Interventional

VI001-EB-X

Entrepreneurship in Interventional Radiology

All Day Room: VI Community, Learning Center

Participants
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TEACHING POINTS

1. Understand that technological advances, miniaturized instruments & high tech imaging has led to advancements in minimally invasive techniques; reducing risk to patients & improving clinical outcomes. Interventional procedures and medical devices are rapidly evolving; innovation is inevitable in IR. 2. Entrepreneurial Culture (EC) is novel in traditional university milieus, however awareness & development of EC can help academics transfer their innovations to market. Academic institutions find it strategically advantageous to be centrally positioned within the maelstrom of high-tech industry, with the intention to liaise, collaborate, consult, license, spin-off & commercialize. Entrepreneurship is inevitable in this field, as it's heavily tech reliant, but navigating skills are crucial and understanding the process from idea to start-ups is critical.

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We aim to provide (1) strategies for choosing a commercialization approach and identifying a market need, (2) funding and financing a startup, (3) assembling a motivated management team, managing resources, and obtaining experienced mentors (4) marketing a product, and planning an exit, (5) case studies of successful and failed companies, (6) common reasons for failures and guidelines to overcome challenges that will then lead to a successful exit.

VI002-EB-X

Future Trends in Interventional Radiology: Liver on a Chip Platform

All Day Room: VI Community, Learning Center

Participants

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TEACHING POINTS

Liver disease is a global public health problem. Transplantation has limitations, thus the need for innovation in drug discovery to improve outcomes. The liver-on-a-chip (LC) platform is one such innovation that combines microfluidic technologies & tissue engineering to mimic biological and physiological properties, which can be utilized to screen safety & efficacy of drugs & various IR treatment modalities in oncologic and non-oncologic applications. Tissue obtained by biopsy can be adapted onto a chip & subjected to drugs to understand susceptibility, toxicity & metabolism. High-throughput screening of drugs or anti-virals can facilitate personalized therapeutic decisions & help overcome resource limitations in prospective, multi-center trials. In oncology, LC can be utilized to learn the effects of radiosensitizers prior to application of therapeutic radioactive materials. Microscopic probes in microfluidic channels can study IRE, microwave, cryo- & RFA on tumor tissue. LC can underpin the personalization in management of liver diseases.

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(1) Organ-on-a-chip; indispensable to the next era of personalized medicine, (2) the Liver-on-a-Chip (LC) platform, (3) What can it do that we can’t already? (4) In-vitro drug discovery platform (5) personalization of chemotherapeutics (6) IR & LC applications.

VI003-EB-X

Guidelines and Tips to Aide in the Reduction of Radiation Dose in the Interventional Radiology Suite

All Day Room: VI Community, Learning Center

Participants

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TEACHING POINTS

1. IR procedures expose both patients and staff to radiation. We aim to define radiation safety rules for staff using fluoroscopic C-Arms in IR with ALARA (As Low As Reasonably Achievable) in mind. Average radiation doses to the patient and staff in the IR suite will be reviewed and all possible sources of potential exposure throughout the suite will be explored. 2. Procedures and guidelines researched and developed at our institution will be presented to allow quick and easy updating of existing guidelines and implementation of novel protocols at other institutions.

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This educational exhibit will review key points for maintaining good practice. Differences in exposure when using the guidelines or not will in particular be illuminated. (1) Basic Principles and Outcomes, (2) Key Physician and Technologist Behavior, (3) Fluoroscopy Device Settings, (4) Equipment – C-Arm Positioning and Technical Operation, (5) Good and Bad C-Arm Geometry, (6) Cautions for patients with large AP dimensions, (7) DSA Fixed vs Variable, (8) Fluoro Loops, (9) Issues with Magnification, (10) Lateral Projections, (11) Aprons, lead Lucite shields, Rad Pads, (12) Maintaining distance and, (13) ALARA principles.

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/

William Pavlicek, PhD - 2012 Honored Educator

VI004-EB-X

Post Treatment CT Imaging Features following Microwave Ablation of Lung Tumors

All Day Room: VI Community, Learning Center

Participants
Rachel C. Brook, MBBS, FRCR, Southampton, United Kingdom (*Presenter*) Nothing to Disclose
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TEACHING POINTS

The appearences following microwave ablation of lung lesions are less well described than in other forms of thermal ablation. The aim of this education exhibit is to provide the reader with a comprehensive understanding of:1. Normal CT appearences following microwave ablation of a lung mass over a period of time – imaging features of the ablation zone and subsequent involution2. Recognition of early and late complications following microwave ablation of lung lesions3. To improve post-treatment "read-out" of imaging following microwave ablation of lung lesions

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1. Thermal ablation of lung lesions and the features of microwave ablation compared to radiofrequency ablation and cryoablation.2. Normal imaging features of microwave ablation of lung lesions.• Immediately post procedural • Within 1 month• Over months/years – involution of the successfully treated Ablation Zone3. Imaging review of early and late complications associated with microwave ablation of lung lesions – from trivial to severe.• Pneumothorax• Pleural effusion• Cavity formation• Haematoma• Bronchopulmonary fistula• Bronchopleural fistula and persistent 'air leaks'• Recurrent disease (unsuccessful treatment)

VI005-EB-X

MR-guided Interventions in the Abdomen: Reviewing Technical Parameters to Optimize Success

All Day Room: VI Community, Learning Center

Participants

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Stuart G. Silverman, MD, Brookline, MA (*Abstract Co-Author*) Author, Wolters Kluwer nv

TEACHING POINTS

MR guided interventions can be an effective useful adjunct to the more established methods when lesions are not able to be as easily identified on the other modalities.Single shot T2 weighted spin echo images (HASTE) and 3D GRE sequences (VIBE) are readily available fast sequences which can allow for lesion detection and targeting while reducing of respiratory motion artifact.Positioning of the patient can assist in reducing the effect respiratory excursion can have on targeting and therapy.Blooming artifact can make identification of the actual needle tip difficult, and it is important to understand how it affects the sequences that are being used to target the lesion(s).The use of non-ionizing radiation with MR can allow for close monitoring of ablative therapy when non-target ablation of adjacent organs could result in significant morbidity or even mortality.

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Review imaging sequences and parameters for image acquisition. Review positioning and effect it can have on both images and ability to perform the procedure. Understanding the artifacts which could affect targeting in MR guided interventions in the abdomen. General imaging techniques used during monitoring of cryoablative therapy.

VI006-EB-X

Cholangiographic Appearance of Neonatal Biliary Abnormalities

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
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TEACHING POINTS

1- Familiarize radiologists with the transhepatic cholangiography techniques, normal anatomy.2- Familiarize radiologists with most commonly encountered pathologies in neonates cholangiography; including biliary
atresia, Alagille syndrome, choledochal cysts, Carole's disease and total parenteral nutrition–associated cholestasis.

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-Objectives -Normal Cholecystocholangiography-Alagille Syndrome-Biliary Atresia-Hepatitis-Choledochal cyst/ Biliary Hypoplasia-Carolies Disease-Sclerosing Cholangitis-Total Nutrition-Associated Cholestasis

VI007-EB-X

Interventional Radiology with a Twist: IR Onboard the Navy Hospital Ship USNS Comfort during Continuing Promise 15

All Day Room: VI Community, Learning Center

Participants

Chad J. Baarson, DO, Great Falls, MT (*Presenter*) Nothing to Disclose
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Marc T. Johannsen, DO, Chesapeake, VA (*Abstract Co-Author*) Nothing to Disclose
Bennett L. Davis, MD, Portsmouth, VA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

TEACHING POINTS:How to use interventional radiology (IR) skills in non ideal conditions? War, disasters and mass casualty, situations that we can be prepared to handle utilizing limited resources. How IR can contribute in trauma care, surgical morbidity mitigation and short inpatient stay. Success stories from the most recent US Navy humanitarian mission in Central America, South America, and the Caribbean highlighting what Interventional radiologist can do beyond the closed doors of IR suite.

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TABLE OF CONTENTS/OUTLINE:This Exhibit will give an overview of Interventional Radiology Assets onboard the USNS Comfort hospital ship during US Navy Continuing Promise 15 humanitarian mission throughout Central and South America and the Caribbean. It will thoroughly discusses interesting radiology cases performed on the ship and in the field with limited resources and successful outcomes, and how this can be translated disaster relief and warfighter support.

VI008-EB-X

Selective Sampling of Adrenal and Ovarian Veins in Patients with Radiographically Occult Steroid Secreting Tumors

All Day Room: VI Community, Learning Center

Participants
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Adrienne McGhee, RRA, Richmond, VA (*Abstract Co-Author*) Nothing to Disclose
Jeffrey D. Elbich, MD, Menomonee Falls, WI (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Provide brief background of androgen secreting tumors.Provide useful management guidelines for workup and diagnosis of radiographically occult androgen secreting tumors.Review of current literature of the subject.

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BACKGROUNDCLINICAL FINDINGS PROCEDURE DETAILS CONCLUSION AND TEACHING POINTS

VI009-EB-X

The Role of Renal Artery Embolization in Renal Tumors

All Day Room: VI Community, Learning Center

Participants
Ryan P. Rimer, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
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TEACHING POINTS

Most renal tumors are diagnosed incidentally on abdominal imaging performed for other indications. Renal cell carcinoma (RCC) accounts for approximately 2 to 3 % of all malignancies with more than 60,000 new cases per year in the US. Angiomyolipomas (AML) are benign hypervascular tumors with the potential for spontaneous hemorrhage with increased size. Renal artery embolization (RAE) can be used preoperatively prior to resection of a RCC or as palliation. In AML, RAE is the treatment of choice to prevent or control hemorrhage. We discuss the role of RAE in the setting of renal masses.

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Discuss indications and role of RAE in renal tumors, such as RCC and AML. Review variant anatomy including accessory renal arteries, double renal arteries that need evaluation before embolization. Technical considerations: pre-procedure imaging, labs, anesthesia, adjunct to cyroablation, outcomes and complications. Overview of embolic agents depending on case requirements. Conclusion and future directions of RAE in renal pathology. Review of several renal tumor cases performed at our institution.

VI010-EB-X

Pictorial Review of Techniques and Advanced Imaging Guidance in Recanalization of Chronic Central Venous Occlusions

All Day Room: VI Community, Learning Center

Participants
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Karunakaravel Karuppasamy, MBBS, FRCR, Westlake, OH (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To describe various useful techniques in recanalization of chronic central venous occlusions. To demonstrate advanced imaging guidance tools available to facilitate the procedure.

TABLE OF CONTENTS/OUTLINE

Background: Patients, who are dependent on central venous catheters for dialysis or total parenteral nutrition, are at risk of venous thrombosis and subsequent central venous occlusion. Often this is an insidious process and hence clinical symptoms are delayed or absent. However, there is frequently need to re-establish flow to relieve symptoms or to re-establish central venous access. **Techniques:** In this section, we aim to provide a pictorial overview of various techniques used by us to successfully re-establish flow and central venous access in such patients. We will include intra-procedural images with schematic diagrams that will provide a pictorial guide to the viewers. Wire using bony/soft tissue landmark as a target Wire with a snare as a target Wire with a balloon as a target Microcatheter and wire Needle/wire puncture (sharp recanalization) Radiofrequency wire (sharp recanalization)**Guidance:** In this section, we describe tomographic image guidance systems such as C-arm cone beam CT and 3D-3D fusion that are currently available to plan and execute the procedure.

VI011-EB-X

Thermal Ablation as a Primer for Immune Based Cancer Therapy

All Day Room: VI Community, Learning Center

Participants

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Rahul A. Sheth, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Beyond its local tumor control, thermal ablation has been shown to impact the immune system in fighting cancer cells. We will demonstrate the range of possible effects that various thermal ablation techniques may have on activating or suppressing the immune system. We highlight key advances in knowledge regarding the interaction between thermal ablation and the immune system.After studying this exhibit, the individual will be able to: Describe the range of impact ablation may have on the immune system Explain how ablation may be used as to enhance immune-based cancer therapies

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Mechanisms of action for clinical ablative therapies Overview of adaptive immunity Requirements for adaptive immune system activation Interactions between thermal ablation and the immune system Radiofrequency ablation RFA increases intratumoral T cell infiltration RFA may cause distant tumor growth Cryoablation “Cryo-immunology” and the evidence supporting cellular immunity following cryoablation The role of thermal ablation as a “primer” for immune-based cancer therapies Dendritic cell vaccines + ablation Novel immune checkpoint inhibitors + ablation Ongoing clinical trials, e.g. NCT02626130

VI012-EB-X

Prostate Artery Embolisation (PAE): The Tricks to Success

All Day Room: VI Community, Learning Center

Participants
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Rick Popert, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Tarun Sabharwal, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Understanding of standard pelvic arterial anatomy and common normal variants encountered during prostate artery embolisation (PAE).Role of cross sectional imaging in pre-procedural planning and post procedural follow-up.Techniques employed to avoid non-target embolisation and to achieve a successful procedural outcome.

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Many men over 50 experience debilitating symptoms caused by obstruction of the bladder outlet by an enlarged prostate. PAE offers these patients a minimally invasive treatment option, however it is vital to understand the arterial anatomy in order to achieve a successful result and avoid non-targeted embolisation. Pre-procedural planning is essential and a drawing of the arterial configuration of each internal iliac artery, based on CT images, can help to interpret angiographic images. The prostatic arteries are cannulated using a Progreat microcatheter and Fathom guidewire, prior to which gyceryl-trinitrate is administered, to avoid spasm. Due to stasis in the vessel, road map can be used to identify the end point of embolisation and prevent non-targeted embolisation. PAE is a safe treatment option for patients with BPH that avoids the complications associated with surgery. We present techniques, which have resulted in a successful procedural outcome, minimising the risk of non-targeted embolisation.

VI013-EB-X

Understanding the Basis behind Venous Thoracic Outlet Syndrome: Pathogenesis, Diagnostic and Therapeutic Approach

All Day Room: VI Community, Learning Center

Participants

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Timothy E. Yates, MD, Miami Beach, FL (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:1. To review the disease process underlying the venous variant of thoracic outlet syndrome (VTOS) or Paget-Schroetter Syndrome.2. To understand the importance of the familiarity of the thoracic outlet anatomy in the diagnosis and in developing a therapeutic approach.3. To learn optimal methods to detect VTOS using different imaging modalities.4. To learn the current recommendations on anticoagulation.5. To review the indications, contraindications and complications related to thrombolysis and mechanical thrombectomy.6. To learn the steps for mechanical thrombectomy.

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- Overview of the disease.- Anatomy: Interscalene triangle, Costoclavicular space and Retropectoralis minor space.- Diagnostic imaging methods: Ultrasound Venous MRI: Upper extremities in adduction and abduction.- Therapeutic options: Current recommendations on anticoagulation. Current recommendations for thrombolysis and mechanical thrombectomy. Balloon venoplasty. Imaging findings for Surgical decompression recommendations.- Mechanical thrombectomy. Treatment steps and new tool alternatives.- Complications related thrombolysis and mechanical thrombectomy: Phlegmasia caerulea dolen Post-thrombotic syndrome Bleeding Pulmonary emboli- Other

VI014-EB-X

Interventional Radiology Procedures in the Management of Liver Transplant Patients

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Qiong Han, MD, Lexington, KY (*Presenter*) Nothing to Disclose
Steven J. Krohmer, MD, Lexington, KY (*Abstract Co-Author*) Speaker, Medtronic plc

TEACHING POINTS

1. Identify types of liver transplants and specific effect on the planning of interventional procedures2. Evaluate postoperative complications of liver transplantation3. Discuss the value of interventional radiological procedures vital in the post operative care of liver transplant patients

TABLE OF CONTENTS/OUTLINE

Complications of liver transplantation- Underlying causes- Diagnostic work-upThe vital role of Interventional Radiology- Multidisciplinary team approach to the care of these patients- Diagnostic evaluation: Review of clinical and imaging findings- Examples of minimally invasive procedures and their role in the management of post-operative liver tranplant patients- Importance of interventional radiological procedures for longevity of the transplanted liver and on the patient's well-being.

VI015-EB-X

The Decision for Revision: A Guide to TIPS Revision

All Day Room: VI Community, Learning Center

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TEACHING POINTS

Since its introduction in the 1980s, the transjugular intrahepatic portosystemic shunt (TIPS) procedure has become a widely accepted and increasingly common treatment for portal hypertension and refractory ascites. However, TIPS procedures may have complications, which the practicing radiologist should be able to diagnose so that further interventions can be performed. Our goal is to highlight some of these potential complications by showing a few select cases demonstrating normal imaging findings, as well as those associated with complications necessitating revision or further action.

TABLE OF CONTENTS/OUTLINE

Introduction to TIPS procedure When to screen TIPS function Normal sonographic findings Imaging findings associated with intimal hyperplasia Imaging findings associated with thrombosis Imaging findings associated with refractory ascites Shunt revision in hepatic encephalopathy Clinical pearls

VI016-EB-X

Step-by-step Approach to Contrast Ultrasound Guided Liver Lesion Biopsy - Becoming Familiar with an Evolving Procedure

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
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Nami R. Azar, MD, Highland Heights, OH (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Certain liver lesions are not amenable to standard B-mode ultrasound guided biopsy secondary to non-visualization. Under normal circumstances these lesions are biopsied with CT guidance. Contrast-enhanced ultrasound (CEUS) guided liver lesion biopsy is feasible, safe and has several advantages.1. Indications for CEUS guided liver lesion biopsy: Non-visualization on standard B-mode ultrasound
2. Advantages of CEUS guided liver lesion biopsy as opposed to CT guided biopsy: Lack of radiation exposure, non-nephrotoxicity of contrast material, real-time imaging, shorter procedure times, decreased costs

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1. Patient work-up in the interventional radiology outpatient clinic
2. Pre-procedure CEUS based liver lesion characterization of benign and malignant entities
3. Value of cross-sectional fusion, including CT and MRI
4. Molecular composition of microbubble contrast material for ultrasound
5. Available contrast agents on the market
6. Safety considerations of microbubble contrast agents
7. Step-by-step approach to CEUS guided liver lesion biopsy including contrast agent dosing and administration protocol based on our experience as a tertiary US medical center
8. Presentation of multiple cases of CEUS guided liver lesion biopsy of benign and malignant liver lesions

VI017-EB-X

Aortic Coarctation: Diagnosis, Management and Post-treatment Features

All Day Room: VI Community, Learning Center

Participants
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TEACHING POINTS

· Discuss the role of CT and MRI in the diagnosis, surgical planning and follow-up of aortic coarctation.· Recognize the imaging features of aortic coarctation in each stage of the disease.

TABLE OF CONTENTS/OUTLINE

A. Review classification of aortic coarctationB. MRI and CT image acquisition: Technical parametersC. Contrast injection protocolD. Image post-processing and interpretationE. Diagnostic imaging findingsF. Surgical planning and differents optionsG. Outcomes

VI100-ED-X

Cross Sectional imaging of Loeys Dietz Syndrome and Associated Complications

All Day Room: VI Community, Learning Center

Participants
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TEACHING POINTS

Loeys Dietz syndrome (LDS) is a relatively recently described (2005, Johns Hopkins Hospital) autosomal dominant connective tissue disorder characterised by aortic and arterial aneurysms. Rapidly progressive aortic aneurysmal disease is a distinct feature of LDS. There is a risk of aneurysm rupture at younger ages with smaller dimensions compared with other aneurysmal syndromes, thus patients require close monitoring.Whilst the aortic root is the most common site of involvement, aneurysmal disease and dissection has been reported in all portions of the aorta and arterial branches of the head, neck, thorax, abdomen and pelvis.Therefore, cross-sectional vascular imaging both at baseline and follow up should include magnetic resonance angiography (MRA) and/or computerized tomography angiography (CTA) with 3D reconstruction of the head, neck, chest, abdomen and pelvis to assess for aneurysms throughout the vascular tree.

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1) Discovery of the condition.2) Epidemiology and genetics.3) Classification, diagnosis and clinical features.4) Imaging monitoring recommendations – timeframes and CTA/MRA protocols.5) Abnormal theshold measurements in LDS (lower limits than normal).6) Pictorial review of complications.

VI101-ED-X

Transjugular Intrahepatic Portosystemic Shunt for Particular Cases

All Day Room: VI Community, Learning Center

Participants

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TEACHING POINTS

The aim of this exhibit are: To know the indications of transjugular intrahepatic portosystemic shunt (TIPS) and to ilustrate the technique. To analyze the clinical benefits obtained in performing a TIPS in special clinical situations such as Budd-Chiari syndrome (BCS), portal vein thrombosis (PVT) and liver transplant recipients.

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The role of TIPS in the management of portal hypertension (PH) is constanly evolving. It can be a first-line theraphy in selected patients in whom it was considered for rescue therapy.It should be considered as a definitive initial treatment option in patients with BCS disease that doesn´t respond to thrombolityc therapy. It improves liver function and is associated with an excellent outcome and low rate of complications (10-year survival rate of 80%). With the availability of TIPS, liver transplantation has become an exception in these patientsPVT is not an absolute contraindication to TIPS placement. It's a safe and effective therapy for chronic cirrhotic PVT, improving their transplant candidacy and reducing surgical bleeding.The role of TIPS for treating complications of PH after liver transplantation is not well defined. It´s an alternative when medical treatment is not effective and only in selected cases because of the risk of liver dysfunction and its lower response rate.

VI102-ED-X

IR Management of Complications of Laparoscopic Pancreaticoduodenectomy

All Day Room: VI Community, Learning Center

Participants
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Barish H. Edil, MD, Aurora, CO (*Abstract Co-Author*) Nothing to Disclose
Paul J. Rochon, MD, Denver, CO (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Laparoscopic Pancreaticoduodenectomy (LPD) is becoming more common because of decreased morbidity relative to the open technique. However, despite improved outcomes, complications remain common and must be understood by the radiologist. To facilitate accurate diagnosis and optimal management, we review the LPD complications amenable to IR therapy. Through a series of image-based case presentations, the learner will become familiar with the diagnosis of LPD complications. The benefits of an IR-first approach and IR management techniques will be reviewed.

TABLE OF CONTENTS/OUTLINE

A. Learning Objectives.B. Rationale for increasing use of LPD.C. Pictorial review of post operative anatomy.D. Role of IR in management of complications of PD.E. Complications of LPD amenable to IR therapy.F. Anastomotic Leaks and resulting complications.G. Pancreaticojejunal Leaks and Fistulas.a. Case presentation.H. Choledochojejunal leaks and strictures.a. Case presentation.I. Vascular complications.J. Imaging of vascular complications.K. Treatment of vascular complications.a. Case presentation.L. Summary of principles for management of anastomotic leaks and fistulas.M. Summary of principles for management of vascular complications.N. Take Home Points.

VI103-ED-X

Techniques for Organ Displacement in Percutaneous Thermal Ablations

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Maggie Chung, Providence, RI (*Presenter*) Nothing to Disclose
Jason D. Iannuccilli, MD, Providence, RI (*Abstract Co-Author*) Research Grant, BSD Medical Corporation
Damian E. Dupuy, MD, Providence, RI (*Abstract Co-Author*) Research Grant, NeuWave Medical Inc Board of Directors, BSD Medical Corporation Stockholder, BSD Medical Corporation Speaker, Educational Symposia
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

TEACHING POINTS

1. To overview methods of organ displacement (hydrodissection, balloon displacement, stick-freeze ("chopstick") cryo-technique, and induced pneumothorax) to minimize collateral organ damage during tumor ablation2. To illustrate techniques for successful tissue salvage3. To identify risks associated with these techniques and methods of minimizing complications

TABLE OF CONTENTS/OUTLINE

1. Hydrodissection Indications (e.g. tumor <1cm to adjacent organs) Mapping grid planning, distance of displacement Materials: 5Fr Yueh catheter, hydrodissection fluid, use and optimal concentration of iodinated contrast media “Lever technique” Efficacy2. Balloon Displacement Indications (e.g. lower pole and posterior renal tumors) Influence of laterality, anatomical location, and morphology of renal lesions on use of displacement technique Materials Efficacy and safety3. Stick-freeze ("chopstick") cryo technique Indications (e.g. tumor adjacent to mediastinal structures) Materials Efficacy Potential complications and methods of reduction4. Induced pneumothorax Indications (e.g. tumor adjacent to mediastinal structures) Epidural kit, needle placement, volume of air to inject into pleural space Efficacy Post procedure monitoring and imaging

Honored Educators

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

Damian E. Dupuy, MD - 2012 Honored Educator

VI105-ED-X

Collateral Damage: Portal Hypertension and the Importance of Detecting Varices

All Day Room: VI Community, Learning Center

Participants
Robert E. Love II, MD, Burlington, VT (*Presenter*) Nothing to Disclose
Anant D. Bhave, MD, Richmond, VT (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to:1. Review the causes and pathophysiology of portal hypertension2. Review the different collateral vascular pathways that develop as a result of portal hypertension and the appearance of these pathways on multiple imaging modalities.3. Discuss the morbidity and mortality associated with portal hypertension and clinically significant varices.4. Review treatment options for varices as well as post-treatment imaging findings.

