limitations of CT and emerging role of new CT technology.

SAM

New in 2017: PLEASE NOTE - All courses designated for SAM credit at RSNA 2017 will require attendees bring a personal device e.g. phone, iPad, laptop to complete the required test questions during the live session.

Active Handout:Dushyant V. Sahani

http://abstract.rsna.org/uploads/2017/16000397/Active RC618.pdf

Sub-Events

RC618A US

Participants
Roya Sohaey, MD, Portland, OR (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify ultrasound features that differentiate between benign and malignant disease, particularly in the female pelvis. 2) Recommend specific scanning techniques and protocols for difficult cases. 3) Develop diagnosis and biopsy strategies for indeterminate masses. 4) Review diagnosis strategies for imaging of non-obstetrical pathology in the pregnant patient.

ABSTRACT

The course will focus on benign and malignant masses that mimic each other, particularly in the area of gynecology.Emphasis is placed on the importance of knowing patient history and using good ultrasound technique in order to make accurate diagnoses with ultrasound alone. However, at times, further imaging and tissue sampling is necessary. The participant will be encouraged to "push the envelope" with ultrasound-guided diagnosis and biopsy for appropriate cases. In addition, we will review non-obstetrical diagnoses in pregnant patients with abdominal pathology (i.e. appendicitis, hydronephrosis, pyelonephritis, ovarian torsion, incidental masses found during pregnancy). The radiologist is often called upon by maternal-fetal-medicine providers to guide imaging in this vulnerable population

Active Handout:Roya Sohaey

http://abstract.rsna.org/uploads/2017/16000398/Active RC618A.pdf

RC618B CT

Participants
Dushyant V. Sahani, MD, Boston, MA (*Presenter*) Research support, General Electric Company; Medical Advisory Board, Allena Pharmaceuticals, Inc

For information about this presentation, contact:

dsahani@mgh.harvard.edu

LEARNING OBJECTIVES

1) To review the statistics and incidence of common cancers in USA. 2) To discuss the role of CT in oncology and value of optimal

oral and IV contrast media protocols for best results. 3) Offer perals and solutions to overcome the limitations of CT and review the potential role of new CT technology.

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 EducatorDushyant V. Sahani, MD - 2015 Honored EducatorDushyant V. Sahani, MD - 2016 Honored EducatorDushyant V. Sahani, MD - 2017 Honored Educator

RC618C MRI

Participants
Dow-Mu Koh, MD,FRCR, Sutton, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To discuss newer MRI techniques that are now applied for body oncologic imaging that allows faster, better or more accurate disease diagnosis. 2) To highlight the applications and pitfalls of diffusion-weighted imaging for assessing upper abdominal cancers, peritoneal involvement, pelvic disease and bone marrow involvement (whole body MRI). 3) To survey the applications and limitations of motion insensitive radial-acquisition MR techniques for dynamic contrast enhanced imaging for cancer evaluation.

RC623

Evolving Perspectives on Ultrasound Safety

Thursday, Nov. 30 8:30AM - 10:00AM Room: S504AB

PH SQ US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
J. Brian Fowlkes, PhD, Ann Arbor, MI (*Director*) Equipment support, Koninklijke Philips NV; Equipment support, General Electric Com;pany; Equipment support, Toshiba Medical Systems Corporation; Research collaboration, Sonetics Inc; Stockholder, HistoSonics, Inc; Founder, HistoSonics, Inc

For information about this presentation, contact:

fowlkes@umich.edu

LEARNING OBJECTIVES

1) Understand the physical principles related to ultrasound safety and the potential for biological effects of ultrasound. 2) Utilize ultrasound in a safe and effective manner in clinical practice. 3) Increase their knowledge and understanding of the regulatory environment associated with medical ultrasound.