TABLE OF CONTENTS/OUTLINE

Pathophysiology of portal hypertension and variceal development Morbidity and mortality associated with portal hypertension and varices Review of imaging findings of varices on multiple imaging modalities (fluoroscopy, CT, MRI, nuclear medicine, and angiography) Treatment options for portal hypertension and varices Samples of post-treatment cases

VI106-ED-X

A Comprehensive Pictorial Review of Retrievable Inferior Vena Cava Filters: Complications and Advanced Retrieval Techniques

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Mithil Pandhi, Chicago, IL (*Presenter*) Nothing to Disclose
Emily J. Li, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Kush R. Desai, MD, Chicago, IL (*Abstract Co-Author*) Speakers Bureau, Cook Group Incorporated; Consultant, Cook Group Incorporated
Robert J. Lewandowski, MD, Chicago, IL (*Abstract Co-Author*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc

TEACHING POINTS

1. To provide a comprehensive literature and pictorial review of retrievable inferior vena cava filter complications2. To provide a technical description of advanced IVC filter retrieval techniques with corresponding schematics/images

TABLE OF CONTENTS/OUTLINE

OVERVIEW OF RETRIEVABLE IVC FILTER DEVICES: Review published guidelines/standards for IVC filters (IVCF) Indications for use with associated published evidence Pictorial/educational review of existing retrievable IVCF**RETRIEVABLE IVCF DEVICE-RELATED COMPLICATIONS:**a) Definition of IVCF complications Classified per Society of Interventional Radiology (SIR) standards/guidelines Acceptable thresholds per SIR guidelinesb) Comprehensive literature review detailing device-specific complications**IMAGING REVIEW OF IVCF COMPLICATIONS:**a) Fluoroscopic/CT images with schematicsb) Pictorial Review: IVCF tilt Strut penetration with/without penetration into adjacent structure Fracture with/without migration or embolization of filter components IVC thrombosis, acute & chronic Fibrin cap encasement of IVCF apex Endothelialization of IVCF components**ADVANCED TECHNIQUES TO REMOVE RETRIEVABLE IVCF:** Technical description Pictorial review of techniques applied to remove embedded IVCF Detailed schematics to highlight technical approaches

VI107-ED-X

Don't Break My Heart: A Pictorial Review of Vascular Complications from Transcatheter Valve Replacement

All Day Room: VI Community, Learning Center

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

TEACHING POINTS

Transcatheter valve replacement has become a viable option for patients with traditionally high surgical risk. Although there is decreased risk compared to open chest surgery, there are other potential serious vascular complications. Following this exhibit the learner should be able to understand and identify: Pre-operative risk for potential TAVR candidates. Imaging appearance of proper TAVR placement. Perioperative and postoperative vascular complications. Possible treatment options when these vascular complications are encountered.

TABLE OF CONTENTS/OUTLINE

Identifying potential candidates for TAVR CTA/MRA pre-operative imaging Types of TAVR systems Balloon-expanding Self-expanding Angiographic/cross-sectional appearance of proper TAVR placement Discussion of acceptable access routes including: Femoral, subclavian, antegrade transapical, suprasternal via the brachiocephalic trunk, minithoractomy, and mini-sternotomy with ascending aortic approach. Case review of vascular complications including key imaging findings, pre and post treatment images. List of cases includes, but is not limited to: Valve migration Arterial rupture Right atrial perforation Left ventricular perforation Access site hematoma Retroperitoneal hematoma Treatment options of potential complications

VI108-ED-X

Hemodialysis AV Fistulas and Grafts: Angiographic Imaging and Common Complications

All Day Room: VI Community, Learning Center

Participants
Luz E. Guerrero, MD, Tarragona, Spain (*Presenter*) Nothing to Disclose
Jonathan R. Joudanin, MD, Valencia, Spain (*Abstract Co-Author*) Nothing to Disclose
Esther Alba, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
David A. Leon Guevara, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Elena Escalante, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Juan Dominguez, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To know the different types of AV fistulas and grafts in hemodialysis patients. Real case explanation of the most common complications of AV fistulas diagnosed by angiography. To show the most common methods used in our hospital for recanalization of dialysis fistulas.

TABLE OF CONTENTS/OUTLINE

Epidemiology and types of AV fistulas and grafts in hemodialysis patients. Dysfunction and complications of AV fistulas and grafts: Venous anastomotic stenoses, arterial inflow stenoses, in-graft stenoses, central venous stenoses, pseudoanaeurysm, dialysis associated steal syndrome. Treatment of graft/fistula dysfunction - Treatment of graft/fistula thrombosis

VI109-ED-X

Envovascular Techniques for Complex Configuration Cerebral Aneurysm Embolization

All Day Room: VI Community, Learning Center

Participants

Ajeet D. Gordhan, MD, Bloomington, IL (*Presenter*) Nothing to Disclose

TEACHING POINTS

1. Define cerebral aneurysms demonstating complex antomic morphology, requiring non standard endovascular tecniques for succesful emoblization.2. Describe endovascular techniques using conventional devices in novel applications that allow for complete cerebral aneurysm occluson.

TABLE OF CONTENTS/OUTLINE

1. Definition of complex configuration cerebral aneurysms.2. Endvascular limitation in embolization of complex configuration cerebral aneurysms.3. Case series presentation demonstratingstandard device application techniques in novel ways to successfully embolize complex configuraton cerebral aneurysms.

VI110-ED-X

You Can't Spell Palliative Care without IR: The Role of Interventional Radiology in Palliative Care

All Day Room: VI Community, Learning Center

Participants
Michael Heller, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Vishal Kumar, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Kavi K. Devulapalli, MD, MPH, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Miles B. Conrad, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Antonio C. Westphalen, MD, Mill Valley, CA (*Abstract Co-Author*) Scientific Advisory Board, 3DBiopsy, Inc
Mark W. Wilson, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The Purpose of this Exhibit is: To review typical imaging findings and clinical presentation of terminal illness complications. To discuss the role of palliation in interventional radiology practice, specifically regarding endovascular, nonvascular, pain and symptomatic fluid collection interventions. To discuss indications for palliative procedures, including costs and benefits. To highlight tips and tricks for commonly encountered palliative procedures.

TABLE OF CONTENTS/OUTLINE

Brief overview of commonly encountered terminal illness complications, with emphasis on imaging findings Review of palliative endovascular interventions, including clinical presentation, imaging findings, and minimally invasive management options through case vignettes Review of palliative non-vascular interventions, including clinical presentation, imaging findings, and minimally invasive management options through case vignettes Review of palliative pain interventions, including clinical presentation, imaging findings, and minimally invasive management options through case vignettes Review of palliative interventions for symptomatic fluid collections, including clinical presentation, imaging findings, and minimally invasive management options through case vignettes Discussion of cost benefit analysis where appropriate and supported by current literature

VI111-ED-X

Medical Student Mentoring by Young Interventional Radiologists: Key Tips and A Call to Action!

All Day Room: VI Community, Learning Center

Participants
Abieyuwa Eweka, MD, Mineola, NY (*Presenter*) Nothing to Disclose
Rishi Chopra, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Neyra Azimov, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Jonathan A. Flug, MD, MBA, Aurora, CO (*Abstract Co-Author*) Nothing to Disclose
Jason C. Hoffmann, MD, Mineola, NY (*Abstract Co-Author*) Consultant, Merit Medical Systems, Inc; Speakers Bureau, Merit Medical Systems, Inc

TEACHING POINTS

1. Early career Interventional Radiologists (IRs) have an opportunity to connect with medical students, increase IR exposure, and impact IR recruitment.2. With the development of the IR residency, medical students will need to determine whether to pursue a career in IR by the end of their third year of medical school. As this shifts the career-selection process earlier by four years, substantial curricula changes and mentoring initiatives are needed to ensure that they have adequate IR exposure and can make an appropriate career choice.

TABLE OF CONTENTS/OUTLINE

Review the development of the IR Residency and the Early Specialization in Interventional Radiology (ESIR) pathways.Detail the major change in the timeline for trainees to choose a career in IR.Review available data regarding how recent and current IR fellows timed their career choice.Provide examples and define the critical role that early career IRs can play in exposing medical students to IR, including:-Become involved in (or start) the IR interest group at your medical school-Enlist medical students in IR research projects-Become involved in medical student education at your institution-Encourage medical students to join IR societies and attend national meetings-Be a leader-Support exposure of medical students to life as both a private practice and academic IR

VI112-ED-X

Percutaneous Extraction of Biliary Plastic Stents

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Luigi Pancione, MD, Romford, United Kingdom (*Presenter*) Nothing to Disclose
Imran Syed, MD, Romford, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Karlo Novacic, MD, Romford, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Abdulrahman Alvi, MD, Romford, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Mohamed Elsayad, MD, Romford, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

We describe our techique for a safe percutaneous extraction of biliary plastic stents and our experience in 15 patients.

TABLE OF CONTENTS/OUTLINE

15 patient with biliary plastic stent occlusion, after unsucessful endoscopic retrograde cholangio-pancreatography (ERCP), were referred to Interventional Radiology for a percutaneous biliary drainage (PTC).After punture of the biliary tree and insertion of the guidewire a 10 French long introducer sheat was inserted over the wire.In the case of a straight stent the stent was cannulated with the wire and a 3 mm diameter ballon catheter. The balloon catheter was inflated to secure the stent. The balloon catheter and the secured stent were pulled back and locked with the introducer sheat. Afterward all the system was easily pulled out of the body of the patient.In patients with double-ended pig tail stent instead of the catheter balloon a goose neck was used.An internal external catheter drainage was inserted at the end of the procedure.All procedures were successful without complications.In the literature the extraction of plastic biliary stent is performed by pushing into the duodenum the stent. This procedure is not completely safe because there is a risk of intestinal perforation.

VI113-ED-X

Peripheral Arterial Disease: Color Doppler Evaluation: What the Residents Need to Know

All Day Room: VI Community, Learning Center

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

TEACHING POINTS

1. The learner will understand the normal color and spectral Doppler appearance of the peripheral arteries, and their underlying physiology. 2. The learner will be able to recognize the abnormal color and spectral Doppler patterns in peripheral arterial evaluation and their clinical significance. They will also learn the Doppler criteria for evaluation of the peripheral arteries.

TABLE OF CONTENTS/OUTLINE

1. Normal upper and lower extremity arterial anatomy.2. Color Doppler technique of peripheral arterial evaluation.3. Normal color and spectral Doppler appearance of the peripheral arteries and their underlying physiology4. Abnormal Doppler appearances of the peripheral arteries, with CT an MRI correlation where applicable.5. Role of Ankle Brachial Index evaluation

VI114-ED-X

Review of Congenital Variants and Pathologic Processes of Inferior Vena Cava

All Day Room: VI Community, Learning Center

Participants
Jorge Galvan Fernandez, MD, Valladolid, Spain (*Presenter*) Nothing to Disclose
Maria I. Jimenez Cuenca, Valadolid, Spain (*Abstract Co-Author*) Nothing to Disclose
Laura Casadiego Matarranz, MD, Valladolid, Spain (*Abstract Co-Author*) Nothing to Disclose
Julio C. Gallego Beuth, MD, Valladolid, Spain (*Abstract Co-Author*) Nothing to Disclose
Santiago Perez Fernandez, MD, Valladolid, Spain (*Abstract Co-Author*) Nothing to Disclose
Antonio Hermosin Pena, MD, Valladolid, Spain (*Abstract Co-Author*) Nothing to Disclose
Rosario Esteban Casado, MD, Valladolid, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:1. Reviewing the embryological development of the inferior vena cava (IVC) and its congenital variants.2. Reviewing inferior vena cava (IVC) pathological processes. 3. Describing potential imaging pitfalls. Describing, in particular, radiological findings and clinical implications.

TABLE OF CONTENTS/OUTLINE

1. Embryology of the inferior vena cava (IVC): 2. Congenital IVC variations: 2.1 Absence: 2.2 Duplication: 2.3 Left-sided IVC: 2.4 Anomalous continuation of the IVC to the thorax: 2.5 Retrocaval ureter: 2.6 IVC webs: 2.7 Extrahepatic portocaval shunt (Abernethy Malformation): 3. Non-tumoural acquired pathology of the inferior vena cava: 3.1 IVC filter: 3.2 Stenosis of the IVC: 3.3 Mesocaval shunt: 3.4 Slitlike IVC: 3.5 Aortocaval fistula: 3.6 IVC Thrombophlebitis: 4. Tumoural acquired pathology of the inferior vena cava: 5. Imaging Pitfalls: 5.1 Pseudo filling defect due to a flow-related phenomenon producing an image of pseudothrombus. 5.2 Pseudolipoma of the IVC. 5.3 Retrograde flow.

VI115-ED-X

Multimodality Imaging of Venous Compression Syndromes

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Evan J. Zucker, MD, Boston, MA (*Presenter*) Nothing to Disclose
Brian B. Ghoshhajra, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
George R. Oliveira, MD, East Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anand M. Prabhakar, MD, Somerville, MA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To illustrate the broad spectrum of venous compression syndromes using multiple imaging modalities.
2. To describe the complementary roles of ultrasound, CT, MRI, and invasive venography in evaluating these disorders.
3. To summarize the key clinical features, imaging findings, and management considerations for each disorder.

TABLE OF CONTENTS/OUTLINE

Venous compression syndromes are a unique class of disorders characterized by anatomical extrinsic venous compression usually in young and otherwise healthy individuals. While rare, they are associated with significant morbidity such as deep venous thrombosis. The complementary roles of ultrasound, CT, MR, and conventional venography in evaluating these disorders is discussed. Using multimodality case examples, the broad spectrum of venous compression syndromes is illustrated, including May-Thurner syndrome, variant iliac vein compression syndrome (IVCS), Paget-Schroetter / venous thoracic outlet (TOS) syndrome, nutcracker syndrome, popliteal venous compression, and potential mimics. For each disorder, the key clinical features, imaging findings, and treatment options are discussed. In summary, imaging is central to the assessment of venous compression syndromes, helping to facilitate precise diagnosis and tailored management.

VI116-ED-X

Plugging the Dam: How to Perform Advanced Techniques for Type II Endoleak Embolization

All Day Room: VI Community, Learning Center

Participants

Tzyy Shyang Chao, MD, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose
Kimberly Scherer, DO, Morristown, NJ (*Presenter*) Nothing to Disclose
Joseph C. DeMarco, DO, Valhalla, NY (*Abstract Co-Author*) Nothing to Disclose
Joanna Kee-Sampson, MD, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose
Thaddeus M. Yablonsky, MD, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose
Sean K. Calhoun, DO, Long Valley, NJ (*Abstract Co-Author*) Nothing to Disclose
Waseem A. Bhatti, MD, Watchung, NJ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Type II endoleak is the most common type of endoleak. The two main techniques used are transarterial and percutaneous direct sac puncture. The purpose of this exhibit is to: Review diagnostic imaging findings of Type II endoleak. Review Type II endoleak embolization techniques. Highlight superselective arterial catheterization techniques and cases.

TABLE OF CONTENTS/OUTLINE

Type II endoleak review and diagnostic imaging Techniques for embolization Transarterial Superselective arterial catheterization may be performed in order to access the endoleak cavity and perform embolization. Percutaneous direct sac puncture Transabdominal or translumbar puncture of the aneurysm sac. Embolic agents: coils or liquid embolics Review of selective and superselective mesenteric arterial catheterization techniques Obtuse angle technique 60-120º Acute angle technique Triaxial technique Review cases of superselective techniques used in treating Type II endoleaks, for example: Arc of Riolan to inferior mesenteric artery approach Internal iliac artery approach Iliolumbar artery approach Middle sacral artery approach Post-intervention assessment of successful endoleak embolization Aneurysm sac pressure measurements Follow-up cross-sectional imaging

VI117-ED-X

Thrill Seeking: Role of Ultrasound in the Evaluation of AV Fistulas and Grafts-The Most Common Complications, Angiographic Correlations and Treatment Options

All Day Room: VI Community, Learning Center

Participants
Dipan Danda, MD, Hamden, CT (*Presenter*) Nothing to Disclose
Artur Velcani, MD, Fairfield, CT (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the types of arteriovenous access and the relevant anatomy. To review the normal pre- and post- operative sonographic findings of arteriovenous fistulas and grafts. To present the sonographic findings of the most common complications that arise from arteriovenous fistulas and grafts with angiographic correlation. To discuss the treatment options for the complications associated with arteriovenous fistulas and grafts.

TABLE OF CONTENTS/OUTLINE

Introduction Types of AV Access for Hemodialysis Preoperative US Vascular Mapping and its importance Normal Doppler US of a mature Arteriovenous Fistulas and Grafts Most common complication of Arteriovenous Fistulas and Grafts Post-operative Hematoma Outflow venous Stenosis Venous Outflow Thrombosis Inflow Arterial Stenosis Arterial Steal Syndrome Pseudoanerysm High flow AVF Stenosis at the anastomosis site Treatment options Conclusions

VI118-ED-X

Not a Fun Guy: Complications of Mycotic Aortic Aneurysm

All Day Room: VI Community, Learning Center

Participants
Brianna G. Abadie, MD, Norfolk, VA (*Abstract Co-Author*) Nothing to Disclose
Turner Fishpaw, MD, Santa Barbara, CA (*Presenter*) Nothing to Disclose
Kai Z. Kinder, MD, Santa Barbara, CA (*Abstract Co-Author*) Nothing to Disclose
Bernard Chow, MD, Santa Barbara, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Mycotic aortic aneurysm, contrary to the implications of its name, is an aneurysm most often caused by bacterial infection of the aorta. Aortitis leads to weakening of the vessel wall, leading to aneurysm formation. Complications are common in mycotic aortic aneurysm and include rupture, ongoing infection, septic emboli, post-obstructive pulmonary changes, among others. Also, depending on aneurysm location, different anatomical structures are susceptible to involvement--for example, the cervical spine in mycotic ascending aortic aneurysms and bronchi in mycotic aneurysms of the descending thoracic aorta. Knowing what structures are commonly and uncommonly involved can guide the radiologist in quickly identifying pathology, which then affects selection and initiation of appropriate therapy.

TABLE OF CONTENTS/OUTLINE

Pathophysiology of mycotic aortic aneurysm Differential diagnosis for thoracic aortic aneurysm and special considerations in the diagnostic evaluation Complications associated with mycotic aortic aneurysm Imaging findings for mycotic aortic aneurysm diagnosis and its complications Sample cases Summary

VI119-ED-X

Blood is in the Air(way): The Interventionalist's Guide to Managing Hemoptysis in Cystic Fibrosis

All Day Room: VI Community, Learning Center

Participants
David B. Pierce, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Eric J. Monroe, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Christopher R. Ingraham, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Karim Valji, MD, Seattle, WA (*Abstract Co-Author*) Royalties, Reed Elsevier

TEACHING POINTS

Review the normal bronchial artery anatomy, variant anatomy, and nonbronchial systemic arterial anatomy as it relates to hemoptysis. Describe the pathogenesis of hemoptysis in cystic fibrosis. Define massive hemoptysis and identify additional clinical factors used to stratify patients. Discuss the consensus recommendations and controversy regarding treatment of hemoptysis. Evaluate the non-interventional options for treating hemoptysis. Debate the role of pre-procedural imaging/bronchoscopy. Learn the technique for performing bronchial artery embolization. Examine the short and long-term outcomes of bronchial artery embolization in cystic fibrosis patients.

TABLE OF CONTENTS/OUTLINE

Background Epidemiology – incidence, mortality Historical perspective Anatomy and Pathophysiology Anatomy of bronchial artery and nonbronchial systemic arteries Pathogenesis of hemoptysis in cystic fibrosis Clinical workup Definition of massive hemoptysis Risk stratification Pre-procedure imaging/bronchoscopy Algorithm for working up CF patients with hemoptysis Non-interventional options Technique for bronchial artery embolization Findings at angiography Conservative approach Provocative approach Results Short-term outcomes Long-term outcomes Complications

VI120-ED-X

The Creation and Utilization of 3D Printed Models for Endovascular Embolization of Visceral Aneurysms

All Day Room: VI Community, Learning Center

Participants
Eisuke Shibata, MD, Tokyo, Japan (*Presenter*) Nothing to Disclose
Hidemasa Takao, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Shiori Amemiya, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Kuni Ohtomo, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:1. To explain how to create 3D printed models of visceral aneurysms from CT data.2. To show the accuracy of 3D printed models of aneurysms and related arteries.3. To discuss the usefulness of 3D printed models in preoperative simulations of endovascular treatment for visceral aneurysms.

TABLE OF CONTENTS/OUTLINE

Overview of 3D printing.Usefulness of 3D printed models. Creating 3D printed models from CT angiography. Accuracy of size and shape of 3D printed visceral aneurysmal models.Preoperative simulations using 3D printed models.Summary and future directions.

VI121-ED-X

Endovascular Management of Traumatic High Flow Priapism: How We Do It

All Day Room: VI Community, Learning Center

Participants
Rachel F. Oser, MD, Birmingham, AL (*Presenter*) Nothing to Disclose
Ahmed K. Abdel Aal, MD, PhD, Birmingham, AL (*Abstract Co-Author*) Consultant, St. Jude Medical, Inc; Consultant, Baxter International Inc; Consultant, C. R. Bard, Inc
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Mohsen Nourbakhsh, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
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Nathan W. Ertel, MD, Hoover, AL (*Abstract Co-Author*) Nothing to Disclose
Joseph B. Eason, MD, Richmond, VA (*Abstract Co-Author*) Nothing to Disclose
Edgar S. Underwood, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Andrew J. Gunn, MD, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1.Review different causative factors of traumatic high flow priapism.
2.Present the clinical picture of high flow priapism.
3.Demonstrate the imaging findings of high flow priapism on Doppler ultrasound, magnetic resonance angiography and catheter angiography.
4.Discuss the endovascular management and embolization of traumatic high flow priapism.
5.Outline potential complications.

TABLE OF CONTENTS/OUTLINE

1.Introduction.
2.Types and causes of priapism with focus on traumatic high flow priapism.
3.Clinical presentation of high flow priapism.
4.Imaging findings of priapism with focus on high flow priapism.
5.Algorithm for the management of traumatic high flow priapism.
6.Endovascular management of high flow priapism including techniques of embolization. We will support these using interesting cases from our institution.
7.The different types of embolic material that can be used in the treatment and their differences.
8.Outcomes of endovascular treatment.
9.Potential complications.
10.Summary and conclusion.

VI122-ED-X

Treating Angiomyolipoma Using Combined Embolic and Sclerotic Mixture

All Day Room: VI Community, Learning Center

Participants
Rachel F. Oser, MD, Birmingham, AL (*Presenter*) Nothing to Disclose
Ahmed K. Abdel Aal, MD, PhD, Birmingham, AL (*Abstract Co-Author*) Consultant, St. Jude Medical, Inc; Consultant, Baxter International Inc; Consultant, C. R. Bard, Inc
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Mohsen Nourbakhsh, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
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Edgar S. Underwood, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Joseph B. Eason, MD, Richmond, VA (*Abstract Co-Author*) Nothing to Disclose
Andrew J. Gunn, MD, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1.Outline the pathophysiology and clinical picture of angiomyolipoma in tuberous sclerosis patients.
2.Describe the imaging findings of angiomyolipoma in different imaging modalities.
3.Discuss the transarterial embolization of angiomyolipoma.
4.Describe the use of an embolic-sclerotic mixture consisting of gelfoam, sotradecol and lipiodol that can be used embolization of angiomyolipoma.
5.Discuss the advantages of this mixture compared to the other available agents used for embolization.
6.Describe the outcomes of transarterial embolization of angiomyolipoma.
7.Outline potential complications.

TABLE OF CONTENTS/OUTLINE

1.Introduction.
2.Clinical presentation of angiomyolipoma in tuberous sclerosis patients.
3.Imaging findings of angiomyolipoma.
4.Endovascular management of angiomyolipoma.
5.Transarterial embolization of angiomyolipoma.
6.Use of an embolic-sclerotic mixture consisting of gelfoam, sotradecol and lipiodol.
7.Advantages of this embolic-sclerotic mixture compared to other embolic agents such as particles and glue.
8.Outcomes of endovascular treatment compared to surgical treatment.
9.Potential complications.
10.Summary and conclusion.

VI123-ED-X

Percutaneous Management of Intra-hepatic and Extra-hepatic Biliary Leak and Fistulas: Thinking Outside the "Bile Diversion" Box

All Day Room: VI Community, Learning Center

Participants

Amr S. Moustafa, MBBCh , Little Rock, AR (*Presenter*) Nothing to Disclose
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Nathan W. Ertel, MD, Hoover, AL (*Abstract Co-Author*) Nothing to Disclose
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Edgar S. Underwood, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Andrew J. Gunn, MD, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1.Review the different types of biliary leak and fistulas.2.Describe the presenting symptoms and signs.3.Highlight the role of different imaging techniques in the diagnosis of intra-hepatic and extra-hepatic biliary leakage and fistulas.4.Demonstrate different percutaneous techniques for management of intra-hepatic and extra-hepatic biliary leakage and fistulas.5.Emphasis on percutaneous embolization of biliary leak and fistulas with different embolic materials.6.Present the technique-related outcomes and the potential complications.

TABLE OF CONTENTS/OUTLINE

1.Introduction.2.Types of biliary leakage and fistulas.3.Clinical presentation of biliary leakage and fistulas.4.Imaging findings by different modalities.5.Management algorithm for intra-hepatic and extra-hepatic biliary leakage and fistulas.6.Percutaneous management techniques7.Percutaneous embolization of biliary leak and fistula using different embolic materials.8.Outcomes of percutaneous treatment.9.Technique-related complications.10.Summary and conclusion.

VI124-ED-X

Frustrated from the Gastric Fundal Loop in Gastrojejunostomy Catheter Placement and Exchange Procedures: A Technique for Reduction

All Day Room: VI Community, Learning Center

Participants

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TEACHING POINTS

Placement of gastrojejunostomy catheters for enteral feeding has become a mainstay in the IR department. Patients return frequently for catheter exchange due to a multitude of reasons including the catheter becoming looped in the gastric fundus with tip pulled back from the jejunum. Unfortunately, in order to reduce the fundal loop, access to the duodenum must often be sacrificed. Re-accessing the duodenum is often time-consuming. Traditional techniques for reducing the fundal loop without using access to the duodenum are highly unreliable. We present a technique for reduction of the fundal loop, which is safe, simple, reliable, fast and inexpensive. This technique is also useful in initial gastrojejunostomy placement in the situation when a wire loops in the fundus and then traverses the pyloric sphincter.This poster will illustrate our technique for using a Fogarty balloon catheter to reduce the fundal loop in gastrojejunostomy placement and exchange. We will support the poster with diagrams and cases from our institution. As we will show, this is a simple, easily mastered technique that leads to decreased fluoroscopy and procedure time.

TABLE OF CONTENTS/OUTLINE

1- Introduction.2- The problem.3- The technique.4- Advantages of the technique5- Summary and conclusion.

VI125-ED-X

Atypical and Bizarre Pseudoaneurysms: A Review of Diagnosis, Management and Post-treatment Complications

All Day Room: VI Community, Learning Center

Participants

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Philip A. Rogoff, MD, Carlisle, MA (*Abstract Co-Author*) Nothing to Disclose
Paul S. Brady, MD, Swarthmore, PA (*Abstract Co-Author*) Nothing to Disclose
Donald F. Romanelli, MD, Prides Crossing, MA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Description of common, less common, and bizzare encountered visceral and peripheral pseudoaneurysms.2. Review of diagnostic imaging modalities, including their advantages and disadvantages in the work up of pseudoaneurysms.3. Discuss traditional and novel therapeutic options for the treatment of pseudoaneurysms and their post-treatment complications.4. At the end of this educational exhibit, the viewer will have learned the pathophysiology of pseudoaneurysms (particularly in unusual locations), recognized the appropriate diagnostic imaging modality for its work up, and understand the different options of management presented in a case based format.

TABLE OF CONTENTS/OUTLINE

1. Pathophysiology of common and unusual pseudoaneurysms. 2. Clinical case presentation.3. Diagnostic imaging. 4. Differential diagnosis/etiology of the common and unusual pseudoaneurysms and their management options. 5. Description of current and novel interventional approaches in treatment. 6. Clinical and imaging follow up. 7. Discussion of treatment complications.

VI126-ED-X

Tip Deflecting Catheters: A Pictorial Review of Common Indications and Unique Uses

All Day Room: VI Community, Learning Center

Participants
Rohit Koppula, MD, Charlottesville, VA (*Presenter*) Nothing to Disclose
John F. Angle, MD, Charlottesville, VA (*Abstract Co-Author*) Consultant, Terumo Corporation Research Grant, Seimens AG

TEACHING POINTS

-Outline the technology behind tip-deflecting catheters.
-Review the current indications / common uses for tip deflecting catheters.
-Highlight difficult cases where tip-deflecting catheters have been used in a unique manner.

TABLE OF CONTENTS/OUTLINE

Tip deflecting catheters are highly versatile tools in an interventionalist's armamentarium. They have traditionally been used for a variety of purposes spanning aortic aneurysm endoleak repair to accessing stenosed / tortuous vasculature. The catheters are inserted in the straight configuration and are subsequently deflected at the target location. The decreased catheter manipulation has resulted in improved procedure times, radiation exposure and likely reduces the risk of plaque disruption / vessel wall injury. Here we provide a pictorial review of common indications as well as unique uses of using tip deflecting catheters, including:-
Transcaval thoracic aortic aneurysm repair
-Facilitated access of a renal artery stent through a fenestrated AAA graft in order to embolize a bleeding segmental renal artery.
-Repositioning of malaligned IVC filter legs in a challenging filter removal case.
-Mechanical thrombectomy in a thrombosed TIPS stent.
-Improved stability of access in bronchial artery embolization.

VI127-ED-X

Short and Long Term Complications of Endovascular Stents: MDCT Findings and the Importance of Volumetric Visualization with 2D MPRs and 3D Rendering for Detection and Characterization

All Day Room: VI Community, Learning Center

Participants

Vikram Rajpurohit, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
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Elliot K. Fishman, MD, Baltimore, MD (*Abstract Co-Author*) Institutional Grant support, Siemens AG; Institutional Grant support, General Electric Company;
Pamela T. Johnson, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

TEACHING POINTS

Endovascular aortic repair (EVAR) has surpassed surgical grafting to repair descending thoracic and abdominal aortic pathology. In the months and years that follow EVAR, a variety of complications may occur. This exhibit reviews the following with respect to short term (1-12 months) and long term (> 12 months) complications: Surveillance guidelines following EVAR MDCT protocol design for detection and characterization Imaging findings across a range of complications Factors contributing to the potential for complications Overview of management for EVAR complications

TABLE OF CONTENTS/OUTLINE

Surveillance GuidelinesProtocol Design Data acquisition and contrast infusion 2D MPRs and 3D renderingCase Review of Short and Long Term Complications Infection Stent migration Graft thrombosis or limb occlusion Stent kinking/angulation Stent fracture Dissociation of overlapping stents Distal emboli (GI, spinal cord, renal ischemia/infarct) Retrograde Type A dissection/pseudoaneurym Aortoenteric fistulaParameters affecting complication rates Initial clinical presentation Aortoiliac tortuosity and calcification Anatomic location of stent Time interval from stent placementManagement and Repair Balloon angioplasty Coil embolization Endograft extension Chimney/fenestrated EVARs Surgical repair

Honored Educators

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

VI128-ED-X

Intra-Arterial Chemotherapy of Retinoblastoma with a Focus on What Interventional Radiologists Should Know

All Day Room: VI Community, Learning Center

Participants
Hossein Ghanaati, MD, Tehran, Iran (*Abstract Co-Author*) Nothing to Disclose
Ramin Pourghorban, MD, Tehran, Iran (*Presenter*) Nothing to Disclose
Morteza Jalilvand, Tabriz, Iran (*Abstract Co-Author*) Nothing to Disclose
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Mohammad Zarei, Tehran, Iran (*Abstract Co-Author*) Nothing to Disclose
Arash Masoumi Kasmaei, Tehran, Iran (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) To review the role of interventional radiology in the management of retinoblastoma. 2) To understand the benefits of intra-arterial chemotherapy over systemic chemotherapy and external beam irradiation. 3) To know the different classifications of retinoblastoma. 4) To understand the technique, indications, and contraindications of intra-arterial chemotherapy in patients with retinoblastoma. 5) To recognize the complications of intra-arterial chemotherapy. 6) To learn how to handle the procedural complication.

TABLE OF CONTENTS/OUTLINE

We will explain the different classifications of retinoblastoma and will discuss the benefits of intra-arterial chemotherapy and its indications and contraindications. We will specially focus on the technique of super-selective catheterization of ophthalmic artery and will show the equipments that we use in our referral center to do the procedure. Then, we will discuss the less frequent variants of the origin of ophthalmic artery that the interventionists may encounter during the procedure. Finally, management of the possible complications of the intra-arterial chemotherapy will be discussed.

VI129-ED-X

Case Based Review of Vascular Renal Interventions: Primer for Radiology Residents and Fellows

All Day Room: VI Community, Learning Center

Participants
Jay Patel, MD, Morristown, NJ (*Presenter*) Nothing to Disclose
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Pardeep K. Mittal, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Thaddeus M. Yablonsky, MD, Morristown, NJ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Review the indications, patient preparation, and equipment for various vascular renal interventions2. Learn multimodality imaging features of a variety of renal pathology3. Discuss interventional treatment options, technical considerations and common complications of these interventions

TABLE OF CONTENTS/OUTLINE

The indications, patient preparation and equipment for each case will be reviewed, followed by a discussion of multimodality imaging features. Interventional treatment options, commonly used embolic agents, technical considerations and common complications will also be reviewed.Topics presented include:**Embolization**• Embolic agents• Renal arteriovenous fistula• Renal arteriovenous malformation• Renal angiomyolipoma• Renal cell carcinoma• Renal trauma**Angioplasty**• Fibromuscular dysplasia**Stenting**• Renal artery stenosis

Honored Educators

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Pardeep K. Mittal, MD - 2016 Honored Educator

VI130-ED-X

Case Based Review of Percutaneous Renal Interventions: Primer for Radiology Residents and Fellows

All Day Room: VI Community, Learning Center

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

TEACHING POINTS

1. Review the indications, patient preparation, and equipment for various percutaneous renal interventions2. Learn multimodality imaging features of a variety of renal pathology3. Discuss interventional treatment options, technical considerations and common complications of these interventions

TABLE OF CONTENTS/OUTLINE

The indications, patient preparation and equipment for each case will be reviewed, followed by a discussion of multimodality imaging features. Interventional treatment options, technical considerations and common complications will also be reviewed.Topics presented include:**Renal biopsy Renal abscess drainageUrinary Drainage** • Percutaneous nephrostomy• Nephroureteral stenting• Ureteral stenting**Tumor ablation** • Cryoablation• Radiofrequency ablation

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/

Pardeep K. Mittal, MD - 2016 Honored Educator
Courtney A. Coursey Moreno, MD - 2016 Honored Educator

VI131-ED-X

Role of the Interventional Radiologist in Portal Vein Thrombosis Previous to Liver Transplant: A New Hope

All Day Room: VI Community, Learning Center

Participants

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Manuel Guerrero-Hernandez, MD, Tlalpan, Mexico (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Portal thrombosis is a known factor in the outcome after liver transplant, nowadays, partially due to interventional options is no longer an absolute contraindication. Besides the recognized role of TIPS as a bridge to transplant, thrombolysis and stent placement are procedures that can impact in the outcome of this group of patients. Interventional procedures can provide a vessel potentially suitable for portal anastomosis during surgery.

TABLE OF CONTENTS/OUTLINE

Pathophysiology of portal thrombosis Multimodality imaging in patients with portal thrombosis previous to liver transplant. Step-by-step guide to performance of interventional options: Portal thrombectomy and thrombolysis Portal stents Vascular paths in patients with cavernomatous portal degeneration Transjugular Intrahepatic Portosystemic shunt (TIPS) Radiologic follow-up and complications Clinical impact of procedures, a review of the evidence.

VI132-ED-X

Clinical Importance of and Practical Procedures for Interventional Radiology in Patients with Renal Injury

All Day Room: VI Community, Learning Center

Participants
Hidenori Mitani, Hiroshima, Japan (*Presenter*) Nothing to Disclose
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Yasutaka Baba, MD, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Renal injury can be divided into traumatic and iatrogenic injury.2. Traumatic: The incidence of renal trauma is 8-10% in abdominal traumas and it is often associated with hepatic and splenic injury. Treatment by interventional radiology (IR) helps to avoid complications and to spare renal function. Advances in IR make it possible to treat severe (grades IV and V) traumatic renal injury.3. Iatrogenic: Hemorrhage is an acute- and arteriovenous fistulae a delayed complication. Postprocedural genitourinary hemorrhage is rare; it occurs after 1-3% of invasive procedures such as open surgery and percutaneous minimally invasive procedures. The incidence of arteriovenous fistulae after renal biopsy is 0.5-16%. IR is indicated in most iatrogenic renal injuries.4. Tips for IR procedures: As renal injury can elicit bleeding from multiple vessels, angiograms and CT images must be inspected carefully. A combination of arterial and venous approaches is safe for the embolization of giant arteriovenous fistulae in patients with renal injury.

TABLE OF CONTENTS/OUTLINE

A. Epidemiology of renal injuryB. Diagnostic imaging proceduresC. Imaging the anatomy of renal vesselsD. Interventional radiology techniques: Tips and pitfallsE. Clinical outcomes and complications

VI133-ED-X

Evaluation of Peripheral Arterial Diseases Using Ultra High-Resolution CT

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Ryoichi Tanaka, MD, Morioka, Japan (*Presenter*) Research Grant, Toshiba Corporation
Kunihiro Yoshioka, MD, Morioka, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation
Hidenobu Takagi, MD, PhD, Morioka, Japan (*Abstract Co-Author*) Nothing to Disclose
Shigeru Ehara, MD, Morioka, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

(1) To understand the basic structure and functions of ultra high-resolution CT(2) Learning the less invasive evaluation of peripheral arterial diseases using ultra high-resolution CT

TABLE OF CONTENTS/OUTLINE

A. Structure of Ultra High-Resolution CTB. Imaging functions and parameters of Ultra High-Resolution CT (including radiation dose)C. Anatomical variations of peripheral arterial diseases (including arteries of foot) and relations to imaging protocolsD. Set-up of patient immobilization systemE. Subtraction techniques for the evaluation of peripheral arterial diseaseF. Feasibility of less invasive imaging in evaluating pedal arteries and digital arteries

VI134-ED-X

Neurointervional 3 Max Catheter: A Revolutionary Distal Access in Acute Ischemic Stroke

All Day Room: VI Community, Learning Center

Participants
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Beatriz Garcia Martinez, BDS, Santander, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- To explain the mechanism of 3 MAX suction microcatheter in mechanical thrombectomy procedures.- To demonstrate with a series of cases from our center that treatment of distal branches in acute ischemic stroke is feasible.- To expose patients clinical evolution before and after treatment with 3 MAX device with CT and MRI controls.

TABLE OF CONTENTS/OUTLINE

1. Introduction: acute ischemic stroke as a leading problem in our societies2. The evolution of neurointerventional devices in mechanical thrombectomy.3. Characteristics of microcatheter 3 MAX ¿how does it work?4. Series of cases from our center: Images pre,during and post- treatment.5. Conclusion: 3 MAX as a secure and feasible way of approaching distal artery branches

VI135-ED-X

What in the SAM Hill? Segmental Arterial Mediolysis Multimodality Imaging and Management

All Day Room: VI Community, Learning Center

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James A. Campbell, Wichita, KS (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To present multimodality imaging of segmental arterial mediolysis (SAM). To discuss the pathophysiology and differential diagnosis for SAM. To review management algorithm and follow-up imaging for SAM.

TABLE OF CONTENTS/OUTLINE

Introduction to segmental arterial mediolysis Review imaging findings CT angiogram findings MRI findings IR findings Review pathophysiology and differential diagnosis Management algorithm of SAM Prognosis and follow-up imaging ConclusionSummarySegmental arterial mediolysis (SAM) is a rare noninflammatory vasculopathy. Most patients present with intraabdominal hemorrhage. We present a case of intrahepatic SAM with CTA, MRI, and IR imaging findings in a middle-aged female with active intraabdominal hemorrhage and resultant transarterial coil embolization. SAM is a potentially life-threatening disease process due to the risk of intraabdominal hemorrhage. However, it can be managed successfully with endovascular therapy.

VI137-ED-X

The Collateral Pathway to the Adamkiewicz Artery Visualized in Computed Tomography Angiography

All Day Room: VI Community, Learning Center

Participants
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Kazuro Sugimura, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, Eisai Co, Ltd Research Grant, DAIICHI SANKYO Group

TEACHING POINTS

Identification of the Adamkiewicz artery (AKA) is crucial prior to surgical treatment of patients with aortic aneurysm to avoid spinal ischemia. Both the detection of the originating level and the supplying source of the AKA from the aorta must be provided by CTA so that clinicians receive adequate information. In particular, the collateral pathways from the aorta are major areas of interest. Better visualization of collaterals is a benefit of CTA, which has a larger coverage and a wider field of view compared with MRA. Further, the knowledge of the collateral pathways to the AKA can be fundamental to understanding the maintenance of the collateral circulation of the spinal cord.The aims of this exhibit are: 1. To revisit the diagnostic approach of AKA using CTA 2. To review the detailed pattern of the collateral sources to the AKA, which can be visualized using CTA.

TABLE OF CONTENTS/OUTLINE

1. The CTA diagnosis approach1-1. Technical aspects as acquisition, and post processing1-2. How to interpret the CTA2. The collateral sources to AKA 2-1. Para-vertebral pathways 2-1-1. Post-vertebral body 2-1-2. Lateral-vertebral body 2-1-3. Post-vertebral arch 2-2. Other pathways 2-2-1. Intercostal artery 2-2-2. Thoraco-dorsal artery 2-2-3. Lumbar artery 2-2-4. Internal thoracic artery 2-2-5. Inferior epigastric artery

VI138-ED-X

Embolization of Arteriovenous Malformations: Treatment Strategies and Adjunctive Techniques to Improve Results and Reduce Complications

All Day Room: VI Community, Learning Center

Participants

Hideki Ishimaru, MD, Nagasaki, Japan (*Presenter*) Nothing to Disclose
Satomi Mine, Omura, Japan (*Abstract Co-Author*) Nothing to Disclose
Sadanori Akita, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Ichiro Sakamoto, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Minoru Morikawa, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Saori Akashi, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Masataka Uetani, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review treatment strategies based on angioarchitectures of AVM To understand proper approach route based on location and morphology of AVM To learn proper selection of embolic materials or sclerosants. To learn adjunctive techniques to improve results and reduce complications.

TABLE OF CONTENTS/OUTLINE

TABLE OF CONTENTS: Houdart's classifications of AVM modified by Cho and corresponding treatment strategy Features of embolic materials and sclerosants (cyanoacrylate, coils, microspheres, ethanol, ethanolamine oleate, and others) Adjunctive techniques (Outflow vessel occlusion, Inflow reduction, Wedged catheter, Direct puncture, Balloon occluded retrograde transvenous approach, transient CO2 emboli protecting vessels supplying normal tissue)Outline：In the treatment of AVM, embolization should be performed at the site of the abnormal arteriovenous connection or the first venous component in order to achieve long-term improvement in symptoms. Approach route (transarterially, direct percutaneously, retrograde transvenously) and appropriate techniques should be selected on the basis of location and angioarchitectures of AVM. Appropriate choice of sclerosants and adjunctive techniques is crucial to reduce procedure-related complications including skin necrosis, non-target embolization, and pulmonary embolism.

VI139-ED-X

Not Only Congenital Variations: The 'Real' Gamut of the Inferior Vena Cava Pathology

All Day Room: VI Community, Learning Center

Participants
Robby Rahim, MD, Shreveport, LA (*Presenter*) Nothing to Disclose
Luis M. De Alba Padilla, MD, Shreveport, LA (*Abstract Co-Author*) Nothing to Disclose
Guillermo P. Sangster, MD, Shreveport, LA (*Abstract Co-Author*) Nothing to Disclose
Jared R. Garrett, MD, Shreveport, LA (*Abstract Co-Author*) Nothing to Disclose
Chaitanya Ahuja, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Alberto A. Simoncini, MD, Shreveport, LA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is:1. To understand the embryonal development of the IVC and how this process impacts in its congenital variations. 2. To depict the gamut of primary and secondary tumors affecting the IVC with discussion of specific imaging patterns to suggest a diagnosis3. To illustrates the imaging patterns of the acute and chronic IVC thrombosis with emphasis in bland and tumor thrombus

TABLE OF CONTENTS/OUTLINE

Normal anatomy and congenital variations. Classification of the IVC tumors Primary Leyomioma Leiomyosarcoma Intravascular, mixed and extravascular patterns Secondary tumors affecting the IVC Benign locally invasive tumors Malignant tumor with IVC invasion Bland Thrombus

VI140-ED-X

Cryoablation of Perivascular Neoplasms: Novel Minimally Invasive Approach to Treat Unresectable Tumors

All Day Room: VI Community, Learning Center

Participants
Ammar A. Chaudhry, MD, Elkridge, MD (*Presenter*) Nothing to Disclose
Abbas A. Chaudhry, BSc, Westbury, NY (*Abstract Co-Author*) Nothing to Disclose
Maryam Gul, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Kenny Lien, MD, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose
William H. Moore, MD, Setauket, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1- Review indications, interventional methods, contraindications, complications, pearls and pitfalls of percutaneous cryoablation.2- Cryoablation was previously not recommended for perivascular neoplasms due to heat sink effects and potential damage to adjacent organs. We will discuss novel approach to treat these previously "do NOT cryo" lesions and how to minimize potential risks while obtaining an appropriate size ablation zone.3- Algorithm to help determine the best treatment modality in managing lung masses.

TABLE OF CONTENTS/OUTLINE

A. Anatomy- Effect of cryoablation on vessels, nerves (vagus, phrenic), tracheobronchial tree, esophagus, etc.B. Clinical Findings secondary to mass effect/obstruction C. Highlight imaging findings (e.g. significance of fat planes) that serve as key to patient inclusion and exclusion criteria.D. Pathophysiology: Cryobiology: Intra- and extracellular mechanisms that promote tumor cell deathE. Procedure Technique: discuss key do’s and don’ts e.g. not crossing fissures, not ablating needle tract, etc.F. Follow-up: Immediate post-procedure management and follow-up guidelinesG. Outcomes:

a. Complications: Immediate (PTX, hemorrhage, BPF, nerve injury, etc), Delayed (recurrence, BPF, pleural effusions, etc)
b. Survival

VI141-ED-X

Vascular Compression Syndromes: Utility of CT Angiography for Diagnosis

All Day Room: VI Community, Learning Center

Participants
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TEACHING POINTS

To review of common vascular compression syndromes. To understand and to learn imaging findings on CT-angiograms in their diagnosis CT-Angiography is the best and more accurate imaging technique for diagnosis.