Sub-Events

RC623A Ultrasound Safety: Understanding the Potential Bioeffects

Participants
J. Brian Fowlkes, PhD, Ann Arbor, MI (*Presenter*) Equipment support, Koninklijke Philips NV; Equipment support, General Electric Com;pany; Equipment support, Toshiba Medical Systems Corporation; Research collaboration, Sonetics Inc; Stockholder, HistoSonics, Inc; Founder, HistoSonics, Inc

For information about this presentation, contact:

fowlkes@umich.edu

LEARNING OBJECTIVES

1) Understand the physics associated with the potential bioeffects of ultrasound. 2) Increase basic knowledge of the controls and operator feedback related to ultrasound safety. 3) Be sufficiently proficient to utilized on-screen displays related to ultrasound safety. 4) Identify additional resources for understanding the physical effects of ultrasound.

Active Handout:J. Brian Fowlkes

http://abstract.rsna.org/uploads/2017/17000402/Active RC623A.pdf

RC623B Ultrasound Safety: What You Should Tell the Clinicians

Participants
Jacques S. Abramowicz, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jabramowicz@bsd.uchicago.edu

LEARNING OBJECTIVES

View Learning Objectives under main course title

Active Handout:Jacques S. Abramowicz

http://abstract.rsna.org/uploads/2017/17000403/Active RC623B.pdf

RC623C Diagnostic Ultrasound Regulation: Substantial Equivalence, Novel Technologies, and Reasonable Assurance of Safety and Effectiveness

Participants
Shahram Vaezy, PhD, Silver Spring, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understanding the mission of the Center for Devices and Radiological Health (CDRH). 2) protection and promotion of the public health: Access to safe and effective medical devices, Facilitating medical device innovation. 3) Understanding diagnostic ultrasound premarket review of safety and effectiveness. 4) Elements of regulatory review: Intended use, Technological characteristics, Performance data, Labeling. 5) Class II medical devices and premarket notification (510(k) submissions): Safety and effectiveness for establishing substantial equivalence, Clearance for marketing. 6) Class III medical devices and premarket approval (PMA submissions): Safety and effectiveness, classification regulation, level of risk, Approval for marketing. 7) The de-novo classification

for devices with novel technologies: Not substantially equivalent, Risk-based classification. 8) Understanding post-market activitie. 9) Compliance: Medical device report (MDR), Recalls, Facility inspections. 10) Understanding FDA resources/information. 11) Code of Federal Regulation (CFR). 12) Consensus standards. 13) General controls and Special Controls. 14) FDA communications and website. 15) Pre-submissions.

Active Handout:Shahram Vaezy

http://abstract.rsna.org/uploads/2017/17000405/Active RC623C.pdf

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RC652

Nerve Ultrasound Based on a Regional Approach: Hip to Knee (Hands-on)

Thursday, Nov. 30 8:30AM - 10:00AM Room: E264

MK NR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Carlo Martinoli, MD, Genova, Italy (*Presenter*) Nothing to Disclose
Jon A. Jacobson, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Kenneth S. Lee, MD, Madison, WI (*Presenter*) Grant, General Electric Company; Research support, SuperSonic Imagine; Research support, Johnson & Johnson; Consultant, Echometrix, LLC; Royalties, Reed Elsevier
J. Antonio Bouffard, MD, Novi, MI (*Presenter*) Nothing to Disclose
Ghiyath Habra, MD, Troy, MI (*Presenter*) Nothing to Disclose
Marnix T. van Holsbeeck, MD, Detroit, MI (*Presenter*) Consultant, General Electric Company; Stockholder, Koninklijke Philips NV; Stockholder, General Electric Company; Stockholder MedEd3D; Grant, Siemens AG; Grant, General Electric Company;
Rachel B. Hulen, MD, Flint, MI (*Presenter*) Nothing to Disclose
Joseph H. Introcaso, MD, Neenah, WI (*Presenter*) Nothing to Disclose
Andrea Klauser, MD, Reith bei Seefeld, Austria (*Presenter*) Nothing to Disclose
Mary M. Chiavaras, MD, PhD, Ancaster, ON (*Presenter*) Nothing to Disclose
Viviane Khoury, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Marina Kislyakova, MD, Moscow, Russia (*Presenter*) Nothing to Disclose
Courtney E. Scher, DO, Detroit, MI (*Presenter*) Nothing to Disclose
Ximena L. Wortsman, MD, Santiago, Chile (*Presenter*) Nothing to Disclose
David P. Fessell, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Matthieu Rutten, MD, Hertogenbosch, Netherlands (*Presenter*) Nothing to Disclose
Sonia Airaldi, Genova, Italy (*Presenter*) Nothing to Disclose
Etienne Cardinal, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Nicki J. Delves, Guildford, United Kingdom (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