TABLE OF CONTENTS/OUTLINE

They are a heterogeneous group of diseases of difficult diagnosis,characterized by compression of hollow viscera by a vascular structure, or a vascular structure by a ligament or adjacent organ.There is controversy in its pathogenesis,as the symptoms can be vague and nonspecific, resulting in delayed or absence of diagnosis. In addition, anatomic findings that predispose to this compression can be found in asymptomatic patients.When these compressions are symptomatic, they give rise to a number of entities that we need to know: Thoracic outlet syndrome Median arcuate ligament syndrome Superior mesenteric artery syndrome May-Thurner syndrome The nutcracker syndrome Ureteropelvic junction syndrome Retrocaval ureter syndrome Ovarian vein syndrome Popliteal artery entrapment syndromeAlthough classically arteriography has been the main tool in diagnosis, currently most used techniques are Doppler ultrasound, Angio-MRI and Angio-multidetector CT, being this last one particularly useful since it allows a full assessment of the anatomy, thanks to its ability to produce multiplanar reconstructions.

VI142-ED-X

Overview of Bronchial Arterial Hemorrhage and Approach to Intervention

All Day Room: VI Community, Learning Center

Participants
Harutyun Gyurjyan, MD, Richmond, VA (*Presenter*) Nothing to Disclose
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Gustavo A. Elias, MD, Richmond, VA (*Abstract Co-Author*) Nothing to Disclose
Daniel J. Komorowski, MD, Richmond, VA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Hemoptysis, while often self-limiting, may present as a potentially life threatening condition in nearly 5% of cases. When this manifests, a clear approach to its diagnostic workup and life saving intervention is essential. The learning objectives include: 1) A synopsis of bronchial artery anatomy, bronchial artery variants, and etiology of hemoptysis 2) Clinical classification of “massive” hemoptysis. 3) Proposed generalized algorithm for diagnostic workup and management.

TABLE OF CONTENTS/OUTLINE

Anatomy of bronchial artery and variances of anatomy. Pathophysiology of hemoptysis as it relates to bronchial artery hemorrhage.Diagnostic criteria for "massive hemoptysis" - Diagnostic workup algorithm General approach to treatment.

VI143-ED-X

Trans-Arterial Treatment of Vein of Galen Aneurysmal Malformation: Essentials for Interventional Radiologists

All Day Room: VI Community, Learning Center

Participants
Hossein Ghanaati, MD, Tehran, Iran (*Abstract Co-Author*) Nothing to Disclose
Ramin Pourghorban, MD, Tehran, Iran (*Presenter*) Nothing to Disclose
Morteza Jalilvand, Tabriz, Iran (*Abstract Co-Author*) Nothing to Disclose
Rambod Salouti, Tehran, Iran (*Abstract Co-Author*) Nothing to Disclose
Arash Masoumi Kasmaei, Tehran, Iran (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) To understand the developmental anomaly that may cause vein of galen aneurysmal malformation (VGAM) 2) To explain the clinical manifestations of the patients with VGAM 3) To know the classifications of arteriovenous connections 4) To understand the advantages and disadvantages of trans-arterial versus trans-venous embolization 5) To understand the advantages of stepwise strategy for multiple sessions of trans-arterial embolization 6) To recognize the complications of trans-arterial embolization 7) To learn the indications of surgical treatment

TABLE OF CONTENTS/OUTLINE

We will explain role of the persistence of median prosencephalic vein and venous outflow pathways in the development of VGAM. We will discuss the choroidal and mural types of malformation. Clinical findings of the patients will be explained. We will discuss the different types of treatment including surgery, trans-arterial and trans-venous embolizations. The advantages of trans-arterial embolizationwil be discussed. We will focus on the technical aspects of trans-arterial embolization and its possible complications. We will also show the angiogram of some of our patients before and after multiple sessions of endovasular treatment with N-butyl-cyanoacrylate.

VI144-ED-X

Trans-Arterial Embolization of Carotid-Cavernous Fistula: Review of Pre- and Post-Endovascular Treatment Imaging

All Day Room: VI Community, Learning Center

Participants
Hossein Ghanaati, MD, Tehran, Iran (*Abstract Co-Author*) Nothing to Disclose
Ramin Pourghorban, MD, Tehran, Iran (*Presenter*) Nothing to Disclose
Rambod Salouti, Tehran, Iran (*Abstract Co-Author*) Nothing to Disclose
Morteza Jalilvand, Tabriz, Iran (*Abstract Co-Author*) Nothing to Disclose
Arash Masoumi Kasmaei, Tehran, Iran (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) To learn the pathophysiology and clinical manifestations of patients with carotid-cavernous fistula 2) To learn the classification of carotid-cavernous fistula 3) To learn the indications of conservative management, endovascular treatment, and surgery in patients with carotid-cavernous fistula 4) To explain the role of different endovasular treatments, including detachable balloon employment, trans-arterial embolization with microcoil, Onyx, or N-butyl-cyanoacrylate, and stent grafting 5) To show the technical aspects of endovascular treatment, specially the trans-arterial embolization 6) To recognize the complications of endovascular treatment

TABLE OF CONTENTS/OUTLINE

We will review the etiology and symptoms of carotid-cavernous fistula. Classification of carotid-cavernous fistula will be discussed. Indications of endovascular treatment as the primary treatment option will be reviewed. Technical tips of different endovascular treatments will be reviewed. The advantages of stepwise approach will be discussed. Angiography of the patients in our referral center before and after trans-arterial embolization will be shown. Possible complications of endovascular treatment will be discussed.

VI145-ED-X

Screening Ultrasound of Peripheral Arterial Disease: A Radiologist's Survival Guide

All Day Room: VI Community, Learning Center

Participants
Matthew Callaghan, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Jeffrey Cruz, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Christopher E. Kim, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Shuchi K. Rodgers, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Mindy M. Horrow, MD, Philadelphia, PA (*Abstract Co-Author*) Spouse, Employee, Merck & Co, Inc

TEACHING POINTS

Discuss components of non-invasive evaluation of peripheral arterial disease (PAD) Examine limitations of the ankle-brachial index (ABI) and identify alternative diagnostic screening methods to detect PAD Review the correlation of abnormal ABI values to disease severity Describe the role of Duplex Doppler ultrasound (US) in the evaluation of disease Consider the treatments of PAD Recognize pitfalls in evaluating PAD

TABLE OF CONTENTS/OUTLINE

Non-invasive screening evaluation of PAD ABI Segmental pressures Volume pulse recordings Exercise ABI Toe-brachial indexAbnormal ABI Abnormal ABI values and disease severity Single lesion Tandem/long segment lesions Inflow insufficiency Limitations of ABIDuplex Doppler US of PAD Normal Doppler US waveforms Criteria for hemodynamically significant lesions Findings suggesting proximal or distal diseaseTreatment modalities Medical/lifestyle modifications Revascularization therapy Endovascular therapy Bypass graft Pitfalls in the evaluation of peripheral arterial disease Other vascular pathologies Non-vascular pathology

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 Educator
Mindy M. Horrow, MD - 2016 Honored Educator

VI146-ED-X

Endovascular Management of Patients with Hemoptysis: Always Review the Other Imaging Modalities before the Procedure and Never Miss the Bleeding Sources Beyond Bronchial Arteries

All Day Room: VI Community, Learning Center

Participants

Hossein Ghanaati, MD, Tehran, Iran (*Abstract Co-Author*) Nothing to Disclose
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Arash Masoumi Kasmaei, Tehran, Iran (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) To review the anatomy of bronchial arteries and its frequent variants 2) To review the other blood supplies of the lung rather than bronchial arteries 3) To review the role of interventional radiology in the management of patients with hemoptysis 4) To review the indications and contraindications of endovascular treatment 5) To understand the importance of reviewing other imaging modalities before taking the patient into the angiography room 6) To focus on the technical aspects of endovascular emblization 7) To review the angiographic images of some patients with a source of bleeding other than bronchial arteries

TABLE OF CONTENTS/OUTLINE

We will review the anatomy of the blood supplies to the lungs. The role of chest radiograph, chest CT scan, CT angiography, and bronchoscopy will be discussed. Indications of endovascular treatment will be reviewed. Technical tips of endovascular treatment will be reviewed. We will show how reviewing the imagings of the patients help us find the source of bleeding more easily on angiography. Angiography of our patients with a source of bleeding apart from bronchial arteries, including internal mammary artery, thyrocervical trunk, intercostal artery, phrenic artery, and major aortopulmonary collateral arteries, will be shown. Complications of endovascular treatment will be discussed.

VI147-ED-X

Contrast-Enhanced Ultrasound (CEUS) in Hepatic Interventional Oncology; Technique and Emerging Applications

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Mittul Gulati, MD, La Canada Flintridge, CA (*Abstract Co-Author*) Nothing to Disclose
Brian F. Luu, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Ilya Lekht, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Contrast-enhanced ultrasound (CEUS) background, diagnostic applications in liver imaging.2. Utility of intravenous CEUS (IV CEUS) in monitoring percutaneous ablations in the liver.3. Utility of intra-arterial CEUS (IA CEUS) in hepatic trans-arterial chemoembolization (TACE) procedures.

TABLE OF CONTENTS/OUTLINE

OUTLINE:
1. CEUS technique, both IV (analogous to CT/MR), and IA (analogous to DSA).
2. CEUS advantages, including lack of radiation and nephrotoxicity.
3. IV CEUS in monitoring percutaneous liver ablations
-CEUS appearance hepatocellular carcinoma (HCC) and metastases pre and post treatment
-CEUS in evaluation post-treatment ablation zone, with CT comparison; option immediate additional ablation based on CEUS
-Post-ablation CEUS artifacts- periablation hyperemia, gas, and pseudoenhancement
4. IA CEUS in hepatic TACE procedures; localization HCC present on CT or MR, but not seen on digital subtraction angiography (DSA), including
- HCC with poor DSA enhancement
-HCC with extra-hepatic arterial supply; IA CEUS in "mapping" tumor supply
-HCC with portal venous supply
SUMMARY
Participant will:
1. Be familiar with technique, advantages, and limitations of CEUS in liver interventions
2. Understand the role of IV CEUS in monitoring percutaneous liver ablations, and of IA CEUS in localizing liver lesions during TACE

VI148-ED-X

Imaging Features in Vascular Compression Syndromes: A Case Based Pictorial Review

All Day Room: VI Community, Learning Center

Participants
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TEACHING POINTS

Vascular compression syndromes are a group of disorders characterized by entrapment of veins or arteries in certain anatomical areas or conversely, blood vessels themselves causing compression of other structures.Diagnosis is based on a proper correlation of clinical features (ischemia, thrombosis, embolism, haematuria) and imaging findings.Noninvasive imaging diagnostic techniques such as Computed Tomography Angiography (CTA) and Magnetic Resonance Imaging (MRI) are the preferred methods used for diagnosis.The purpose of this exhibit is:1) To know normal anatomy and variants related to different vascular compression syndromes.2) Review the various clinical scenarios and potential complications.3) To evaluate imaging features of different syndromes using CTA and MRI.

TABLE OF CONTENTS/OUTLINE

1) Thoracic outlet syndrome.2) Median arcuate ligament.3) Wilkie Syndrome.4) Nutcracker Syndrome.5) Pyeloureteral Junction obstruction.6) May Thurner.7) Popliteal entrapment.

VI149-ED-X

Making the Argument for Catheter Directed Therapy in Massive and Submassive PE: A Practical Review of the Literature

All Day Room: VI Community, Learning Center

Participants

Austin J. Peters, DO, Windcrest, TX (*Presenter*) Nothing to Disclose
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Christopher J. Lisanti, MD, Schertz, TX (*Abstract Co-Author*) Royalties, Wolters Kluwer nv

TEACHING POINTS

Develop a framework for evaluating catheter directed therapy for pulmonary embolism. Know the definitions of massive and submassive pulmonary embolism. Become familiar with landmark studies defining safety and efficacy of CDT. Understand the limitations of current literature.

TABLE OF CONTENTS/OUTLINE

Central question (Should catheter directed therapy be considered 1st line for certain patients to improve outcomes?) Definition of conditions Questions to answer safety efficacy Outcomes (meaningful parameters) rv function Heart failure, oxygen demand, renal function, etc... Limitations of research irregularity of research

VI150-ED-X

Multimodality Imaging Approach to Diagnose Common and Uncommon Pathologies of Inferior Vena Cava (IVC): The Good, the Bad and the Ugly

All Day Room: VI Community, Learning Center

Participants

Ameya J. Baxi, MBBS, DMRD, San Antonio, TX (*Presenter*) Nothing to Disclose
Abhijit Sunnapwar, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
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TEACHING POINTS

1. To discuss embryology and anatomy of IVC
2. To study the role of imaging in the diagnosis and evaluation of common IVC pathologies
3. To discuss imaging of IVC tumors

TABLE OF CONTENTS/OUTLINE

IVC pathologies are common. Though congenital malformations of IVC per se are of little consequence, their identification is very important for interventional radiologist`s point of view. IVC involvement is also commonly seen in many primary as well as metastatic neoplasms of the abdomen.Recognizing typical imaging findings with adequate clinical correlation is essential for timely and accurate diagnosis as well as for guiding treatment.In this exhibit, we discuss the characteristic multimodality imaging findings and differential diagnosis of common and uncommon IVC congenital anomalies as well as acquired pathologies. Increased awareness of such entities will contribute to optimized care of patients. Aims/ObjectivesIntroduction
Anatomy and embryology
Common congenital malformations
Pathology, role of imaging and imaging findingsStenosis
Thrombosis: Bland and tumoral
Leiomyoma
Hemangioma
Lipoma
Leiomyoscrcoma
Contiguous involvement by surrounding tumors and other pathologies
Miscellaneous- trauma, Budd Chiari syndrome, fistulas, pseudo-lesionsIVC filters: what radiologist needs to know
Conclusion

Honored Educators

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

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

VI151-ED-X

Role of Interventional Radiology in Postpartum Hemorrhage: Let´s Give Mothers a Second Chance

All Day Room: VI Community, Learning Center

Participants
Ane Ugarte Nuno, MBBS, San Sebastian, Spain (*Presenter*) Nothing to Disclose
Amaia Goienetxea Murgiondo, MD, Bergara, Spain (*Abstract Co-Author*) Nothing to Disclose
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Francisco Loyola Echaniz, San Sebastian, Spain (*Abstract Co-Author*) Nothing to Disclose
Idoia Echegoyen, San Sebastian, Spain (*Abstract Co-Author*) Nothing to Disclose
Virginia Gomez Usabiaga, Donostia-San Sebastian, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To describe the different etiologies of postpartum hemorrhage (PPH). To review the role of interventional radiology in the management algorithm of PPH. To review the steps of a pelvic transarterial embolization. To show our experience in endovascular treatment of PPH through a pictorial review.

TABLE OF CONTENTS/OUTLINE

Over the past two decades, pelvic transarterial embolization techniques have significantly improved, having now a days a key role in obstetric hemorrhage. Transcatheter therapeutic embolization procedures are minimally invasive and may obviate surgery, thereby decreasing morbimortality and safeguarding the patient´s future fertility potential. These techniques have demonstrated to have excellent results in cases of postpartum hemorrhage. 1. Introduction to the postpartum hemorrhage (PPH) and its prevalence and morbimortality worldwide.2. Classification and etiologies of PPH - Primary - Secondary3. Role of interventional radiology in PPH: A key procedure in the latest management algorithms.4. How to perform a pelvic transarterial embolization: - Materials - Step by step5. A review of radiological findings through a case-based review: From CT images to angiographic technique and treatment.6. Summary

VI152-ED-X

Haemodialysis Arteriovenous Fistula: Does it work? How the Radiologist Can Help

All Day Room: VI Community, Learning Center

Participants

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Inaki Prieto Jr, San Sebastian, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To describe normal findings of a well-functioning haemodalysis fistula in doppler ultrasound. To review possible complications of the fistulas: How to evaluate them. To correlate US images with angiographic images and endovascular treatment, if appropriate.

TABLE OF CONTENTS/OUTLINE

Over the last two decades, US has acquired a key role in the evaluation of dysfunctional haemodialysis access due to its reliability and noninvasive technique. Therefore, every radiologist should be familiar with the normal appearance of an arteriovenous fistula and should be aware of the most common complications. 1. Role of Doppler US in the evaluation of arteriovenous fistulas for haemodialysis2. Normal US findings in a well-functioning fistula3. Complications of the fistulas: How to evaluate them? - Aneurysms

- Pseudoaneurysms
- Stenosis
- Thrombosis
- Steal syndrome
- Infection - Mural vein hematoma4. Summary

VI153-ED-X

Deep Inferior Epigastric Perforator Flap Reconstruction: What Does a Plastic Surgeon Want to Know from a Radiologist?

All Day Room: VI Community, Learning Center

Participants

Ricky L. Miller, MD, New Orleans, LA (*Presenter*) Nothing to Disclose
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Raman Danrad, MD, New Orleans, LA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

After reviewing the exhibit, the learner should be able to:1) Identify variant branching patterns of the deep inferior epigastric artery (DIEA).2) Discuss the essential CT angiographic preoperative features a plastic surgeon wants to know prior to surgery.3) Explain the pitfalls and limitations of CT angiography in identifying perforator arteries for dissection and graft harvesting.

TABLE OF CONTENTS/OUTLINE

1. Introduction to DIEP flap: common surgical use, frequency of use, and failure rates.2. Relevant Anatomy: external landmarks, vascular anatomy of the anterior abdominal wall, and surgical anatomy.3. Description of CT protocol, imaging, and post-processing.4. CT reporting customized to what the plastic surgeon wants to know preoperatively.5. Harvesting the DIEP flap: common surgical technique and scenarios, intraoperative imaging.6. Shortcomings of preoperative imaging in predicting surgical course.

VI154-ED-X

Clinical Outcomes of Catheter Directed Pulmonary Thrombolysis: A Primer for Radiology Trainees

All Day Room: VI Community, Learning Center

Participants
Jan Hansmann, MD, Chicago, IL (*Presenter*) Nothing to Disclose
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TEACHING POINTS

1. With favorable short-term outcomes, prospective studies evaluating long-term outcomes are required to further expand the role of CDT in patients with PE and RV dysfunction.
2. An up-to-date knowledge of patient selection, technical approaches, and procedure outcomes will assist IR trainees expand the relevance of CDT in the care of PE patients with RV dysfunction.

TABLE OF CONTENTS/OUTLINE

- Clinical Presentation- Assessment of right ventricular dysfunction- Pulmonary Embolism Classification and Proposed Treatments- Technical Pearls- Evidence and Outcomes- Conclusion and Teaching Points- References

VI156-ED-X

Filter Retrievals Gone Wrong: A Pictorial Essay

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Rahmat Ali, MD, New Haven, CT (*Presenter*) Nothing to Disclose
Jeet Minocha, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
emilio lopez, MD, new haven, CT (*Abstract Co-Author*) Nothing to Disclose
Douglas D. Silin, MD, Cheshire, CT (*Abstract Co-Author*) Nothing to Disclose
Hamid R. Mojibian, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
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Igor Latich, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Keith B. Quencer, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Over a quarter of a million filters are placed in the US every year. Current estimates are that <10% of filters are ever removed. The FDA, SIR and ACR all advise for their removal when filters are no longer needed. However, filter removal can be difficult with significant complications ensuing including intimal injury to the IVC, caval thrombus formation, filter fracture and vascular injury. These complications are shown in this educationl exhibit. In addition, current guidelines for IVC filter placement, retrievals, diagnosis and management of IVC filters related complications will be summarized. Guidelines and evidence for use of filters should be familiar to clinicians and interventional radiologists alike.

TABLE OF CONTENTS/OUTLINE

1. Our exhibit will review current guidelines for indications and contraindications for IVC filter placement.
2. Review evidence for, rates of and guidelines for IVC filter retrieval.
3. Overview of the common complications associated with IVC filters placement, while they are indwelling and at the time of retrieval.
4. Review common techniques for uncomplicated and complicated IVC filter retrieval.
5. Illustrate multiple cases of complications related to IVC filter retrieval.
6. Review of literature regarding IVC filter retrieval complications.

VI157-ED-X

Interventional Radiology Management of Latrogenic Gastrointestinal Hemorrhages

All Day Room: VI Community, Learning Center

Participants
Vidya Bhargavi, MBBS, Bangalore, India (*Presenter*) Nothing to Disclose
Indusekhara Subbanna, DMRD, MD, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose
Aakash P. Patel, MBBS, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Prompt and timely intervention is imperative to reduce significant morbidity and mortality in iatrogenic gastrointestinal hemorrhages .The techniques of interventional radiology have not only allowed easy, safe , reliable and immediate access to the source of bleeding but also in cessation of bleeding.

TABLE OF CONTENTS/OUTLINE

Introduction :Iatrogenic gastrointestinal hemorrhages are being increasingly recognized and is a life threatening condition with major concern.Emphasis is now on interventional radiology both as a diagnostic and therapeutic tool.Materials and methods :Retrospective review of past 3 years. Study population: 6 patients referred to our department of interventional radiology with acute gastrointestinal hemorrhage secondary to an iatrogenic cause for localization of the bleeding site and its therapeutic management. Case presentations :We present a spectrum of cases with gastrointestinal hemorrhages from various iatrogenic causes and from different sources of bleeding. The role and the techniques of interventional radiology involved in identification and cessation of bleeding will be enumerated in these series of cases.

VI160-ED-X

Enhancing Radiofrequency Ablation with Contrast-Enhanced Ultrasound

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Emily Pang, MD, Vancouver, BC (*Presenter*) Nothing to Disclose
Alison C. Harris, MBChB, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Stephen G. Ho, MD, Vancouver, BC (*Abstract Co-Author*) Medical Advisory Board, Boston Scientific Corporation

TEACHING POINTS

Review the background, procedural technique and optimal settings for performing contrast-enhanced ultrasound (CEUS), with a particular focus on CEUS in concert with radiofrequency ablation (RFA) in the liver and kidney. Illustrate situations in which CEUS can add utility to ultrasound-guided RFA, with case examples. Describe the general pitfalls and limitations of CEUS in well as in the context of RFA.

TABLE OF CONTENTS/OUTLINE

Introduction (Contrast ultrasound agents, mechanism of action, radiofrequency ablation overview) Technique (CEUS imaging method, ultrasound settings, injection and imaging timing optimization) Utility in ultrasound-guided RFA with focus on liver and kidney Improving lesion visibility Detecting and targeting recurrence Post-procedure assessment of residual disease Imaging in renal failure Other: concurrent biopsy of viable tumor, pre-procedural upstaging Pearls, Pitfalls, and Limitations (expected findings post-treatment on CEUS, CEUS Artifacts, limitations of CEUS technique) CEUS guided RFA in the literature

VI161-ED-X

Using Transradial Arterial Access for Non-coronary Diagnostic and Interventional Procedures-What Radiologists Must Know

All Day Room: VI Community, Learning Center

Participants
Amir Talebi, MD , Los Angeles, CA (*Presenter*) Nothing to Disclose
Ilya Lekht, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Using transradial arterial access for interventional procedures has been widely accepted in the cardiology community dating back to 1989, however this approach has not been able to gain as much popularity amongst the radiology community. Lack of adequate transradial training and paucity of clinical studies with this method are of the most common reasons given for this lack of popularity. The aim of this exhibit is to enhance the knowledge of pertinent normal and variant anatomy in performing transradial approach interventions. We will provide a review of the patient preparation, patient selection and proper techniques needed to perform such procedures. We will also depict a wide spectrum of the interventions that can be done via this method and aim to re-introduce this approach as a safe alternative to the traditional transfemoral approach in performing interventional procedures.

TABLE OF CONTENTS/OUTLINE

1. Introduction to transradial arterial access2. Advantages and pitfalls of transradial arterial access3. Overview of pertinent normal and variant anatomy4. Patient preparation, post procedural management and proper techniques5. Important role of ultrasound guidance in transradial access and patient selection.6. Spectrum of applicable interventions with introduction of transradial access in interventions above the aortic arch

VI162-ED-X

Thyroid Ablation: History, Current Use, and Future Developments

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Siavash Behbahani, MD, Mineola, NY (*Presenter*) Nothing to Disclose
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Rishi Chopra, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Dov Bechhofer, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Jason C. Hoffmann, MD, Mineola, NY (*Abstract Co-Author*) Consultant, Merit Medical Systems, Inc; Speakers Bureau, Merit Medical Systems, Inc

TEACHING POINTS

1. Despite the fact that most thyroid nodules are benign, many patients seek treatment due to subjective symptoms, cosmetic reasons, and/or for treatment of potential malignancy.2. Interventional radiology may begin to play a larger role in management of thyroid nodules and/or goiter, as ablation may have an increasing role in management of select patients in the future.3. An understanding of the current role and future applications of ablation in management of thyroid nodules is important for interventional radiologists to effectively work as a member of the endocrine surgical team.

TABLE OF CONTENTS/OUTLINE

-Review the etiology and pathophysiology of solitary thyroid nodules and thyroid goiter, as well as indications for treatment-Discuss the current and future role that interventional radiologists can have in managing these conditions-Review the relevant literature on this topic, including discussion about what procedures are currently offered in the U.S. versus Europe and Asia-Treatment options discussed include (but are not limited to):-Active surveillance-Surgical resection-Percutaneous ethanol ablation-Laser ablation-Thermal ablation (radiofrequency, microwave, and cryoablation)-Summarize the current role of ablative technologies in the management of thyroid abnormalities in the U.S., including future directions/developments

VI163-ED-X

Hitting the Bull's Eye: Vascular Interventions in Obstetrics Emergencies

All Day Room: VI Community, Learning Center

Participants
Sheragaru H. Chandrashekhara, MD, New Delhi, India (*Presenter*) Nothing to Disclose
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Anuradha Singh, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Mukesh K. Yadav, MBBS, MD, Chandigarh, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Indications of endovascularembolization in obstetrics emergenciesComplications

TABLE OF CONTENTS/OUTLINE

Endovascular interventions are emerging as an ever increasing need in managing obstetric emergencies marking a paradigm shift toward non operative approach. Traditionally reserved for pelvic injuries and uterine fibroid , these radiological interventions are now being used for the definitive management of post partum haemorrhage (PPH) ,uterine arteriovenous malformations and pseudoaneurysm. Prophylcatically, these have been used in anticipated control of PPH in placental abnormalities like placenta accrete/percreta orprevia and to reduce intra-operative blood loss in pelvic malignancies. Rapid recovery further reduces the risk of co-morbidities like infections and thromboembolic events.The exhibit will include the following contents.**Indication of endovascular embolization in obstetrics emergenciesTherapeutic**Post partum haemorrhage
Arteriovenous malformation
Pseudoaneurysm **Prophylactic**Abnormal placentation like placenta previa or accrete/percreta
Pelvic malignancies **Complications of endovascular interventions**

VI164-ED-X

Percutaneous Arterial Embolization: A Review of Current Applications in the Female Pelvis

All Day Room: VI Community, Learning Center

Participants
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Philippe A. Soyer, MD, PhD, Paris, France (*Abstract Co-Author*) Consultant, Guerbet SA;

TEACHING POINTS

The purpose of this exhibit is:1. To review the most common but also unusual indications of percutaneous arterial embolization (PAE) in the female pelvis.2. To describe the technique for PAE in the female pelvis depending on the specific indication3. To explain the rationale for the most appropriate PAE technique in each indication and depict the corresponding angiographic features.

TABLE OF CONTENTS/OUTLINE

1. Vascular approach and occluding agents for PAE in the female pelvis.2. Indications for PAE in the female pelvis3. Description of pre and post PAE angiographic findings4. Tips and tricks for a safe PAE depending on the specific angiographic situation including postpartum hemorrhage (uterine atony, laceration, retained placenta, abnormal placentation pseudoaneurysms), arterio-venous malformations, pelvic bleeding after curettage, adenomyosis, uterine leiomyoma, ectopic pregnancy, and malignant pelvic tumors.

VI165-ED-X

How ' Sound' is your Radiology!? A Residents Guide to Classic Sonographic Appearances of Important Vascular Conditions of the Abdomen

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

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James T. Lee, MD, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose
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Scott D. Stevens, MD, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose
Adrian A. Dawkins, MD, Lexington, KY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the importance of Ultrasound as an important non-invasive, non-ionizing imaging toolTo review some of the classical sonographic features of important vascular conditions of the abdomen and pelvis which would serve a useful review for the radiology trainee as well as the practising radiologist

TABLE OF CONTENTS/OUTLINE

Discuss the utility of ultrasound as a valuable tool in the evaluation of intraabdominal vasculature.Review some of the classic sonographic features of important vascular conditions in the abdomen and pelvis.Highlight several examples with correlating CT /MRI / Angigraphic findings which would serve as a guide to the trainee as well as a refresher to the practising radiologist.Summary

VI166-ED-X

Imaging Review of Vasculitis

All Day Room: VI Community, Learning Center

Participants

Franco Verde, MD, Baltimore, MD (*Presenter*) Nothing to Disclose
Elliot K. Fishman, MD, Baltimore, MD (*Abstract Co-Author*) Institutional Grant support, Siemens AG; Institutional Grant support, General Electric Company;

TEACHING POINTS

Vasculitis is a disease entity that may be initially diagnosed by the radiologist who should be able to categorized and give a differential for large and medium vessel vasculitis.Manifestations may be mild to extensive vascular involvement with end-organ injuryThe reader should be aware of the current nomenclature and name changes.

TABLE OF CONTENTS/OUTLINE

A. Introduction B. Nomenclature and definitions 2012 CHCC nomenclature changes Large-vessel Takayasu arteritis Giant cell arteritis Medium-vessel Polyarteritis nodosa Kawasaki disease Small-vessel ANCA-associated vasculitis: MPA, GPA, EGPA Immune complex small-vessel vasculitis: anti-GBM, CV, IgAV, anti-C1q Variable-vessel Behcets disease Cogan's syndrome Single-organ Vasculitis associated with systemic disease Lupus Rheumatoid Sarcoid Vasculitis associated with probable etiology Hepatitis B/C Syphilis Drug associated Cancer associated Diagnostic approach History, physical exam, and laboratory testing Role of imaging Imaging case based approach Summary of vasculitis Summary of important imaging findings Conclusion

Honored Educators

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

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

VI167-ED-X

Embolization for Type 2 Endoleak with Sac Expansion after Endovascular Repair of Abdominal Aortic Aneurysms

All Day Room: VI Community, Learning Center

Participants

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TEACHING POINTS

1. Endovascular aneurysm repair (EVAR) has become an effective alternative to open surgery for abdominal aortic aneurysms.2. Post-EVAR endoleaks are classified into 4 types based on their cause. Type 2 endoleaks (T2EL) are the most common complication. Blood enters the aneurysm through a circuitous route and retrogradely flows into the aneurysm sac. Only an increase in the aneurysmal size necessitates intervention in patients with T2EL.3. The safe and effective treatment of T2EL requires skill and cognizance of treatment options. The endpoint of treatment in patients with T2EL with sac expansion is to arrest expansion rather than to eliminate T2EL.

TABLE OF CONTENTS/OUTLINE

1. Classification of endoleak after EVAR2. Imaging studies (CT arteriography, angiography) of T2EL3. Indications for the treatment of T2EL4. Current T2EL treatment methods: Tips for and pitfalls of embolization5. Complications after treatment for T2EL

VI168-ED-X

Evolving Role of Interventional Radiology in the Management of Emergent Obstetrical Conditions

All Day Room: VI Community, Learning Center

Participants
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TEACHING POINTS

• Interventional radiology plays a key role in the multidisciplinary approach to management of obstetrical emergencies.
• Etiologies of emergent obstetrical hemorrhage include postpartum uterine atony and genital tract lacerations, placental implantation abnormalities, uterine rupture, ectopic pregnancy, arteriovenous malformations, coagulopathies, and iatrogenic injury.
• Pelvic angiography delineates the site of active extravasation while selective transcatheter embolization allows for control of hemorrhage with very low incidence of complications.
• Increasing incidence of cesarean sections has led to a rise in placental implantation abnormalities. Interventional techniques such as prophylactic intraoperative internal iliac artery balloon occlusion, catheterization, and postoperative uterine artery embolization can allow for uterine preservation in women with abnormal placental attachment undergoing scheduled cesarean delivery.

TABLE OF CONTENTS/OUTLINE

• Pelvic anatomy, vascular supply, and common anatomic variations
• Emergent and pre-operative clinical indications requiring endovascular intervention, patient outcomes, and review of cases
• Technical considerations of endovascular techniques
• Emerging role of interventional radiology in the realm of obstetrical emergencies

VI169-ED-X

Endovascular Management for Bowel Ischemia: Current Technique and Key CT Findings of Judgment of Treatment Option

All Day Room: VI Community, Learning Center

Participants

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Makoto Wakamiya, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Bowel ischemia is caused by various types of primary mesenteric ischemia including arterial occlusion, venous occlusion and non-occlusive mesenteric ischemia, as well as, strangulation.Managements for these challenging conditions consist of revascularization either by endovascular treatment or surgery, resection of infarcted bowels and medical therapy for prevention of recurrence.Endovascular revascularization in this clinical setting is a relatively new approach applied only in patients without bowel infarction and varieties of technique are applied depending on the etiologies and clinical conditions. To understand the major etiologies of bowel ischemia. To know key CT findings for assessment of bowel viability for choice of treatment options. To learn current technique and outcome of endovascular treatments.

TABLE OF CONTENTS/OUTLINE

General consideration of bowel ischemia in various etiologies; incidence, clinical background and CT findings. Demonstration of key CT findings for assessment of bowel viability for choice of treatment options. Demonstration of current technique and outcome of endovascular treatments. *Arterial embolism
*Arterial thrombosis
*Venous thrombosis
*Non-occlusive mesenteric ischemia Discussion of choice of treatment and limitation

VI170-ED-X

How to Stop the Itch: IR Management of Benign versus Malignant Biliary Strictures

All Day Room: VI Community, Learning Center

Participants
Michael Heller, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
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Mark W. Wilson, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The Purpose of this Exhibit is: To understand the epidemiology, clinical presentation and imaging findings of benign and malignant biliary strictures. To discuss imaging work-up for the most common causes of benign and malignant biliary strictures. To summarize the role of interventional radiology in diagnosing and managing benign and malignant biliary strictures. To discuss the role and indications for stenting strictures.

TABLE OF CONTENTS/OUTLINE

Brief review of normal biliary anatomy, with emphasis on non-invasive (MRI, CT, US) and minimally invasive (PTC, ERCP) imaging modalities. Discussion of clinical presentation and imaging characteristics of benign biliary strictures, such as iatrogenic (post-Y90, -transplant, -cholecystectomy) and PSC, as illustrated via case vignettes. Discussion of clinical presentation and imaging characteristics of malignant biliary strictures as illustrated through case vignettes. Overview of available treatment options for each, with a specific focus on indications, patency rates, and efficacy.

VI171-ED-X

A Pictorial Review of Iliac Vein Diseases

All Day Room: VI Community, Learning Center

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

TEACHING POINTS

The purpose of this exhibit is:To know embryology and normal anomaly of iliac veinTo know imaging findings of congenital anomaly and acquired iliac vein diseases.3. To know differential diagnosis4. To know management of iliac vein diseases.

TABLE OF CONTENTS/OUTLINE

1. Embryology and normal anomaly of iliac vein2. Congenital anomaly and acquired iliac vein diseases.3. Differential diagnosis4. Management of iliac vein diseases.5. Illustrative cases- Review of imaging of embryology and normal anomaly of iliac vein- Review of imaging findings of congenital anomaly and acquired iliac vein diseases.- Differential diagnosis- Management of iliac vein diseases.4. Discussion5. Summary

VI172-ED-X

Thoracic Interventions for the Non-interventionalist: What the Diagnostic Radiologist Should Know

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Rahmat Ali, MD, New Haven, CT (*Presenter*) Nothing to Disclose
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Christopher R. Ingraham, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Demetrius L. Dicks, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Interventional radiologists (and some thoracic radiologists) perform a large number of intrathoracic procedures including lung and mediastinal biopsies, pleural drain placement, thrombolysis for hemodynamically significant large pulmonary emboli, bronchial artery embolization for massive hemoptysis and pulmonary radiofrequency ablation. This pictorial essay reviews indications, expected post-procedure imaging appearance and complications of commonly performed interventional thoracic procedures.

TABLE OF CONTENTS/OUTLINE

1. An overview of the common intrathoracic abnormalities requiring minimally invasive procedures such as, pleural effusions, pulmonary embolism, pulmonary arteriovenous malformations (AVMs), hemoptysis and primary lung and secondary thoracic malignancies.
2. Diagnosis and management of these abnormalities.
3. Discuss the common intrathoracic therapeutic procedures performed by interventional radiologists such as, Pleural drain placement, pulmonary embolotherapy, pulmonary AVMs coiling, bronchial artery embolization, lung cancer radiofrequency ablation.
4. Current guidelines and indications for these minimally invasive procedures.
5. Describe expected post-procedural imaging findings and potential complications of the above-mentioned procedures.

VI173-ED-X

Radioembolization: An Ally Therapy in Advanced Neuroendocrine Tumors

All Day Room: VI Community, Learning Center

Participants
Meylin Caballeros, MD, Pamplona, Spain (*Presenter*) Nothing to Disclose
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Maria Paramo Alfaro, MD, Pamplona, Spain (*Abstract Co-Author*) Nothing to Disclose
Jose I. Bilbao, MD, PhD, Pamplona, Spain (*Abstract Co-Author*) Proctor, Sirtex Medical Ltd

TEACHING POINTS

1.To review the description, classification and prevalence of neuroendocrine tumors (NET). 2.To assess the indications and exclusion criteria of intra-arterial treatments in advanced NET.3.To compare the advantages of radioembolization and other intraarterial techniques in NET´s liver metastases.4.To review the treatment planning before radioembolization.5.To describe the radioembolization procedure using Yttrium-90 microspheres.6.To explain the possible complications of this technique.7.To analize the predictive factors of response.

TABLE OF CONTENTS/OUTLINE

A. Introduction. Definition. Classification according to WHO. Prevalence.B. Indications of intra-arterial treatments. C. Exclusion criteria.D. Advantages of radioemboliztion (RE) over bland embolization (TAE) and chemoemboliztion (TACE). RE aims for a more durable and less toxic impact by loading larger embolic beads that is then released slowly mainly into the hepatic parenchyma, with less systemic exposure.E. Radioembolization technique description. F. Treatment planning. Preprocedual evaluation with technetium 99m-labeled macroagregated albumin. SPECT. Lung shunt fraction. PET-CT after RE.G. Complications. H. Outcomes and representative cases

VI174-ED-X

Freezing and Frying Renal Cancers: An Imaging Menu for Radiologists to Understand Intra- and Post-Procedural Imaging Findings after Renal Tumor Ablation

All Day Room: VI Community, Learning Center

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

TEACHING POINTS

1. To review imaging findings during different forms of ablation of renal cell carcinoma (RCC) with the various imaging modalities.
2. Key surveillance image findings and how to define imaging characteristics of successful ablation.
3. Define signs of tumor recurrence seen at longitudinal follow-up.

TABLE OF CONTENTS/OUTLINE

1. Ablative techniques and intra-procedural image findings in cryoablation, radiofrequency, microwave ablation, and irreversible electroporation.
2. Post-procedural imaging protocols for CT, MRI, contrast-enhanced ultrasound, and conventional ultrasound
3. Surveillance imaging and findings immediately after ablation and up to one year longitudinal follow-up4. Definition of successful outcomes
5. Signs of recurrence
6. Role of biopsy after ablation

VI175-ED-X

MDCT Veno-Fistulogram in Haemodialysis Access Fistula: Here Complications are the Rule!

All Day Room: VI Community, Learning Center

Participants
Madhav Hegde, MD, Bangalore, India (*Presenter*) Nothing to Disclose
Ganesh Hegde, MBBS, DMRD, hyderabad, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1.To know briefly about the techniques ,types and sites of upper limb haemodialysis access fistulas in upper limb.2.To understand that ultrasound and Doppler are the most commonly used techniques to assess fistulas although,MDCT veno-fistulo gram is being frequently used in this scenario.3.To learn that MDCT is better in detecting abnormalities of veins in proximal arm,neck.It also provides better imaging data to plan for treatment procedures of complications.4.To acquaint radiologists the limitations of the technique in demonstrating superficial veins,and in ischemic steal phenomenon

TABLE OF CONTENTS/OUTLINE

1. Anatomy of veins arteries,important variants.2.Types of hemodialysis access fistulas:Brachio-cephalic,brachio basilic,grafts.3.Technique :Timing and planning,contrast quantity and flow rate,position of the limb,double lumen catheter.4.Indications : Diffuse limb edema,difficulty during hemodialysis,focal swelling ,arterial ischemia,compartment syndrome.5.Data available before and after the study6.Complications:6.1Superficial vein stenosis,occlusion,aneurysm 6.2Aneurysm from arteries.6.3stenosis,occlusion,thrombus of deep veins, neck veins 6.4Cardiac 7.Treatment option:7.1Percutaneous thrombolysis,venous stenting,surgical interventions 7.2Complications of stenting:Restenosis,occlusion,fracture of stent

VI176-ED-X

A New Method about a Diagnosis of the in-Stent Stenosis after the Carotid Artery Stenting (CAS)

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

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Yasuo Nakazawa, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

New scan method in the restenosis diagnosis in the stent. Utility of DECT in the diagnosis.

TABLE OF CONTENTS/OUTLINE

Problems in the restenosis diagnosis Basic examination Visual evaluation Further examination in Dual Energy CT Examination in the clinic Conclusion

VI177-ED-X

Feasibility of Thoracic Aorta Computational Modeling in Clinical Practice

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
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Giuseppe Mamone, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose
Angelo Luca, MD, Palermo, Italy (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- To explain computational modeling methodology - To analyze clinical advantages and disadvantages- To identify a clinical validation strategy

TABLE OF CONTENTS/OUTLINE

1 ECG-gated CT Angiography technique2 From CT scan to patient specific computational model of Thoracic Aorta 3 Model-derived hemodynamic and biomechanical variables 4 Limiting factors for routine clinical use5 “In vivo” assessment of Thoracic Aorta: the role of Magnetic Resonance6 Validation strategy to overcome limiting factors

VI178-ED-X

Technique of Percutaneous Direct Needle Puncture of Calcified Plaque (PIERCE Technique) in Superficial Femoral and Tibial Arteries

All Day Room: VI Community, Learning Center

Participants
Tomoyasu Sato, Hiroshima, Japan (*Presenter*) Nothing to Disclose
Shigeo Ichihashi, MD, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

A new recanalization method for heavily calcified arteriosclerotic lesions is presented.

TABLE OF CONTENTS/OUTLINE

According to the improvement of the result of angioplasty, angioplasty plays an important role in the treatment of PAD. Angioplasty sometimes fails due to massive calcifications especially in the hemodialysis patients. Even if guidewire passed the target lesion successfully, we sometimes can not advance the other devices such as microcathters or balloon catheters, or we can not dilate the target lesion because to the calcifications.
To deal with such problems, we developed a novel method of percutaneous direct needle puncture of calcified plaque (PIERCE) technique. This technique was invented to make cracks in the calcified plaques using percutaneous needle puncture, and we can obtain device crossing and favorable dilatation of the lesions.
Precise procedure of this technique will be presented. After local anesthesia, calcified plaque was directly punctured using 16-18 G needle under fluoroscopic guidance. Puncture was done several times at another level of the lesions. Though puncture was done in the severely diseased arteries, hemostasis was obtained after 5 to 10 minutes of balloon dilatation at the puncture site. This technique would be safe, effective and extreamly low cost.

VI179-ED-X

Interventional Angiography and Thrombectomy of Fulminant Pulmonary Embolisms in Patients Primarily Unsuited for Conventional Intravenous Anticoagulation Treatment

All Day Room: VI Community, Learning Center

Participants
Alexej Titschert, Bochum, Germany (*Presenter*) Nothing to Disclose
Arnd G. Felten, MD, Karlsruhe, Germany (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) Indications and (new) percutaneous treatment options in patients with severe pulmonary embolism.2) To understand that treatment outcome should be correlated with vital parameters (e.g. blood pressure) local parameters (e.g. pulmonary artery pressure) therapeutic parameters (e.g. catecholamine dosage).

TABLE OF CONTENTS/OUTLINE

A. Overview/Incidence of Pulmonary EmbolismB. Diagnostic ImagingD. Review of Therapeutic Options and IndicationsE. Initial Treatment (Thrombectomy techniques)F. Outcomes

VI180-ED-X

CT-guided Interventions Using MDCT-fluoroscopy: Evaluation of the Radiation Dose Received by Patients and Physicians

All Day Room: VI Community, Learning Center

Participants

Yohei Inaba, PhD, Sendai, Japan (*Presenter*) Nothing to Disclose
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Isao Yanagawa, Sendai, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

-To understand the utility of MDCT-fluoroscopy in CT-guided interventions-To emphasize the importance of evaluating the occupational dose, especially the eye dose, in MDCT-guided intervention-To understand radiation-protection and -reduction methods for the patient and physician in MDCT-guided interventions

TABLE OF CONTENTS/OUTLINE

Evaluation of radiation dose in numerous MDCT-guided interventionsRadiation exposure to the physician and staff were measured using multiple personal dosimeters.Relationships among dose-related factors (CTDI, DLP *etc.*) and physician doses were investigated.The radiation doses of bone biopsies and soft tissue biopsies were compared. ***Reducing the radiation in CT-guided interventions***Use lead drapes, *etc.* **OUTLINE:** The clinical benefits of MDCT-guided interventions are clear, and these procedures are increasing in number. In CT-guided interventions, procedure instruments, such as biopsy needles, are used under CT-fluoroscopic control, including CT acquisition. Consequently, the radiation dose to the patient, physician, and staff is a significant issue. Furthermore, the physician and staff are at high risk of radiation-induced eye injury (cataracts). In CT-guided interventions, physicians are close to the source of scattered radiation. Thus, dose-reducing measures for physicians are important.

VI181-ED-X

CT Assessment of Aortic Diameters: What Radiologists Should Know

All Day Room: VI Community, Learning Center

Participants
Sara Boccalini, MD , Genova, Italy (*Presenter*) Nothing to Disclose
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Gabriel P. Krestin, MD, PhD, Rotterdam, Netherlands (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Bayer AG; Research Grant, Siemens AG; Consultant, Bracco Group; Scientific Advisor, Zebra Medical Vision Ltd; Advisory Board, Quantib BV
Ricardo P. Budde, MD, PhD, Utrecht, Netherlands (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

A precise assessment of aortic diameters is one of the main goals of CT examinations of the aorta and important decisions regarding patient management are based on these measurements or their change in time. However there is still no universally accepted and standardized method to derive diameters in clinical practice resulting in different and numerous techniques and measurements variability Aortic anatomy, common sites of measurement and different measurement methods will be described as well as CT acquisition protocols, including the role of ECG-gating and the latest technological improvements on CT scanners and analysis software

TABLE OF CONTENTS/OUTLINE

Pathological conditions that require a precise assessment of aortic diameter Diameter thresholds for intervention Aortic anatomy and sites of measurements CT acquisition protocols to study the aorta, with and without ECG-gating, and the impact of technological developments of the latest generation CT scanners Different manual, semi-automated and fully automated measurement techniques and their advantages and limitations and the consequences of their use on every-day workflow Changes in aortic root morphology during the cardiac cycle and how this effects measurements with ECG-gating Implications of conditions that are associated with a thickening of the aortic wall

VI182-ED-X

Pulmonary Arteriovenous Malformations: Diagnosis and Treatment

All Day Room: VI Community, Learning Center

Participants
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Alan C. Legasto, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Cameron Hassani, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Judith K. Amorosa, MD, Somerville, NJ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

TEACHING POINTS1. Learn the embryology, pathophysiology and classification of pulmonary arteriovenous malformations (PAVM)2. Review the multimodality imaging characteristics of PAVMs and how they relate to the clinical presentation3. Describe PAVMs diagnostic workup, treatment, post-interventional management and complications

TABLE OF CONTENTS/OUTLINE

TABLE OF CONTENTS/OUTLINEPulmonary arteriovenous malformations (PAVM) are a relatively rare entity that have taken on special clinical significance because of their association with cerebrovascular and other systemic pathologies. PAVMs are often clinically asymptomatic but are commonly associated with hereditary hemorrhagic telangiectasia (HHT) which has a distinct set of clinical findings. Imaging is paramount in the diagnosis of PAVMs, therefore, radiologists (diagnostic and interventional) play a central role in the workup and treatment. After a review of the embryology, anatomy and classification, cases are presented to highlight the imaging appearances on CXR, CT and angiography. Diagnostic and therapeutic angiography is described with an emphasis on treatment planning. An understanding of the pathophysiology, clinical presentation, imaging characteristics and therapeutic options are important for successful management.