viviane.khoury@uphs.upenn.edu

mkisliakova@yandex.ru

mskeletal.radiology@gmail.com

LEARNING OBJECTIVES

1) Familiarize course participants with the ultrasound appearance of nerves and the scanning techniques used to image them about the hip and knee. 2) Emphasize the ultrasound anatomy of the femoral, sciatic and peroneal nerves and their divisional branches at their common sites of entrapment. 3) Learn the technique to image some minor nerves in their course throughout the proximal lower extremity, such as the lateral and posterior femoral cutaneous, the obturator, the saphenous and the sural. 4) Outline the range of clinical conditions where ultrasound is appropriate as the primary imaging modality for nerve assessment.

ABSTRACT

In recent years, ultrasound of the musculoskeletal and peripheral nervous systems is becoming an increasingly imaging tool with an expanding evidence base to support its use. However, the operator dependent nature and level of technical expertise required to perform an adequate ultrasound assessment means that appropriate training is required. For this purpose, the present course will demonstrate the basic principles of musculoskeletal ultrasound with a special focus on nerves of the proximal lower extremity (hip to knee). The standardized techniques of performing an adequate ultrasound study of the femoral, lateral and posterior femoral cutaneous, obturator, peroneal, saphenous, sciatic, sural nerves and their divisional branches will be illustrated. The hands-on workshops will provide the opportunity to interactively discuss the role of ultrasound in this field with expert instructors. Participants will be encouraged to directly scan model patients. A careful ultrasound approach with thorough understanding of soft-tissue planes and extensive familiarity with anatomy are prerequisites for obtaining reliable information regarding the affected structure and the site and nature of the disease process affecting it.

Honored Educators

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MSCB51

Case-based Review of Breast (An Interactive Session)

Thursday, Nov. 30 1:30PM - 3:00PM Room: S406A

BR MR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Jiyon Lee, MD, New York, NY (*Director*) Nothing to Disclose

For information about this presentation, contact:

Jiyon.Lee@nyumc.org

LEARNING OBJECTIVES

1) Identify appropriate application of multimodality breast imaging for routine screening, supplemental screening, and diagnostic indications. 2) Select appropriate methods for image-guided percutaneous biopsy and perform post-biopsy radiologic-pathologic correlation for next management recommendation. 3) Review appropriateness criteria and performance benchmarks, and guidelines for ongoing breast imaging audits.

ABSTRACT

Our case-based review course will use the interactive audience response system (ARS) to walk and skip through the fundamentals of breast imaging. We will present how we use mammography, ultrasound, and MRI in daily screening and diagnostic scenarios, along with reminders of overarching principles of ACR appropriateness criteria and performance metrics. Our international faculty (sessions 1 and 2) will also add depth, and the fun added dimensions of how breast imaging works around the world. Varying breast cancer statistics, possible innate ethnic variations, differing cultural expectations and socioeconomic context can and do impact how we carry out our discretionary work. Such interesting details will inform the narrative of the speakers' case scenarios, while the core diagnostic radiology skills aim to be constant, and teachable. The focus is using lots of cases to demonstrate breast imaging now and evolving. Please join us for smart tun!

Sub-Events

MSCB51A Mammography and Ultrasound: Appropriateness Criteria and Performance Measures in the United States

Participants
Priscilla J. Slanetz, MD, MPH, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

pslanetz@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Discuss the appropriate indications for screening and diagnostic mammography for symptomatic and asymptomatic patients. 2) Describe the target metrics of performance for interpretation of mammography and breast ultrasound in the United States. 3) Understand the components of the MQSA audit and their implications for clinical practice. 4) Preview emerging imaging tools for which performance metrics have yet to be established and discuss their potential clinical utility.