VI184-ED-X

Critical Interactions of Systemic Therapies and Liver-Directed Treatment

All Day Room: VI Community, Learning Center

Participants

Andrew Sideris, New York, NY (*Presenter*) Nothing to Disclose
Hearns W. Charles, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Lawrence Leichman, New York, NY (*Abstract Co-Author*) Nothing to Disclose
James Park, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Amy R. Deipolyi, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the commonly used systemic chemo- and immune therapies for primary and secondary liver malignancy To discuss which systemic therapies must be dose-modified or withheld during hepatic embolization, due to concern for liver failure To describe how specific systemic therapies can potentiate the effect of liver-directed therapy by sensitizing tumor cells to locoregional treatments

TABLE OF CONTENTS/OUTLINE

Primary immune and chemotherapies of most common tumors encountered in the liver Primary liver malignancy Hepatocellular carcinoma Cholangiocarcinoma Metastatic liver malignancy Colorectal cancer Others (breast, melanoma, lung, neuroendocrine) Types of systemic therapies Chemotherapy Hormones and hormone inhibitors Biological therapy/immunotherapy Indications to hold or dose-reduce systemic therapies while locoregional liver-directed therapy is performed Wound-healing Arterial changes Liver failure Techniques to enhance effect of liver-directed therapies with complementary systemic therapies Radiosensitization

VI185-ED-X

Percutaneous Drainage in Infected Necrotizing Pancreatitis: First (and May Be Last) Step of Treatment and Reference Guide for Further VARD

All Day Room: VI Community, Learning Center

Participants
Ander Zugazaga Cortazar, MD, Barcelona, Spain (*Presenter*) Nothing to Disclose
Aleksandar Radosevic, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Fernando Bazan, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Guadalupe Aguilar, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Juan Sanchez, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Ana Sierra, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Marcos Busto, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Jose Maria Maiques LLacer, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Ignasi Poves, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

- To familiarize the radiologists with the recent surgical techniques considering infected necrotizing pancreatitis (with special attention to video-assisted retroperitoneal debridement - VARD)- To review the technical aspects of image-guided percutaneous access for peri/pancreatic collections

TABLE OF CONTENTS/OUTLINE

Infected necrosis is the main indication for invasive intervention in acute necrotizing pancreatitis. Recent guidelines state that percutaneous catheter drainage should be the first step in the treatment of infected necrosis and surgery is preferably delayed up to 4 weeks. In around 30% of patients percutaneous drainage obviates the need for surgery. In case surgery is needed percutaneous drainage may be used as a reference guide for minimally invasive techniques as VARD.Severe acute and necrotizing pancreatitis requires a multi-disciplinary treatment strategy that must be individualized for each patient. Minimally invasive procedures combine image-guided percutaneous drainage and video-assisted retroperitoneal debridement. Therefore it is of the utmost importance for radiologist to be familiarized with this techniques.

VI186-ED-X

CT-guided Infiltrations in Refractory Pelvic Pain Syndromes: When, Why and How?

All Day Room: VI Community, Learning Center

Participants
Adrian I. Kastler, MD, MSc, Grenoble, France (*Presenter*) Nothing to Disclose
Bruno A. Kastler, MD, PhD, Besancon, France (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1- Pelvic pain syndromes are often refractory to specific pain medications and are debilitating conditions with possible high socio economic impact. Existing treatment options are sparse and patients eventually develop chronic refractory pain
2- CT guided infiltration of inguinofemoral, pudendal nerves, interiliac sympathetic plexus, hypogastric plexus and impar ganglion are procedures which should be known by the interventional radiologist, as they have both a diagnostic and therapeutic value
3-The objectives are to describe the prerequisites to perform successful CT-guided pelvic interventional procedures

TABLE OF CONTENTS/OUTLINE

A Anatomical background : What is mandatory ?B Pelvic pain: what the radiologist must know.C Possible Differential diagnosis and Pre-procedure Imaging Assessment : When not to perform pelvic infiltration ?D Why is CT an ideal guiding tool E CT guided infiltration. Pros and Cons, How to do it. Tips and tricks on how to increase procedure effectiveness ?E What to expect of pelvic pain nerve infiltration in 2016 : Results and controverseF What about RF neurolysis ?F Take home messages

VI187-ED-X

Development of the Real-time Multi Slices CT-NAB Navigation System Using Color and Sound Information

All Day Room: VI Community, Learning Center

Participants
Katsumi Tsujioka, PhD, Toyoake-City, Japan (*Presenter*) Nothing to Disclose
Masayoshi Niwa, RT, Toyoake, Japan (*Abstract Co-Author*) Nothing to Disclose
Toshihiko Yamagiwa, Toyoake-City, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoichi Tomita, Toyoake-City, Japan (*Abstract Co-Author*) Nothing to Disclose
Hironori Otsubo, RT, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose
Keita Akebo, RT, Toyoake, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Real-time multi slices CT-NAB using the CT fluoroscopy is useful for clinical study. However, it was difficult to understand the position of the needle tip of the Z-axis direction immediately. We developed new CT-NAB navigation system using color and sound information to solve this problem.

TABLE OF CONTENTS/OUTLINE

Content (1)Development of the real-time multi slices CT-NAB system using the color information. (2)Development of the real-time multi slices CT-NAB system using the sound information. (3)Evaluation using the phantom. (4)Evaluation using the past clinical data. Conclusion (1)We were able to easily perform CT-NAB speedily by using color information. (2)We were able to prevent the enforcement of wrong CT-NAB by using sound information. (3)By our new system, the precision of CT-NAB improved. (4)The radiation exposure dose of patient and operator for CT-NAB decreased.

VI188-ED-X

Post Procedural CT Angiography: Sweet and Sour Scenarios! What Does Surgeon Want to Know? What Does Radiologist Need to Know?

All Day Room: VI Community, Learning Center

Participants
Madhav Hegde, MD, Bangalore, India (*Presenter*) Nothing to Disclose
Ganesh Hegde, MBBS, DMRD, hyderabad, India (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1.To know the importance of immediate post procedural imaging and follow up imaging 2.To learn basic principles of common cardio vascular open surgeries so as to make interpretation easier3.To understand important complications of common open cardiovascular surgeries 4.To appreciate the complications of percutaneous interventional procedures

TABLE OF CONTENTS/OUTLINE

1.Review of principles of common cardiovascular surgeries. CABG,Bentall procedure,by pass grafts2.Post surgical imaging Immediate post operative period,early and late follow up period.3.Generic post operative complications 3.1General like PE,stroke,haemorrhage. 3.2.Fluid collection,pneumonia.4.Surgery specific complications.5.Percutaneous interventional procedures General and specific complication Complications due to medication6.Puncture site haematoma,pseuodo aneurysm,arterio venous fistula.7.In stent restenosis,stent occlusion,stent displacement,fracture.8.Technical customisation of CT angiogram technquesPost CABG ,Fontan procedure,delayed acquisition of images.

VI189-ED-X

Role of Radiologists in Diagnosis and Management of Varicocele

All Day Room: VI Community, Learning Center

Participants
Ramez N. Abdalla, MBBCh, MSc, Cairo, Egypt (*Presenter*) Nothing to Disclose
Khaled O. Shehata, MBBCh, MSc, Cairo, Egypt (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To understand the venous drainage of the testis and its anatomical variants. To understand the Diagnosis and grading of varicocele by ultrasound and color Doppler. To understand the indications, limitations , technique and complications of varicocele embolization.

TABLE OF CONTENTS/OUTLINE

IntroductionAnatomy of testis and venous drainage and its anatomic variantsPathology of varicocele and its effect on fertilityDiagnosis of VaricoceleVaricocele embolization Preparation Patient selection Embolization technique Complications Aftercare and followup Embolization vs. surgeryTake home points

VI190-ED-X

Percutaneous Vertebroplasty for Malignant Disease

All Day Room: VI Community, Learning Center

Participants
Karl H. Schuleri, MD, Darby, PA (*Presenter*) Nothing to Disclose
Aliaksei Salei, MD, Darby, PA (*Abstract Co-Author*) Nothing to Disclose
Oleg Teytelboym, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Salmi Simmons, MD, Darby, PA (*Abstract Co-Author*) Nothing to Disclose
Sergiy Kushchayev, MD, Darby, PA (*Abstract Co-Author*) Nothing to Disclose
Gerard T. Berry JR, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Become familiar with the indication and contraindication for percutaneous vertebroplasty in malignant disease. Provide practical tips for performing percutaneous vertebroplasty. Describe the complication and limitation in malignant disease. Discuss the evolving role and importance of combination therapy. Highlight benefits, limitations and pitfalls of percutaneous vertebroplasty

TABLE OF CONTENTS/OUTLINE

Introduction Indication Metastatic Disease Multiple Myeloma Contra-indication Absolute Relative Pre-procedure Imaging Procedure and Technical Aspect Practical Approach Complications Post-procedure Imaging Combination Therapy Chemotherapy Radiation therapy Timing Benefits, Limitations and Pitfalls

VI191-ED-X

Modified BRTO Techniques for the Treatment of Gastric Varices: Balloon-occluded Antegrade Transvenous Obliteration (BATO)/ Vascular Plug-assisted Retrograde Transvenous Obliteration (PARTO)/ Coil-Assisted Retrograde Transvenous Obliteration (CARTO)

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Seung Kwon Kim, MD, Saint Louis, MO (*Presenter*) Consultant, Cook Group Incorporated
Carlos J. Guevara, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
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Auh-Whan Park, ANN ARBOR, MI (*Abstract Co-Author*) Nothing to Disclose
David J. Kim, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Edward W. Lee, MD, PhD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To know the basic BRTO techniques To know the modified BRTO techniques: BATO, PARTO, CARTO To present interesting cases of BRTO and modified BRTO techniques.

TABLE OF CONTENTS/OUTLINE

Pathophysiology of Gastric varices Basic BRTO techniques Balloon-occluded antegrade transvenous obliteration (BATO) techniques Vascular plug-assisted retrograde transvenous obliteration (PARTO) Coil-assisted retrograde transvenous obliteration (CARTO) Interesting cases

VI192-ED-X

Internal Iliac Artery Balloon Occlusion prior to Cesarean Hysterectomy for Abnormal Placentation: Rationale and Technique

All Day Room: VI Community, Learning Center

Participants

Ansar Z. Vance, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Assaf Graif, MD, Newark, DE (*Abstract Co-Author*) Nothing to Disclose
Omar Z. Chohan, DO, Newark, DE (*Abstract Co-Author*) Nothing to Disclose
Aaron L. Reposar, MD, Newark, DE (*Abstract Co-Author*) Nothing to Disclose
Mark J. Garcia, MD, Chadds Ford, PA (*Abstract Co-Author*) Boston Scientific Merit Medical
Daniel A. Leung, MD, Newark, DE (*Abstract Co-Author*) Nothing to Disclose
Christopher J. Grilli, DO, Wilmington, DE (*Abstract Co-Author*) Nothing to Disclose
Demetrios J. Agriantonis, MD, El Paso, TX (*Abstract Co-Author*) Nothing to Disclose
Samuel G. Putnam III, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To review the background and pathophysiology of abnormal placentation.2. Discuss the management options for abnormal placentation.3. Discuss the rationale for, the role of interventional radiology in, and the technique for preoperative endovascular balloon occlusion of the bilateral internal iliac arteries prior to cesarean hysterectomy for abnormal placentation with a pictorial case-based description.

TABLE OF CONTENTS/OUTLINE

A. History & Background of Abnormal Placentation 1. Epidemiology 2. Pathophysiology 3. Imaging 3. SubtypesB. Treatment Strategies & Rationale 1. Standard cesarean section 2. Cesarean section followed by empiric bilateral internal iliac artery embolization and subsequent D&C for remaining products 2. Preoperative bilateral internal iliac artery balloon placement with occlusion prior to cesarean hysterectomyC. Technique for preoperative bilateral internal iliac artery balloon placement 1. Interventional Procedure a. Femoral artery access b. Placement of sheaths and Fogarty balloons into contralateral internal iliac arteries c. Test inflation, confirmation of occlusion, and contrast measurement 2. Intraoperative Procedure a. Cesarean section b. Intraoperative fogarty balloon inflation c. Cesarean hysterectomy d. Balloon deflation, sheath removal, and groin hemostasis

VI193-ED-X

An Arm and a Leg: Gaining Purchase with Radial versus Femoral Artery Access in Percutaneous Transarterial Procedures

All Day Room: VI Community, Learning Center

Participants

Saad Hussain, MD, New Haven, CT (*Presenter*) Nothing to Disclose
Shayan Rashid, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Vivek Patel, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Mike Spektor, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Keith B. Quencer, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Discuss the advantages of radial versus femoral artery access in image guided percutaneous transarterial procedures.2. Present and discuss complications of radial and femoral arterial access.3. Discuss the barriers preventing widespread utilization of radial arterial access.

TABLE OF CONTENTS/OUTLINE

1. Radial and femoral artery access basics2. Technical advantages of the transradial approach3. Technical advantages of the transfemoral approach4. Complications of radial arterial access - Cerebral embolization/stroke - Radial artery pseudoaneurysm - Radial artery loop5. Complications of femoral arterial access - Femoral artery pseudoaneurysm - Femoral arteriovenous fistula - Femoral artery dissection - Occlusion of the superficial femoral artery resulting in limb ischemia - Post procedure hemorrhage6. Discussion of the barriers preventing more frequent utilization of the transradial approach7. Summary

VI195-ED-X

Percutaneous Translumbar Endoleak Repair: Techniques, Tips, and Pitfalls

All Day Room: VI Community, Learning Center

Participants
Daniel Burritt, MD, Worcester, MA (*Presenter*) Nothing to Disclose
Hesham H. Malik, MD, Worcester, MA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Type II endoleak is the most common complication following endovascular aortic aneurysm repair. These are dynamic entities with complex physiology and cannot always be distinctly classified by CTA. Interventional strategies vary depending on the complexity of the feeding vessels. Complete characterization of feeding vessels often occurs at the time of intervention when the endoleak sac is opacified with contrast. Furthermore, as the endoleak is repaired, the flow within the sac can be altered. Familiarization with the possible approaches to type II endoleak repair is essential to making real time decisions regarding treatment strategies. This exhibit will review the clinical workup and discuss the techniques and pitfalls from a single institution experience with percutaneous translumbar endoleak repair.

TABLE OF CONTENTS/OUTLINE

Case 1: Moderate type II endoleak with 4 lumbar arteries feeding the sac.Case 2: Moderate type II endoleak with a single lumbar artery providing both inflow and outflow.Case 3: Two separate small type II endoleaks in the same sac.Case 4: Large type II endoleak with 2 feeding ileolumbararteries and outflow to the IMA and right 3rd lumbar artery. Embolization of the ileolumbars results in inflow from the IMA.Case 5: Combination of type III/type II endoleak repair in a poor surgical candidate.

VI197-ED-X

Image Guided Approaches to Treating Pain Secondary to Primary and Metastatic Bone Tumors

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Omar Hasan, MD, New Brunswick, NJ (*Presenter*) Nothing to Disclose
Steven Calamita, BA, Jackson, NJ (*Abstract Co-Author*) Nothing to Disclose
Vyacheslav Gendel, MD, New Brunswick, NJ (*Abstract Co-Author*) Nothing to Disclose
John L. Nosher, MD, New Brunswick, NJ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review different image guided approaches in the treatment of pain related to primary and metastatic bone tumors. Mechanism, limitations, advantages as well as indications and complications will be discussed. Briefly review common presentations for osteoid osteoma and metastatic bone tumors.

TABLE OF CONTENTS/OUTLINE

Osteoid osteoma Presentation Localized pain which is worse at night and responds to non-steroidal anti-inflammatory medication. Indications Patients with refractory pain despite analgesia. Interventions Radiofrequency ablation Microwave ablation Metastatic bone tumors Presentation Insidious onset of pain localized to the lesion site. Initially intermittent, later becoming constant. Unrelenting nocturnal pain is common. Indications Pain refractory to medical management Patients who are poor surgical candidates Minimize blood loss prior to surgical resection Interventions Microwave Ablation Radiofrequency ablation Cementoplasty Cryoablation Trans-arterial embolization Alcohol ablation

VI198-ED-X

Vascular Detours: Illustration of Common Collateral Pathways in the Upper and Lower Extremities

All Day Room: VI Community, Learning Center

Participants
Omar Hasan, MD, New Brunswick, NJ (*Presenter*) Nothing to Disclose
Steven Calamita, BA, Jackson, NJ (*Abstract Co-Author*) Nothing to Disclose
Vyacheslav Gendel, MD, New Brunswick, NJ (*Abstract Co-Author*) Nothing to Disclose
John L. Nosher, MD, New Brunswick, NJ (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review of normal and variant venous and arterial anatomy in the upper and lower extremities There are large numbers of potential venous and arterial collateral pathways that can develop when there is chronic vessel occlusion. The location of the occlusion plays a role in determining which pathways develop. The purpose of this presentation is to recognize these pathways on different imaging modalities and identify the site of occlusion.

TABLE OF CONTENTS/OUTLINE

Normal and variant arterial and venous anatomy of the upper and lower extremity. Persistent sciatic artery Localization of arterial and venous collaterals depends on the level of occlusion. We will review the collateral pathways associated with the following scenarios: Upper Extremity Axillary vein occlusion Subclavian artery occlusion Radial and ulnar artery occlusion Collaterals related to arteriovenous fistulas and grafts for dialysis access Lower extremity Femoral artery occlusion Popliteal artery occlusion Peroneal artery occlusion Anterior and posterior tibialis artery occlusion Collateral pathways in chronic deep vein thrombosis (DVT) of the lower extremity Review computer tomographic (CT) findings in chronic DVT of the lower extremity

VI199-ED-X

Neocava: When all Lumens are Closed

All Day Room: VI Community, Learning Center

Participants
Ricardo Garcia Buen-Abad, MD, Mexico City, Mexico (*Presenter*) Nothing to Disclose
Bianca V. Granados Pinedo, MD, Mexico City, Mexico (*Abstract Co-Author*) Nothing to Disclose
Manuel Guerrero-Hernandez, MD, Tlalpan, Mexico (*Abstract Co-Author*) Nothing to Disclose
Ricardo Gonzalez Rodriguez, MD, San Luis Potosi, Mexico (*Abstract Co-Author*) Nothing to Disclose
Ivan E. Casanova Sanchez, MD, Mexico City, Mexico (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review the main causes of central vein stenosis. Survey current approaches for central vein stenosis, pros and cons. Acknowledge the described role of interventionism for central vein stenosis as well as newer techniques.

TABLE OF CONTENTS/OUTLINE

1. Central vein stenosis generalities Definition Main causes Physiopathology Diagnosis2. Current management of central vein stenosis3. Neocava When to do it How to do it Our experience

VI200-ED-X

Portal Cavernomas: Can the Intervencionist Help?

All Day Room: VI Community, Learning Center

Participants
Ivan E. Casanova Sanchez, MD, Mexico City, Mexico (*Abstract Co-Author*) Nothing to Disclose
Ricardo Garcia Buen-Abad, MD, Mexico City, Mexico (*Presenter*) Nothing to Disclose
Bianca V. Granados Pinedo, MD, Mexico City, Mexico (*Abstract Co-Author*) Nothing to Disclose
Ricardo Gonzalez Rodriguez, MD, San Luis Potosi, Mexico (*Abstract Co-Author*) Nothing to Disclose
Manuel Guerrero-Hernandez, MD, Tlalpan, Mexico (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Review the physiopathology of portal cavernomas and their natural evolution. Discuss the contemporary management of portal cavernomas and their outcomes. Describe the neoporta technique for the treatment of chronic portal thrombosis, its advantages and disadvantages.

TABLE OF CONTENTS/OUTLINE

1. Development of portal cavernomas Chronic portal thrombosis2. Imaging of portal cavernomas Ultrasound CT venography3. Management of portal cavernomas Conservative Invasive4. Neoporta Indications Technique Complications

VI201-ED-X

Tunneled Ascitic Drainage: How We Do it

All Day Room: VI Community, Learning Center

Participants
Alison Elstob, London, United Kingdom (*Presenter*) Nothing to Disclose
Joshua Shur, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Laura Ward, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Shahriar Islam, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Graham J. Munneke, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To understand the clinical situations in which a tunnelled ascitic drain is appropriate To gain a step by step guide as to how to safely perform the procedure. To be aware of the complications of the procedure and their management.

TABLE OF CONTENTS/OUTLINE

Clinical overview of malignant ascitesReview of options for management Indications for tunneled cathetersStep by step guide to the procedure Complications and their management Review of published outcome results

VI202-ED-X

The Analysis and Treatment Strategy for Thin Wall Area of Unruptured Cerebral Aneurysm with Computational Fluid Dynamics (CFD) Software

All Day Room: VI Community, Learning Center

Participants

Masashi Takahashi, RT, hiroshima, Japan (*Presenter*) Nothing to Disclose
Satoshi Inada, hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
tsuyoshi kagimoto, hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Chisato Yoritaka, RT, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
tatsuya mizoue, hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Takanobu Yagi, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Yun Shen, PhD, Beijing, China (*Abstract Co-Author*) Employee, General Electric Company Researcher, General Electric Company
Xiao Zhu Lin, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The analysis for the thin wall area of unruptured cerebral aneurysm by CFD software which is clinically approved. Provide effective IVR treatment plan under the surgery whereby CFD software visualizes vessel flow of the thin wall area of unruptured cerebral aneurysm

TABLE OF CONTENTS/OUTLINE

The threshold for VR image is calculated by full width at half maximum(FMHM)of Hounsfield unit (HU) value generated from the profile curve on 2D image: this method produces more accurate VR image depending on CT contrast effect.
Investigate the relevance between the inner flow pattern of total cerebral aneurysm and the thin area of cerebral aneurysm, comparing Wall Shear Stress (WSS), Velocity, and Pressure of the thin wall area of cerebral aneurysm to those of regular (not thin) area of unruptured cerebral aneurysm.
In all cases, the visualized thin wall area under the surgery is equivalent to the low value of WSS area: The ratio of WSS (thin/thick) and the ratio of Velocity are significantly deceased: avg. 0.12±0.095 for WSS, avg. 0.348±0.136 for Velocity. On the other hand, the ratio of Pressure (thin/thick) is not significantly different: avg. 1.02 ±0.016.
This evaluation supports the assessment of treatment strategy for Coil embolization of cerebral aneurysm, that assists patient safely and effectively in interventional radiology.

VI203-ED-X

Laser Sheath Assisted Filter Removal

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Mohammad Arabi, MD, FRCR, Riyadh, Saudi Arabia (*Presenter*) Nothing to Disclose
Abdulaziz Al Harbi, MD, Riyadh, Saudi Arabia (*Abstract Co-Author*) Nothing to Disclose
Mohamed Al-Moaiqel M, Riyadh, Saudi Arabia (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Provide readers with a brief review on the laser sheath and its use in pacemaker leads extraction.2. Provide a step-by-step guide on laser sheath assisted filter removal.3. Briefly review existing literature on the use of this technology.

TABLE OF CONTENTS/OUTLINE

1. Description of laser sheath2. Laser sheath use in pacemaker lead extraction.3. Step-by-step guide to the use in filter retrieval.4. Potential pitfalls and complications5. Summary of previous literature regarding laser sheath assisted filter removal.

VI204-ED-X

Please Pass the Bubbly! Contrast Enhanced Ultrasound for Diagnostics and Intervention

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Paul A. DiCamillo, MD, PhD, Cleveland, OH (*Presenter*) Nothing to Disclose
Michael B. Shvarts, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Ali Gholamrezanezhad, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
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Dean A. Nakamoto, MD, Beachwood, OH (*Abstract Co-Author*) Research agreement, Toshiba Corporation
Nami R. Azar, MD, Highland Heights, OH (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Describe the composition/structure of a microbubble and the physical property considerations to optimize matching an agent to a clinical application Understand strengths and weakness of contrast enhanced ultrasound Review examples of diagnostic and interventional applications of contrast enhances ultrasound technology

TABLE OF CONTENTS/OUTLINE

Bubble Technology
Introduction/definitions
Physics
Bubble echo characteristics/visibility**Structure/Composition of an ultrasound contrast reagent**
Microbubble Shell and its properties
Gas core of microbubble and its properties**Specific agents available for clinical use****Strengths of Contrast Enhaced Ultrasound**
Real time assessment
Targeted Bubble disruption
Cost considerations
Avoiding non-ionizing radiation
Lack of known side effects
Paucity of contraindications**Weaknesses**
Theoretical heating of tissues
Bubble longevity in circulation**Indications and Motivations for Use**
Low GFR
Severe contrast allergies
Avoid ionizing radiation in sensitive populations
Dynamic real time evaluations
Same-day repeat perfusion studies/exams

Applications with Cine/Video Examples
Increasing lesion visibility intervention
Lesion characteristics assessment
Organ assessment**Future Directions**
Coating bubbles with materials/surfaces for targeting

VI205-ED-X

Klippel-Trenaunay Syndrome: Imaging findings and Interventional Treatment Options

All Day Room: VI Community, Learning Center

Participants
Alexander H. Lam, MD, Orange, CA (*Presenter*) Nothing to Disclose
Kevin T. Bui, MD, Laguna Hills, CA (*Abstract Co-Author*) Nothing to Disclose
Jimmy Ton, MD, Orange, CA (*Abstract Co-Author*) Nothing to Disclose
Nadine Abi-Jaoudeh, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Dayantha Fernando, MD, Orange, CA (*Abstract Co-Author*) Nothing to Disclose
Kari J. Nelson, MD, Charlottesville, VA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Klippel-Trenaunay syndrome (KTS) is a rare, frequently underdiagnosed disorder classically delineated by the triad of cutaneous capillary malformations, varicose veins, and bony and/or soft tissue hypertrophy. The triad is frequently accompanied by lymphatic anomalies and lymphedema. Duplex scanning and MR venography are useful in delineating the superficial and deep venous anatomy, assessing venous competence, and evaluating the extent of lymphedema and limb hypertrophy. Complications include superficial thrombophlebitis, thromboembolism, cellulitis, lymphedema, venous stasis ulcers, and hemorrhage. The severity of KTS complications necessitates early identification and management. Published treatment options, although scarce in the literature, include surgical ligation, coil embolization, endovenous thermal ablation, and sclerotherapy. The aims of this exhibit are to improve fluency in KTS, from clinical presentation to radiographic evaluation and intervention.

TABLE OF CONTENTS/OUTLINE

1. Overview of the pathophysiology surrounding KTS.
2. Review of common clinical and imaging features with an emphasis on diagnostic approach.
3. Multiple endovascular, case-based management examples with a focus on procedural techniques including:
a. Sclerotherapy.
b. Endovenous laser ablation.
4. Treatment follow-up, outcomes, and potential complications.

VI206-ED-X

Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA): From A to Z and Beyond

All Day Room: VI Community, Learning Center

Participants
Marie Takahashi, Kawasaki-shi, Japan (*Presenter*) Nothing to Disclose
Junichi Matsumoto, MD, Kawasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Seigo Okuma, Kawasaki-shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Takeshi Miura, Otawara-shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasuhiko Taira, MD, Kawasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasuo Nakajima, MD, Kawasaki, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1) To learn the basics of REBOA. 2) To learn basic and advanced applications of REBOA

TABLE OF CONTENTS/OUTLINE

1. The Basics of Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA). 1) What is "REBOA"? 2) When and How to put the balloon catheter in. 3) When and How to remove the balloon catheter. 4) Complications 5) Review of the recent articles about REBOA.2. Advanced application of REBOA. 1) "Partial Occlusion" in REBOA. 2) Trauma Panscan under REBOA. 3) Prehospital/Field usage of REBOA. 4) REBOA for non-traumatic situations.

VI207-ED-X

Challenges and Benefits of Ablation for Treatment of Carcinoma in the Caudate Lobe

All Day Room: VI Community, Learning Center

Participants
George C. Dantas, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Luiz R. Peixoto, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Francisco D. Junior, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Vanessa Sacramento, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Antonio Rahal Junior, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Marcos R. Queiroz, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Rodrigo Gobbo, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is to discuss the ablation of carcinoma in the caudate lobe, emphasizing the indications, anatomy review, technique and complications.- The caudate lobe contains a unique Glisson and venous system different from other liver lobes.- Surgical resection an effective method of treating tumors in the caudate lobe. However, the deep location and proximity to complex structures make the lobectomy technically challenging. - Percutaneous ablation could be performed under US or CT guidance, as well fusion images. Microbubble contrast can increase accuracy of ultrasound in context. The knowledge about the techniques is important to avoid complications and increase the effectiveness of the procedure.- The major complications are pneumo/hemothorax, hemoperitoneum, intestinal perfuration, gallblader injury, liver infarction and billiary tract injury.- After treatment, contrast-enhanced MRI, PET-CT and PET-MRI can closely assess the coagulation area, to determine whether obtained a sufficient safety margin around the tumor.- Proper selection of puncture routeand meticulous attention to the safety margin around the tumor are essentials to avoid complications and local recurrence.

TABLE OF CONTENTS/OUTLINE

Introduction Indications / Contraindications Technique Complications Conclusion

VI208-ED-X

Three-dimensional Imaging of Vascular Abnormalities of the Thorax

All Day Room: VI Community, Learning Center

Participants
Eiman R. Musa, MD, Dohar, Qatar (*Presenter*) Nothing to Disclose
Hanan Sherif, MD, Doha, Qatar (*Abstract Co-Author*) Nothing to Disclose
Abbas H. Moustafa Elbagoury, MD, Doha, Qatar (*Abstract Co-Author*) Nothing to Disclose
Mohamed S. Abbas, MBBCh, Doha, Qatar (*Abstract Co-Author*) Nothing to Disclose
Ahmed-Emad Mahfouz, MD, Doha, Qatar (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1- To review the anatomy of the great vessels of the thorax.
2- To review the different types of congenital vascular anomalies and their appearance on sectional and volume rendered imaging.

TABLE OF CONTENTS/OUTLINE

1- Aberrant left Subclavian artery.
2- Right aortic arch and its subtypes.
3- Pulmonary sling.
4- Double aortic arch.
5- Aortic coarctation.
6- Persistence left sided superior vena cava.
7- Anomalous pulmonary venous drainage including Scimitar syndrome
8- Intra and extralobar pulmonary sequestration
9- Pulmonary arteriovenous malformation
10- Anomalies of major vessels associated with congenital cardiac disease

VI209-ED-X

Carotid and Vertebral Dissections: A Challenge in Diagnosis and Treatment

All Day Room: VI Community, Learning Center

Participants
Iqra N. Akhtar, MD, Kansas City, MO (*Abstract Co-Author*) Nothing to Disclose
Jared S. Halpin, MD, Kansas City, MO (*Abstract Co-Author*) Nothing to Disclose
Coleman Martin, MD, Iowa City, IA (*Abstract Co-Author*) Nothing to Disclose
William E. Holloway, MD, Mission Hills, KS (*Abstract Co-Author*) Nothing to Disclose
Naveed Akhtar, MD, Mission Hills, KS (*Presenter*) Nothing to Disclose

TEACHING POINTS

To provide awareness of the diverse presentations of carotid and vertebral dissections like neck pain, TIA, Horner's syndrome, stroke and subarachnoid hemorrhage. To highlight the diagnostic challenges in carotid and vertebral dissections and role of imaging. To provide rationale for the benefits of early interventional treatment for flow restricting stenosis and dissecting aneurysms. Adequate followup intervals are essential in patients with dissection receiving medication alone. Identification of late sequale of dissection such as residual stenosis and pseudoaneurysm is of importance and management of sequale should be undertaken with a variety of treatment options available.

TABLE OF CONTENTS/OUTLINE

1. Illustrate imaging findings (CT angio, CT perfusion, MR angio, MRI, and cerebral angiogram) of carotid and vertebral dissections with explanations highlighting the presentation and challenges of diagnosis2. Early treatment for flow significant stenosis and/or clot in cases of acute dissection discussed 3. Discuss conservative management and regimen of anticoagulation therapy. Followup interval and imaging recommendations emphasized. 3. Demonstration of late consequences of dissections like residual stenosis and pseudoaneursym formation and their treatment options

VI210-ED-X

TIPS and Tricks for Trans-splenic Portal Vein Recanalization

All Day Room: VI Community, Learning Center

Participants
Jason T. Salsamendi, MD, Miami, FL (*Abstract Co-Author*) Nothing to Disclose
Francisco Gortes, Miami, FL (*Abstract Co-Author*) Nothing to Disclose
Mehul Doshi, MD, Miami, FL (*Abstract Co-Author*) Nothing to Disclose
Ji Fan, MD, miami, FL (*Abstract Co-Author*) Nothing to Disclose
Alan Livingstone, Miami, FL (*Abstract Co-Author*) Nothing to Disclose
Joseph M. Dalonzo, MD, Miami, FL (*Presenter*) Nothing to Disclose
Govindarajan Narayanan, MD, Miami, FL (*Abstract Co-Author*) Consultant, BTG International Ltd; Consultant, AngioDynamics, Inc; Consultant, Medtronic plc; Consultant, Guerbet SA

TEACHING POINTS

1) Introduce a novel approach to difficult portal vein recanalization procedure2) To illustrate four such cases performed at our institution

TABLE OF CONTENTS/OUTLINE

A. Anatomy (include surgical anatomy)B. PathophysiologyC. Diagnostic Imaging (US, CT)D. Review of Indications, ContraindicationsE. Initial Treatment (conventional approaches, novel approach)F. Follow-up ManagementG. Outcomes (include complications)

VI211-ED-X

Frozen Bones: Multimodality Imaging Appearance after Cryoablation of Bone Tumors

All Day Room: VI Community, Learning Center

Participants

Anil N. Kurup, MD, Rochester, MN (*Presenter*) Research Grant, Galil Medical Ltd; Royalties, UpToDate, Inc
Ann Packard, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Stephen M. Broski, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
John J. Schmitz, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Jonathan M. Morris, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Thomas D. Atwell, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Grant D. Schmit, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Adam J. Weisbrod, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Matthew R. Callstrom, MD, PhD, Rochester, MN (*Abstract Co-Author*) Research Grant, Thermedical, Inc Research Grant, General Electric Company Research Grant, Siemens AG Research Grant, Galil Medical Ltd

TEACHING POINTS

After reviewing this exhibit, the participant should be able to:1. Describe the typical appearance of bone tumors treated with cryoablation on CT, MRI, and PET.2. Identify the most common complications visualized on post-ablation imaging.3. Recognize the usual appearance of local tumor progression along the ablation margin.

TABLE OF CONTENTS/OUTLINE

Indications for bone tumor cryoablationIntraprocedural findings - Imaging the iceballNormal postprocedural findings- CT- MRI- PETAppearance of the most common complications- Fracture- Articular injury- Nerve injury- InfectionLocal tumor progression

VI212-ED-X

Pulmonary Circulation Anomaly by Angio CT 320

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Fernando Saguier, MD, CABA, Argentina (*Abstract Co-Author*) Nothing to Disclose
Maria de los Milagros Di Cecco, MD, Buenos Aires, Argentina (*Presenter*) Nothing to Disclose
Laura C. Dragonetti, MD, Capital, Argentina (*Abstract Co-Author*) Nothing to Disclose
Tatiana Gillanders, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Paula Ramos, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Cintia B. Barale, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Miguel E. Nazar, MD, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose
Eduardo P. Eyheremendy, MD, Buenos Aires, Argentina (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

Pryce classifies pulmonary sequestrations in three types. We review a case of a type 1 incomplete pulmonary sequestration. We demonstrate the efficacy and benefits of Angiotomografy as a first line,noninvasive method for the diagnosis of pulmonary vascular malformations.

TABLE OF CONTENTS/OUTLINE

1) Case presentation: a. Medical history b. AngioCT technique c. Radiologic findings and CT image reconstructions2) Discussion3) Conclusions

VI214-ED-X

Noncirrhotic Complete Obliterative Portal Vein Thrombosis: Novel Management using Trans-splenic TIPS with Portal Vein Recanalization

All Day Room: VI Community, Learning Center

Participants

Joseph R. Kallini, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Ahmed Gabr, MD, MBBCh, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Laura Kulik, MD, Chicago, IL (*Abstract Co-Author*) Speaker, Bayer AG Advisory Board, Bayer AG Speaker, Onyx Pharmaceuticals, Inc Advisory Board, Onyx Pharmaceuticals, Inc Speaker, Gilead Sciences, Inc
Daniel Ganger, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Robert J. Lewandowski, MD, Chicago, IL (*Abstract Co-Author*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc
Bartley G. Thornburg, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Riad Salem, MD, MBA, Chicago, IL (*Abstract Co-Author*) Research Consultant, BTG International Ltd Research Grant, BTG International Ltd

TEACHING POINTS

(1) To discuss the PVR-TIPS procedure using the transsplenic approach(2) To discuss the management of chronic noncirrhotic portal vein thrombosis and the potential role of PVR-TIPS in the complete obliterative setting.

TABLE OF CONTENTS/OUTLINE

Case Series PVR-TIPS Procedure Noncirrhotic portal vein thrombosis (PVT) Background Management Role of PVR-TIPS in complete obliterative PVT

VI215-ED-X

Percutaneous Thermal Ablation of Liver Lesions at Compromising Locations - A Lot of Words Still to Say

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Aleksandar Radosevic, MD, Barcelona, Spain (*Presenter*) Nothing to Disclose
Juan Sanchez Parrilla, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Fernando Bazan, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Ander Zugazaga Cortazar, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Marcos Busto Barrera, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Fernando Burdio, Barcelona, Spain (*Abstract Co-Author*) Stockholder, Apieron, Inc
Guadalupe Aguilar-Sanchez, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Ana Sierra, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Ignasi Poves, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To define the nodule at compromising locations - and to consider the peculiarities related with To review en existing techniques for reducing the risk during the procedure- and to present some of modification we find useful Ultrasound guided radiofrequency and microwave ablation –our way to do it

TABLE OF CONTENTS/OUTLINE

When we speak about difficult to treat liver lesion, we consider it according to its size (the larger, the more difficult to treat), location (difficulties considering it visualization and image guidance) or relationship with the adjacent structures (the heart, large and small intestine, gall bladder and central biliary tree, kidneys, adrenal gland or diaphragm).A variety of protective techniques have been described, some of them, as artificial ascitis, hydrodissection or artificial pleural effusion have been used in over 25 % of our patient. We present our modification of technique for creation of pleural effusion and we introduce the new termin referring the special type of overlapping ablation-the "crossed ablation".In this exhibit we present some of the challenging cases, review the relevant complications and the steps we have taken for its management.

VI216-ED-X

Carotid Atherosclerotic Plaque Evaluation; Technique, Limitations, and Role of Multiparametric Ultrasound Evaluation

All Day Room: VI Community, Learning Center

FDA Discussions may include off-label uses.

Participants

Ferdinando D'Ambrosio, Rome, Italy (*Presenter*) Nothing to Disclose
Vito Cantisani, MD, Rome, Italy (*Abstract Co-Author*) Speaker, Toshiba Corporation; Speaker, Bracco Group; Speaker, Samsung Electronics Co, Ltd;
Emanuele David, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Mauro Ciccariello, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Hektor Grazhdani, MD, PhD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Antonello Rubini, MD, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Nicola Di Leo, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Eleonora Tassone, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Federica Flammia, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesco M. Drudi, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesco Flammia, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Mattia Di Segni, MD, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Milvia Martino, MS, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Giorgio Ascenti, MD, Messina, Italy (*Abstract Co-Author*) Nothing to Disclose
Giorgio Ascenti, MD, Messina, Italy (*Abstract Co-Author*) Nothing to Disclose
Daniele Fresilli, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To show efficacy, limitations of multiparametric ultrasound (Color-doppler, CEUS, Ultrasound elastography and 3 D arterial analysis software) evaluation of carotid stenosis as compared with CTA or MRA.To describe tips and tricks of the techniques

TABLE OF CONTENTS/OUTLINE

A soft plaque with irregular surface, neoangiogenesis and internal bleeding, is more prone to embolic events, while the percentage of stenosis is not a highly reliable parameter.Color-Doppler US is usually first line study. Lately, ultrasound elastography (UE), contrast enhanced ultrasound (CEUS) have been used to better characterize atherosclerotic plaques of the carotid.UE is an ultrasonographic technique capable of assessing or even measuring the elasticity of tissues (indirectly the composition of plaques), hard versus soft (fibrosis and calcification versus lipid content).CEUS as reported by EFSUMB guidelines has established role for carotid artery stenosis evaluation.Arterial Analysis© is a new software for rapid automated calculation of the displacements in carotid wall motion, with automatic volumetric acquisition, which provides stenosis evaluation, plaque characterization (low and high risk).Our results with typical and atypical cases of carotid stenosis compared with CTA and MRI will be presented, while describing the signs and technique tips and tricks.

VI217-ED-X

Acute Intraluminal Thrombus in Cervical Carotid and Vertebral Arteries without Intracranial Occlusion at Presentation with Stroke Symptoms: A Treatment Dilemma

All Day Room: VI Community, Learning Center

Participants
Iqra N. Akhtar, MD, Kansas City, MO (*Abstract Co-Author*) Nothing to Disclose
Naveed Akhtar, MD, Mission Hills, KS (*Presenter*) Nothing to Disclose
William E. Holloway, MD, Mission Hills, KS (*Abstract Co-Author*) Nothing to Disclose
Coleman Martin, MD, Iowa City, IA (*Abstract Co-Author*) Nothing to Disclose
Jared S. Halpin, MD, Kansas City, MO (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

The aim of the exhibit is: To familiarize oneself with the array of clinical presentations that a patient with an acute thrombus in their cervical arteries without intracranial involvement may present with. We will be using imaging and history findings from 8 patients seen at our facility to achieve this purpose. To highlight the importance of imaging in the diagnosis of an acute thrombus in the cervical vasculature. To identify the challenges of treatment of an acute thrombus in cervical arteries without intracranial involvement and how to cater treatment according to the clinical situation.

TABLE OF CONTENTS/OUTLINE

1. **Background**: Clinical vignettes regarding the various presentations of an acute intraluminal thrombus in the cervical carotid and vertebral arteries and imaging techniques used classically for the diagnosis.**2. Overview of treatment options:** Discussion of anticoagulation versus intervention (endarterectomy and/or clot retrieval) in the treatment of an acute intraluminal thrombus without intracranial involvement.**3. Histories and images** displayed from patients who presented with an acute intraluminal thrombus in the cervical vasculature treated by various techniques at our facility.**4.** Discussion of the complications of an acute intraluminal thrombus such as intracranial embolization and how to treat challenges as they arise.

ED007-SU

Interventional Radiology Sunday Case of the Day

Sunday, Nov. 27 7:00AM - 11:59PM Room: Case of Day, Learning Center

IR

AMA PRA Category 1 Credit ™: .50

Participants

Anne M. Covey, MD, New York, NY (*Presenter*) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose
Bradley B. Pua, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
John A. Kaufman, MD, Portland, OR (*Abstract Co-Author*) Advisory Board, Bio2 Technologies, Inc; Consultant, Cook Group Incorporated; Consultant, Guerbet SA; Stockholder, Hatch Medical LLC; Stockholder, VuMedi, Inc; Stockholder, Veniti, Inc; Royalties, Reed Elsevier; Advisory Board, Delcath Systems, Inc; Researcher, W. L. Gore & Associates, Inc; Researcher, EKOS Corporation; Stockholder, EndoShape, Inc; Advisory Board, AV Medical Technologies Ltd; Advisory Board, Javelin Medical

TEACHING POINTS

1) The objective of the Interventional Radiology Case of the Day at RSNA 2016 is to provide participants the opportunity to review challenging cases and synthesize cogent a differential diagnosis based on limited history and images.

SPIO11

Oncodiagnosis Panel: Liver Cancer

Sunday, Nov. 27 10:45AM - 12:15PM Room: E353C

GI IR OI RO

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

Participants
Kathryn J. Fowler, MD, Chesterfield, MO (*Moderator*) Nothing to Disclose

Sub-Events

SPIO11A Pretreatment Imaging Evaluation of Liver Cancer

Participants
Ashkan A. Malayeri, MD, Bethesda, MD, (ashkan.malayeri@nih.gov) (*Presenter*) Nothing to Disclose

SPIO11B Surgical Intervention for Liver Cancer

Participants
Sam G. Pappas, MD, FACS, Maywood, IL (*Presenter*) Nothing to Disclose

SPIO11C Interventional Radiology Procedures for Liver Cancer

Participants
Sandeep Vaidya, MD, Seattle, WA (*Presenter*) Nothing to Disclose

SPIO11D Radiotherapy for Liver Cancer and Post-RT Evaluation of Response

Participants
Michael I. Lock, MD, FRCPC, London, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Overview of technical details and options for radiation of liver cancer. 2) Review the evidence. 3) Review an approach to liver image interpretation post radiation.

ABSTRACT

Radiation for liver is becoming common. However, the literature reveals a large variation in practice and outcome. This review of the data will provide an organized summary of the evidence and an understanding of the various methods of radiating liver cancers. The primary objective is to review an approach to liver image interpretation post radiation. The presentation will cover expected imaging changes with time after radiation, provide predictive imaging tools to identify i) which patients will progress ii) when patients will progress and iii) which patients will survive.

URL

none

SSA24

Vascular Interventional (Portal Vein Imaging and Intervention)

Sunday, Nov. 27 10:45AM - 12:15PM Room: E350

VA CT IR MR

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

FDA Discussions may include off-label uses.

Participants
Albert A. Nemcek JR, MD, Chicago, IL (*Moderator*) Consultant, B. Braun Melsungen AG
Wael E. Saad, MBBCh, Ann Arbor, MI (*Moderator*) Research Consultant, Siemens AG; Research Consultant, Boston Scientific Corporation; Research Consultant, Medtronic, Inc; Research Consultant, Getinge AB; Research Consultant, Merit Medical Systems, Inc;

Sub-Events

SSA24-01 An Irradiation Stent for Portal Vein Tumor Thrombosis in Hepatocillular Carcinoma-Initial Results

Sunday, Nov. 27 10:45AM - 10:55AM Room: E350

Awards
Trainee Research Prize - Medical Student

Participants
Jian Lu, Nanjing, China (*Presenter*) Nothing to Disclose
Gao-Jun Teng, MD, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose
Jin-He Guo, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose
Hai-Dong Zhu, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose
Guang-Yu Zhu, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

We aim to assess the safety and preliminary efficacy of an irradiation portal vein stent for PVTT in patients with HCC.

METHOD AND MATERIALS

Participants with PVTT caused by HCC were evaluated for the treatment with an irradiation portal vein stent (self-expandable stent loaded with 125I seeds). Transarterial chemoembolization (TACE) was conducted after stenting. The outcomes were measured in terms of technical success, recanalization success, stent patency, overall survival, and complications.