MSCB51B Screening and the Rest: Use the Tools You've Got

Participants
Jean M. Seely, MD, Ottawa, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jeseely@toh.ca

LEARNING OBJECTIVES

1) Recognize the fundamental tools available to evaluate screening mammography performance. 2) Understand the target metrics of performance in the Canadian screening mammography program. 3) Identify some practical educational methods to help improve screening mammography performance. 4) Perform a basic audit of a screening mammography program.

ABSTRACT

This course will provide basic information about performance metrics used in the Canadian population based screening program and show how these metrics can be applied to help improve performance with an educational approach. Using a case-based approach the course will provide practical ways for evaluating and improving performance in screening mammography.

MSCB51C Breast MRI Cases: Appropriateness Criteria and Performance Measures in the United States

Participants

Peter R. Eby, MD, Seattle, WA (*Presenter*) Consultant, Leica Biosystems Nussloch GmbH

For information about this presentation, contact:

peter.eby@virginiamason.org

LEARNING OBJECTIVES

1) Recognize and discuss the appropriate and inappropriate indications for breast MRI in the United States. 2) Understand the target metrics of performance for individuals and groups reading breast MRI in the United States. 3) Perform a basic audit of a breast MRI program and interpret the results. 4) Discuss the risks and benefits of breast MRI in terms of general test performance with patients.

Active Handout:Peter R. Eby

http://abstract.rsna.org/uploads/2017/17000531/Active MSCB51C.pdf

MSCB51D Breast MRI in Netherlands and Europe

Participants
Ritse M. Mann, MD, PhD, Nijmegen, Netherlands (*Presenter*) Research agreement, Siemens AG; Research agreement, Seno Medical Instruments, Inc; Research agreement, Identification Solutions Inc; Research agreement, Micrima Limited; Scientific Advisor, ScreenPoint Medical BV

LEARNING OBJECTIVES

1) Have a feeling for the breast radiology within the Netherlands and Europe and the varying use of guidelines. 2) Discuss the patient information to women prior to breast MRI. 3) Understand the use and indications for breast MRI in Europe. 4) Describe common European protocols for breast MRI.

ABSTRACT

This session will provide insight in the European use of breast imaging with a specific focus on breast MRI

RC710

Thyroid and Neck Ultrasound

Thursday, Nov. 30 4:30PM - 6:00PM Room: S402AB

HN NR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Sub-Events

RC710A Thyroid Nodules: When and What to Biopsy

Participants
Jill E. Langer, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify and describe the sonographic features that are associated with thyroid cancer and those that are associated with benign thyroid nodules. 2) Discuss the rationale for the current biopsy and sonographic follow-up imaging recommendations.

RC710B Thyroid Elastography

Participants
Richard G. Barr, MD, PhD, Campbell, OH (*Presenter*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Toshiba Medical Systems Corporation; Research Grant, Esaote SpA; Research Grant, BK Ultrasound; Research Grant, Hitachi, Ltd

LEARNING OBJECTIVES

1) Explain the difference between strain and shear wave elastography. 2) Understand the techniques to be able to perform thyroid ultrasound elastography. 3) Apply ultrasound elastography into routine clinical practice of thyroid nodules.

Honored Educators

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RC710C Parathyroid and Other Neck Masses

Participants
Mary C. Frates, MD, Sharon, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mfrates@bwh.harvard.edu

LEARNING OBJECTIVES

1) Identify abnormal parathyroid glands based on sonographic characteristics. 2) Develop an accurate differential for cystic lesions in the neck based on sonographic characteristics, lesion location, and clinical circumstances. 3) List the most common etiologies of solid lesions located between the thyroid and the superior mediastinum.

RC715

BIRADS-Difficult Cases (Interactive Session)

Thursday, Nov. 30 4:30PM - 6:00PM Room: E451B

BR MR US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Cherie M. Kuzmiak, DO, Chapel Hill, NC (*Moderator*) Nothing to Disclose

Sub-Events

RC715A Mammography

Participants
Carol H. Lee, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize situations in which choosing the appropriate BI-RADS assessment may difficult. 2) Learn how to assign the appropriate BI-RADS assessment for cases in which the assessment and management may not be concordant. 3) Apply principles of BI-RADS assessment to difficult cases.

RC715B Ultrasound

Participants
Rachel F. Brem, MD, Washington, DC (*Presenter*) Board of Directors, iCAD, Inc; Board of Directors, Dilon Technologies, Inc; Stock options, iCAD, Inc; Stockholder, Dilon Technologies, Inc; Consultant, Dilon Technologies, Inc; Consultant, ClearCut Medical Ltd; Consultant, Delphinus Medical Technologies, Inc

For information about this presentation, contact:

rbrem@mfa.gwu.edu

LEARNING OBJECTIVES

1) Appropriately use BIRADS descriptors for breast lesions using ultrasound. 2) Assess lesion characteristics to appropriately assign BIRADS for breast lesions. 3) Identify appropriate and inappropriate use of ultrasound for challenging cases. 4) Access resources to assist with challenging cases for the appropriate use of BIRADS for ultrasound.

ABSTRACT

This presentation will discuss challenging ultrasound cases and how to appropriately assess the BIRAD categories. Examples of appropriate and inappropriate cases will be presented using an interactive, audience participation format.

RC715C MRI

Participants
Bonnie N. Joe, MD, PhD, San Francisco, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bonnie.joe@ucsf.edu

LEARNING OBJECTIVES

1) Be able to apply a systematic approach to using MRI BI-RADS. 2) Recognize the similarities between BI-RADS for MRI and mammography. 3) Recognize situations where a BI-RADS assessment is not used for MRI.

ABSTRACT

Breast MRI BI-RADS follows a systematic approach analogous to mammography BI-RADS. BI-RADS includes three important components: (a) a lexicon of descriptors, (b) a reporting structure to include final assessment categories and management recommendations,and (c) a framework for data collection and auditing. This session will use an interactive format (audience response system) to review appropriate use of BI-RADS for breast MRI interpretation including scenarios where BI-RADS assessments are not appropriate.

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RC718

Challenging Cases in Body Oncologic Imaging (An Interactive Session)

Thursday, Nov. 30 4:30PM - 6:00PM Room: E351

CT MR NM OI US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Gary A. Ulaner, MD, PhD, New York, NY (*Moderator*) Research support, General Electric Company; Research support, F. Hoffmann-La Roche Ltd

For information about this presentation, contact:

ulanerg@mskcc.org

LEARNING OBJECTIVES

1) Learn how to correlate CT and FDG PET findings to optimize diagnosis. 2) Identify iatrogenic effects which mimic malignancy on FDG PET/CT. 3) Learn histologies of breast cancer which may not be appreciably FDG-avid. *This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.*

ABSTRACT

This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

Sub-Events

RC718A Magnetic Resonance Imaging

Participants
Alexander R. Guimaraes, MD, PhD, Portland, OR (*Presenter*) Consultant, Agfa-Gevaert Group

LEARNING OBJECTIVES

1) Updated understanding of soft tissue contrast mechanisms inherent in MRI including T1rho, diffusion weighted imaging, DCE-MRI. 2) Updated protocols for each organ site. 3) Potential benefits of PET/MRI in diagnosing disease.

ABSTRACT

This course is designed to update the attendee on novel MRI techniques and the benefits of MRI in diagnosing challenging cases within the abdomen and pelvis. Multiparametric MRI offers the unique ability to monitor the tumor microenvironment. Increasingly, multiparametric MRI is used for diagnosis and grading of malignancy in various organ systems (e.g. prostate cancer).

RC718B Ultrasound

Participants
Deborah J. Rubens, MD, Rochester, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the technical parameters to optimize to improve ultrasound diagnosis. 2) Identify discrete ultrasound features to discriminate between various pathologic entities. 3) Characterize disease processes in solid organs, vessels and soft tissues using the unique features of ultrasound and appreciate how ultrasound is complementary to CT, MRI and PET in the oncology patient.

ABSTRACT

This session will highlight a variety of disease processes in the oncology patient using grayscale, color and spectral Doppler ultrasound. Technique and potential pitfalls will be highlighted as they contribute to diagnostic acumen of the sonologist. Cases will include neoplastic, infectious and vascular processes in multiple organs. Differential diagnosis will be stressed with companion case examples, as well as when to use comparative imaging such as CT, MRI or PET/CT

RC718C PET/CT

Participants
Gary A. Ulaner, MD, PhD, New York, NY (*Presenter*) Research support, General Electric Company; Research support, F. Hoffmann-La Roche Ltd

For information about this presentation, contact:

ulanerg@mskcc.org

LEARNING OBJECTIVES

1) Learn where CT findings can improve FDG PET interpretation and where FDG PET findings can improve CT interpretation.

ABSTRACT

FDG PET/CT has become an indispensible modality in the treatment of cancer. While proven to be of great clinical benefit in the management of a wide array of malignancies, there are many potential pitfalls which may be detrimental if not properly identified and explained. In particular, FDG-avidity may be incorrectly ascribed to malignancy when corresponding CT findings demonstrate the FDG-avidity to be benign. In other cases, the presence of FDG avidity correctly deterimes the presence of malignancy despite to lack of correlate findings on CT. In this presentation, challenging FDG PET/CT cases will be used to demonstrate how correlation of FDG PET and CT findings leads to optimal FDG PET/CT interpretation.

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RC752

Dynamic Musculoskeletal US: Clicks and Clunks of the Lower Extremity (Hands-on)

Thursday, Nov. 30 4:30PM - 6:00PM Room: E264

MK US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

Participants
Viviane Khoury, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Etienne Cardinal, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Jon A. Jacobson, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
David P. Fessell, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Ghiyath Habra, MD, Troy, MI (*Presenter*) Nothing to Disclose
Joseph H. Introcaso, MD, Neenah, WI (*Presenter*) Nothing to Disclose
Kenneth S. Lee, MD, Madison, WI (*Presenter*) Grant, General Electric Company; Research support, SuperSonic Imagine; Research support, Johnson & Johnson; Consultant, Echometrix, LLC; Royalties, Reed Elsevier
Humberto G. Rosas, MD, Madison, WI (*Presenter*) Nothing to Disclose
Marnix T. van Holsbeeck, MD, Detroit, MI (*Presenter*) Consultant, General Electric Company; Stockholder, Koninklijke Philips NV; Stockholder, General Electric Company; Stockholder MedEd3D; Grant, Siemens AG; Grant, General Electric Company;
Kambiz Motamedi, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Mark Cresswell, MBBCh, Vancouver, BC (*Presenter*) Research Consultant, RepliCel Life Sciences Inc; Investigator, RepliCel Life Sciences Inc; ; ; ;
Girish Gandikota, MBBS , Ann Arbor, MI (*Presenter*) Nothing to Disclose
Benjamin D. Levine, MD, Santa Monica, CA (*Presenter*) Research Consultant, Merck & Co, Inc
J. Antonio Bouffard, MD, Novi, MI (*Presenter*) Nothing to Disclose
Joseph G. Craig, MD, Detroit, MI (*Presenter*) Nothing to Disclose
Thomas Moser, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Carlo Martinoli, MD, Genova, Italy (*Presenter*) Nothing to Disclose
Robert R. Lopez, MD, Charlotte, NC (*Presenter*) Nothing to Disclose
Marcos L. Sampaio, MD, Ottawa, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

viviane.khoury@uphs.upenn.edu

msampaio@toh.ca

LEARNING OBJECTIVES

1) Identify anatomic structures which can impinge or move abnormally in the hip and ankle causing pain during normal range of motion. 2) Describe the ultrasound anatomy and scanning technique for a dynamic examination of these lesions. 3) Position patients optimally for the dynamic evaluation of the hip and ankle respecting ergonomics.

ABSTRACT

This course will demonstrate standardized techniques of performing the dynamic examination of hip and ankle lesions that are only or best demonstrated dynamically. These include the snapping hip, peroneal tendon subluxation/dislocation, flexor hallucis longus impingement, and ankle ligament instability. In the first portion of the course, probe positioning will be demonstrated on a model patient with overhead projection during live scanning. In the second portion of the course, an international group of expert radiologists will assist participants in learning positioning and scanning of hip and ankle joint lesions described. An emphasis on dynamic maneuvers and ergonomic documentation of tissue dynamics will be taught. Participants will be encouraged to directly scan model patients.

Honored Educators

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RC811

Emerging Technology: Immuno Imaging Probes—Opportunities and Challenges

Friday, Dec. 1 8:30AM - 10:00AM Room: E261

MI NM OI US

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 1.75

FDA Discussions may include off-label uses.

Sub-Events

RC811A A Primer on 89Zr-ImmunoPET

Participants
Brian M. Zeglis, PhD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn about the basic physical and chemical properties of the radioisotope 89Zr. 2) To understand the basic components of a 89Zr-labeled radioimmunoconjugate. 3) To understand how 89Zr-labeled radioimmunoconjugates are synthesized and purified. 4) To gain an appreciation of the forces behind the recent advent of 89Zr-based immunoPET imaging. 5) To explore the PSMA-targeting radioiommunoconjugate 89Zr-DFO-J591 as a case study for the journey of an immunoPET imaging agent from the laboratory to the clinic.

RC811B Engineered Antibodies for ImmunoPET: Probes for Profiling Tumors and Immune Responses

Participants
Anna M. Wu, PhD, Los Angeles, CA (*Presenter*) Stockholder, ImaginAb, Inc; Consultant, ImaginAb, Inc; Consultant, Avidity Biosciences LLC;

For information about this presentation, contact:

awu@mednet.ucla.edu

LEARNING OBJECTIVES

1) Identify key properties of antibodies that can be modified/improved to produce probes optimized for in vivo imaging. 2) Discuss applications of new immunoPET tracers to address challenges in oncology and immunology. 3) Describe the process and potential of translating immunoPET probes into clinical use.

RC811C Clinical Applications of Immuno Probes in Oncology

Participants
Elisabeth G.E. de Vries, MD, PhD, Groningen, Netherlands (*Presenter*) Institutional Research Grant, F. Hoffmann-La Roche Ltd ; Institutional Research Grant, Amgen Inc; Institutional Research Grant, Synthon Holding BV; Institutional Research Grant, AstraZeneca PLC; Institutional Research Grant, Radius Health, Inc; Institutional Research Grant, CytomX Therapeutics, Inc; Institutional Research Grant, Nordic Nanovector ASA; Consultant, Synthon Holding BV; Consultant, Pfizer Inc

For information about this presentation, contact:

e.g.e.de.vries@umcg.nl

LEARNING OBJECTIVES

1) To learn about the answers immuno probes can provide in clinical oncology. 2) To learn about the potential of the immuno probes consisting of radioactively labeled antibodies as well as fluorescently labeled antibodies in the clinic.

ABSTRACT

Currently monoclonal antibodies (mAbs) are an expanding innovative class of cancer drugs. Numerous mAbs, including several antibody-drug conjugates, are in advanced clinical development, forming an important part of the many molecularly targeted anticancer therapeutics currently in development. Development and treatment decisions for registered mAbs could benefit from quantitative biomarkers, enabling visualization of the tissue distribution of (potentially modified) therapeutic mAbs to confirm effective whole-body target expression, engagement, and modulation and to evaluate heterogeneity across lesions and patients. Such biomarkers may be realized with positron emission tomography (PET) imaging of radioactively labeled antibodies, a process called immunoPET or with a fluorescently labeled antibodies and optical imaging. This approach could potentially increase the power and value of trials and clinical practice by improving patient selection, optimizing dose and schedule, and rationalizing observed drug responses.

RC811D Companion Imaging Diagnostics: Small Molecule Ligands versus Immune-Based Agents

Participants
Michael D. Farwell, MD, MA, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

michael.farwell@uphs.upenn.edu

LEARNING OBJECTIVES

1) Describe desirable properties of a companion diagnostic imaging probe. 2) Discuss likely clinical scenarios where a companion diagnostic might be used. 3) List advantages and disadvantages of small molecule versus immune-based probes as companion diagnostics.