RESULTS

From a group of 40 candidates, 25 were recruited. The median follow-up was 13.4 months (range 0.2-32.5). The technical success rate was 92% (23/25). The recanalization success rate was 100% (23/23) immediately after stenting. The median stent patency period was 10.1 months (95% CI: 6.5, 13.7). The 3-, 6-, 9-, and 12-month cumulative stent patency rates were 89.7%, 66.1%, 54.1%, and 27.8%, respectively. The median survival was 12.5 months (95% CI: 8.8, 16.1). The 3-, 6-, 9-, and 12-month cumulative survival rates were 86.4%, 81.6%, 76.1%, and 54.5%, respectively. No Grade 3 or higher stenting or radiation-related complications were observed.

CONCLUSION

Placement of the irradiation portal vein stent appears feasible and safe. This is a promising technique for combining recanalization of an occluded portal vein and brachytherapy for PVTT, which allows TACE to be performed following stenting. Therefore, this irradiation stent placement may benefit to prolong the overall survival of these patients.

CLINICAL RELEVANCE/APPLICATION

Irradiation stent placement is a promising technique for combining recanalization of an occluded portal vein and brachytherapy for PVTT, which provides a longer patency period and allows TACE or other treatments to be performed safely following stenting

SSA24-02 Inpatient Mortality is Higher in Hospitals with Low Annual TIPS Volume

Sunday, Nov. 27 10:55AM - 11:05AM Room: E350

Participants
Lujia Zhou, Boston, MA (*Presenter*) Nothing to Disclose
Ammar Sarwar, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Elliot Tapper, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Raza Malik, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine patient and hospital characteristics associated with inpatient mortality in patients undergoing transjugular intra-hepatic portosystemic shunt (TIPS).

METHOD AND MATERIALS

An all-payer database containing discharge information from all hospitalizations in 21 states between 1/1/13 and 12/31/13 (~14 million hospitalizations) was analyzed. All patients >18 years old with an ICD-9 procedure code of 39.1 (intra-abdominal venous shunt) during index admission but without liver transplantation prior to or during the index admission were included (n=2731).

Hospitals were divided into equal quintiles based on annual TIPS volume; very low (1-4/yr), low (5-9/yr), medium (10-19/yr), high (20-29/yr) and very high (>=30/yr). Inpatient mortality during hospitalizations with TIPS was calculated. Multivariate regression analysis was performed to assess the association of annual procedure volume with inpatient mortality using the following co-variates: patient demographics, route of admission (emergent vs. elective), etiology of liver disease (alcoholic, viral, non-alcoholic, and other), insurance status, AHRQ co-morbidity measures and hospital characteristics (ownership, bed size, teaching status, location).

RESULTS

In 2013, 2731 patients underwent TIPS (57.2±10.95 age; 37.24% female). Inpatient mortality for the index admission was 10% (286/2731). Inpatient mortality decreased across quintiles of annual procedure volume (13% for very low to 6.6% for very high volume hospitals; p=0.005). Elective admissions for TIPS procedures increased across quintiles of annual procedure volume (19.4% for very low to 33.3% for very high volume hospitals; p<0.0001). On multivariate analysis, compared to hospitals performing >=30 TIPS/yr, hospitals performing 1-4/yr (OR:2.05, 95%CI:1.32-3.23; p=0.0015) and 5-9/yr (OR:1.67 95%CI:1.07-2.63; p=0.02) had a higher rate of inpatient mortality.

CONCLUSION

Inpatient mortality during admissions with TIPS is higher in hospitals performing less than 10 TIPS per year.

CLINICAL RELEVANCE/APPLICATION

Similar to association of surgical volume and mortality, annual TIPS volume is inversely associated with inpatient mortality. Further validation could result in TIPS placement at high volume centers only.

SSA24-03 Ablative Liver Partition and Portal Vein Embolization (ALP-PVE): Proof of Concept Testing in a Rabbit Model

Sunday, Nov. 27 11:05AM - 11:15AM Room: E350

Awards
Student Travel Stipend Award

Participants
Janesh Lakhoo, BS, Chicago, IL (*Presenter*) Nothing to Disclose
James T. Bui, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Ron C. Gaba, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Guerbet SA; Research Grant, NeuWave Medical, Inc

PURPOSE

Portal vein embolization (PVE) is used for future liver remnant (FLR) growth induction prior to hepatectomy. Associated liver partition and portal vein ligation (ALPPS) is an alternative 2-step surgery involving PV ligation and hepatic transection followed by resection at a later date. ALPPS may result in more rapid/robust FLR growth vs. PVE, allowing more patients to be resection eligible, but has high morbidity/mortality. Theoretically, combining these two procedures to retain the minimal invasiveness and safety of PVE and exploit the regenerative capacity of ALPPS may allow high FLR growth rates with low adverse events. This study examined the feasibility and efficacy of a modified combined approach—termed Ablative Liver Partition and Portal Vein Embolization (ALP-PVE)—in an animal model.

METHOD AND MATERIALS

In this proof-of-concept study, 16 rabbits (mean weight 2.6 kg) underwent PVE (n=8) or ALP-PVE (n=8). All rabbits underwent laparotomy for PVE to 3 cranial liver lobes using 100-300 micron microspheres and metallic coils; the PV to the caudal lobe FLR was spared. In the ALP-PVE cohort, the parenchymal bridge connecting cranial and caudal lobes was ablated with a commercially available microwave ablation device. Animals were sacrificed and livers were harvested on post-procedure day 7. Caudal/cranial liver lobes were weighed after oven drying for 4 weeks. Liver masses were standardized to rabbit weight, and compared using the 1-tailed Student's t-test.

RESULTS

The final cohort included 15 rabbits; 1 ALP-PVE rabbit died on post-procedure day 2 and was excluded. The caudal lobe to whole liver mass ratio was higher for ALP-PVE vs. PVE (0.313 vs. 0.267, P=0.058). This difference became statistically significant when the first 2 rabbits in each group (constituting the procedure learning curve) were excluded (0.323 vs. 0.266, P=0.029), with ALP-PVE caudal lobes showing a 6% greater degree of hypertrophy. Immunohistochemical analysis of Ki-67 activity to quantify and compare cellular proliferation in FLRs between groups is currently pending.

CONCLUSION

This study suggests that ALP-PVE spurs faster and more robust FLR growth vs. PVE, due to ablative destruction of PV collateral networks between embolized and non-embolized liver. This study provides evidence favoring use of ALP-PVE for FLR hypertrophy that mandates further preclinical/clinical testing.

CLINICAL RELEVANCE/APPLICATION

ALP-PVE may enhance FLR growth vs. standard PVE.

SSA24-04 Changes in Platelet Count after Transjugular Intrahepatic Portosystemic Shunt: Correlation with Portosystemic Pressure Gradient

Sunday, Nov. 27 11:15AM - 11:25AM Room: E350

Participants
Sanghun Kim, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Sherwin Chiu, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Mohamed Babi, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Ahmed K. Abdel Aal, MD, PhD, Birmingham, AL (*Presenter*) Consultant, St. Jude Medical, Inc; Consultant, Baxter International Inc; Consultant, C. R. Bard, Inc

Moustafa Massoud, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Sherif M. Moawad, MBBCh, MSc, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Amr S. Moustafa, MBBCh , Little Rock, AR (*Abstract Co-Author*) Nothing to Disclose
Bradford Jackson, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Souheil Saddekni, MD, Birmingham, AL (*Abstract Co-Author*) Consultant, St. Jude Medical, Inc
Mohamed G. Shoreibah, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Omar Massoud, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Platelet count is an important laboratory metric that reflects the change in portal pressure after transjugular intrahepatic portosystemic shunt (TIPS) placement. However, the increase in platelet count after TIPS placement is variable between patients. The purpose of this study is to demonstrate if there is a correlation between the changes in platelet count after TIPS with the change in portosystemic pressure gradient.

METHOD AND MATERIALS

We retrospectively reviewed the medical records of 306 patients who had TIPS placed between January 2004 and December 2015. We stratified the patients into 4 groups according to the pre-TIPS platelet count: group 1 (0-20), group 2 (20-50), group 3 (50-100), group 4 (100-150). We calculated the percent change in platelet count before and after TIPS as well as the percent change in PSG for each group.

RESULTS

The study included 193 (63%) males and 113 (37%) females, 208 Caucasians (68%), with a mean age of 56.6 years. There was an overall increase in the platelet count after TIPS (mean=17%, SD=62%). When the patients were stratified according to their pre-TIPS platelet counts, the percent change in the platelet count was statistically significantly different by pair wise comparison between the groups ($p<0.05$), with patients in groups 1,2,3 and 4 showing a mean of 243%, 59%, 25% and 0.26% increase in platelet counts respectively. There was a negative correlation between the change in the platelet count and the change in PSG which decreased after TIPS (mean=67%, SD=17%). This negative correlation was maintained when the patients were stratified into groups, despite the fact that the change in the PSG was not statistically significantly different between the groups.

CONCLUSION

Pre-TIPS platelet count is an important indicator for the improvement in platelet count after TIPS. The change in the platelet count correlates with the change in PSG, and can be used as an indicator for improvement of PSG after TIPS.

CLINICAL RELEVANCE/APPLICATION

Pre-TIPS platelet count is an important indicator for the improvement in platelet count after TIPS. The change in the platelet count correlates with the change in PSG, and can be used as an indicator for improvement of PSG after TIPS.

SSA24-05 MR-iGuide TIPS: MRI-Angio Fusion Image Guided TIPS (Pre-Clinical Study)

Sunday, Nov. 27 11:25AM - 11:35AM Room: E350

Participants
Edward W. Lee, MD, PhD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Jonathan K. Park, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Bashir A. Tafti, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Justin P. McWilliams, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Stephen T. Kee, MD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the feasibility, safety and reproducibility of performing MRI-Angio fusion image guided TIPS

METHOD AND MATERIALS

Upon ARC approval, twelve Yorkshire swine underwent TIPS procedure using an iGuide software (Siemens) and Rosch-Uchida TIPS set. 3D images were prepared using non-contrast MRI images fused with cone-beam CT images. The following data were evaluated: a time to create 3D images, a total procedure time, a total fluoro time and the number of punctures needed to cannulate portal vein. Any procedure related complications were also noted.

RESULTS

A technical success rate of creating TIPS was 100% in all 12 animals. Of 12, 11 animals had a "single puncture" TIPS with a mean fluoro time of 7 minutes. A mean time of creating 3D image map was 10 minutes. MRI-Angio fusion images were successfully created in all 12 animals. A mean total procedure time for the entire TIPS procedure was 25 minutes. No immediate complications were noted.

CONCLUSION

Using MR-iGuide, a safe, "single puncture" TIPS is possible. MR-iGuide TIPS is feasible and reproducible with a minimal radiation exposure.

CLINICAL RELEVANCE/APPLICATION

One of the most challenging part of performing TIPS procedure is to identifying intrahepatic portal vein blindly. With our results, we may be able to improve and change the way we perform TIPS currently by providing a direct guidance to the portal vein safely and effectively.

SSA24-06 Long-term Outcomes of Endovascular Intervention for Portal Venous Inflow Disturbance after Liver Transplantation

Sunday, Nov. 27 11:35AM - 11:45AM Room: E350

Participants
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Jinyoung Chang, MD, Anyang, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

We retrospectively evaluated long-term outcomes of percutaneous transhepatic balloon angioplasty with or without stent placement for portal vein stenosis or thrombosis after liver transplantation (LT).

METHOD AND MATERIALS

Between January 2004 and December 2014, 1294 patients underwent LT (living donor: 889, deceased donor: 405); 54 (43 men, 11 women; mean age, 57.7 years) were confirmed to have portal vein stenosis or thrombosis on follow-up computed tomography or ultrasonography. All patients with portal vein stenosis underwent percutaneous transhepatic interventions, including direct portography with manometry and balloon angioplasty with or without stent placement. Technical and clinical success, laboratory and manometry findings, patency, and major complications were evaluated. Follow-up after the initial balloon angioplasty ranged from 14 days to 110.6 months (mean, 38.2 months).

RESULTS

The technical success rate was 98.1%, and clinical success was achieved in 90.7% of cases. Forty-eight patients experienced a significantly improved pressure gradient across the stenosis after percutaneous transhepatic balloon angioplasty with or without stent placement; the mean pressure gradient decreased from 11.2 mmHg to 2.04 mmHg. At 1, 3, 6, and 12 months and at the last follow-up after balloon angioplasty with or without stent placement, clinical success rates were 98.1%, 96.2%, 94.3%, 94.3%, and 92.5%, respectively. One major complication following balloon angioplasty with stent placement was noted, namely abrupt removal of the vascular sheath with tract bleeding.

CONCLUSION

Percutaneous transhepatic balloon angioplasty with or without stent placement is a safe and effective treatment with long-term patency for portal vein stenosis after LT.

CLINICAL RELEVANCE/APPLICATION

Percutaneous transhepatic balloon angioplasty with portal vein stent placement is a useful and safe treatment for portal vein stenosis after liver transplantation.

SSA24-07 Evaluation of Portal Vein System in Patients after Liver Transplantation by Unenhanced MR Angiography Using Spatial Labeling with Multiple Inversion Pulses Sequence and by CT Portography

Sunday, Nov. 27 11:45AM - 11:55AM Room: E350

Participants
Hao Tang, Wuhan, China (*Presenter*) Nothing to Disclose
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Xiaoyan Meng, MD, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Zhen Li, MD, PhD, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The objective of this study was to evaluate the diagnostic performance of unenhanced MR Angiography using spatial labeling with multiple inversion pulses sequence (SLEEK) in comparison with CT portography in the detection of Portal Vein System in patients with liver transplantation.

METHOD AND MATERIALS

22 patients, 21 men and 1 women (mean age 44.3 years; age range, 15–51 years). Unenhanced MRA using SLEEK was performed on a 1.5-T MRI system for assessing portal vein system in 22 patients with liver transplantation. Then all patients underwent 16-slice CT portography within 1–4 days. The ability to present the portal vein system and to reveal portal vein system disease with SLEEK was evaluated by two experienced radiologists and was compared with CT portography results using a joint reading performed in consensus.

RESULTS

22 patients with liver transplantation underwent SLEEK MRA. A total of 20 portal veins were successful assessed, including 16 normal portal veins, 4 with stenoses. Nineteen of the 20 patients were performed end-to-end anastomosis between the donor's and recipient's portal veins. One of the 20 patients was performed end-to-end anastomosis between the donor's portal vein and recipient's inferior vena cave. There was excellent correlation between SLEEK and CT portography in presenting the diameter of portal vein ($R = 0.92$; $p < 0.05$). SLEEK was superior to CT portography in revealing the third- and fourth-order segmental branches in the hepatic parenchyma ($p < 0.05$). SLEEK has the advantage of avoiding interference from ribs, arterial and venous system enhancement.

CONCLUSION

The SLEEK has a comparable ability in demonstrating portal vein system in patients with liver transplantation as well as CT portography does. It can provide helpful information for surgeons to make an accurate postoperative assessment. Unenhanced MRA using SLEEK is relatively inexpensive and is not associated with renal complications. It can be as a good choice for screening portal

vein system in patients with liver transplantation, especially in patients with renal insufficiency.

CLINICAL RELEVANCE/APPLICATION

The SLEEK has a comparable ability in demonstrating portal vein system in patients with liver transplantation as well as CT portography does. It can be as a good choice for screening portal vein system in patients with liver transplantation, especially in patients with renal insufficiency.

SSA24-08 Do Cirrhotic Patients Have a Higher Rate of Development of HCC after Placement of TIPS?

Sunday, Nov. 27 11:55AM - 12:05PM Room: E350

Awards
Student Travel Stipend Award

Participants
Shanchita Ghosh, MD, Miami, FL (*Presenter*) Nothing to Disclose
Beatrice L. Madrazo, MD, Miami, FL (*Abstract Co-Author*) Nothing to Disclose
Dania Cioni, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
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Patricia D. Jones, Miami, FL (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Several studies suggest surgically created portosystemic shunts predispose to greater risk of HCC development (Bañares et al, Hepatology 2005), thought to be secondary to altered venous drainage. Our study seeks to determine if there is an increased risk of developing HCC in cirrhotic patients with intrahepatic porto-systemic shunting, the lag period between TIPS placement and HCC development, and contribution of HCC to mortality in patients who underwent TIPS procedure if any.

METHOD AND MATERIALS

Patients who underwent a TIPS procedure at multiple medical centers from 2010–2016 were retrospectively identified and reviewed for development of HCC and mortality. Exclusion criteria included an existing diagnosis of HCC. Patients were followed until death, development of HCC, or to liver transplant. Primary outcome included incidence of HCC, with secondary outcomes being time to diagnosis of malignancy, all-cause mortality rate, and disease specific mortality. Patients were further characterized by MELD score and etiology of cirrhosis for comparison.

RESULTS

A total of 115 patients with TIPS were followed for 234 person-years with 3 incident cases of HCC. Two cases were identified within two months after placement of TIPS and likely existed prior to the procedure. One case of HCC developed four years after initial TIPS placement. Additionally, of the total 12 observed deaths, the majority were attributable to complications of the underlying liver disease and severe life threatening infection/sepsis, rather than HCC.

CONCLUSION

Despite literature suggesting that portosystemic shunts predispose to greater risk of HCC development, our study indicates that TIPS procedures are not associated with an increased risk for developing HCC. Furthermore, malignancy did not contribute to all-cause mortality in our patient population, whereas mortality related to underlying liver disease was much higher. Thus, a more rigorous HCC surveillance program for this specific patient population as previously argued may be of limited benefit to patient care.

CLINICAL RELEVANCE/APPLICATION

Alteration in venous drainage due to portosystemic stent shunting does not predispose to greater risk of HCC development or contribute significantly to mortality in this patient population.

SSA24-09 Outcomes of TIPS Reduction: Do Symptoms Related to The Original Indication for TIPS Return?

Sunday, Nov. 27 12:05PM - 12:15PM Room: E350

Awards
Student Travel Stipend Award

Participants
Anthony M. Esparaz, MD, Boston, MA (*Presenter*) Nothing to Disclose
Ammar Sarwar, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
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Raza Malik, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine effect of TIPS reduction (TIPS-R) on reducing side effects of increased shunting and original symptoms requiring TIPS (volume overload [VO] or variceal bleeding [VB]).

METHOD AND MATERIALS

After IRB approval, we retrospectively reviewed all TIPS reductions at a single institution from 01/08-01/16. Indication for TIPS and pre-TIPS, pre-TIPS-R, and post-TIPS-R clinical parameters were collected. Outcomes of patients undergoing TIPS for VO (ascites/hydrothorax) and VB were analyzed separately.

RESULTS

Twenty patients (61±9 years; 80% males) with cirrhosis (MELD: Median 17 [IQR: 10.5-21]) underwent TIPS-R after TIPS placement (time between TIPS-R: Median 64 days [IQR: 22.25-110]; TIPS for VO 10/20, VB 10/20). TIPS-R was deemed technically

successful by an immediate increase in portosystemic gradient ([PSG] pre: 7.6±4.3 mmHg, post: 14.6±5.2 mmHg; $p < .0001$) in 19/20 patients. Concurrent variceal embolization was performed in 4/19 patients, all with VB. TIPS-R was indicated due to hepatic encephalopathy (HE; 13/19), new liver failure (LF; 3/19), or new right heart failure (RHF; 3/19). In patients with successful TIPS-R, at median 30 days, MELD was unchanged (16.1±4.8 to 18.5±9.1; $p = 0.15$). TIPS-R improved hepatic encephalopathy in 12/13 patients (West Haven score decreased from 3.4±0.5 to 1.8±0.9, $p < .0001$), improved pulmonary arterial hypertension in 2/3 patients with RHF, and improved total bilirubin for 2/3 patients with LF (11.7 to 3.4 mg/dL and 27.0 to 6.1 mg/dL). No variceal bleeding recurred in VB patients after TIPS-R, but 1/10 (10%) patient had hematemesis due to a band-related ulcer. In patients with TIPS for VO, 3/10 had reduced frequency of paracentesis after TIPS-R, while 7/10 had either no change in frequency or increased frequency compared to pre-TIPS state.

CONCLUSION

TIPS-R with concurrent variceal embolization in VB patients can improve side-effects of increased shunting with low risk of re-bleeding. However, TIPS-R results in recurrence of volume overload in a majority of patients with VO.

CLINICAL RELEVANCE/APPLICATION

TIPS reduction (TIPS-R) to treat shunt-induced hepatic encephalopathy (HE), hepatic decompensation, and right heart failure is successful without rebleeding, but can result in recurrence of ascites.

SSA25

Vascular Interventional (Percutaneous Ablation of the Liver)

Sunday, Nov. 27 10:45AM - 12:15PM Room: E352

GI IR

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

FDA Discussions may include off-label uses.

Participants
James T. Bui, MD, Chicago, IL (*Moderator*) Nothing to Disclose
Nael E. Saad, MBBCh, Saint Louis, MO (*Moderator*) Research Consultant, Veran Medical Technologies, Inc; Proctor, Sirtex Medical Ltd

Sub-Events

SSA25-01 Effectiveness of Contrast-Enhanced Ultrasonography as a Planning Modality for Radiofrequency Ablation of Isoechoic Hepatocellular Carcinoma

Sunday, Nov. 27 10:45AM - 10:55AM Room: E352

Participants
Jae Woong Choi, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
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Cheol Min Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To demonstrate the added value of contrast-enhanced ultrasonography (CEUS) as a radiofrequency ablation (RFA) planning modality for hepatocellular carcinoma (HCC) compared with conventional gray-scale ultrasonography (GSUS)

METHOD AND MATERIALS

This retrospective study was approved by our institutional review board and the requirement for informed consent was waived. Total sixty-four HCCs from 57 patients (men:women=41:16; mean age, 62.6) who have undergone GSUS & CEUS for RFA planning were retrospectively reviewed. Sonographic contrast agent was used for CEUS after conventional GSUS. Two radiologists reviewed the recorded images of GSUS and CEUS in consensus. On GSUS, the size, location, & echogenicity of each HCC were reviewed. Also the definition of HCC on GSUS was categorized to clearly-visible, equivocal, and invisible.

RESULTS

The mean size of HCCs was 1.8 cm (range, 0.9-4.8 cm). Among 64 HCCs, hyperechoic nodules were 11; isoechoic, 24; hypoechoic, 22; and mixed echogenicity, 7 on GSUS. Among the 24 isoechoic nodules, three nodules were clearly visible due to hypoechoic rim on GSUS, two were equivocal, and 19 were invisible. One hypoechoic nodule and two mixed nodule were equivocal on GSUS. Total 40 nodules were clearly visible, 5 were equivocal, and 19 were invisible. By performing CEUS, 11 out of 19 invisible, isoechoic nodules and 5 out of 5 equivocal nodules were identified. Forty out of 64 nodules were identified on GSUS, however 56 out of 64 nodules were identified by performing GSUS and CEUS (detection rate: 62.5% vs 87.5%, p-value < 0.001).

CONCLUSION

Total 48 HCCs were enrolled in RFA by using CEUS, compared to 40 HCCs on GSUS only (40% increase). CEUS is a useful RFA planning modality when a target HCC is poorly defined or invisible on GSUS.

CLINICAL RELEVANCE/APPLICATION

Small HCC invisible on GSUS can not be a candidate for US-guided RFA, however CEUS can help detect isoechoic HCC more clearly thus expands candidates for US-guided RFA.

SSA25-02 No Touch Multibipolar Radiofrequency Ablation Improves Sustained Local Response of HCC<=5cm Compared to Monopolar Techniques: A Multicentric Study

Sunday, Nov. 27 10:55AM - 11:05AM Room: E352

Participants
Arnaud Hocquelet, Pessac, France (*Presenter*) Nothing to Disclose
Christophe Aube, MD, PhD, Angers, France (*Abstract Co-Author*) Speaker, Bayer AG Support, General Electric Company
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Olivier Sutter, Ezanville, France (*Abstract Co-Author*) Nothing to Disclose
Herve Trillaud, MD, Bordeaux, France (*Abstract Co-Author*) Nothing to Disclose
Olivier Seror, Bondy, France (*Abstract Co-Author*) Consultant, Angiodynamics, Inc Consultant, Olympus Corporation Consultant, Bayer AG

PURPOSE

The aim of this study was to compare global radiofrequency ablation failure between monopolar RFA (MonoRFA) versus NoTouch MultiBipolar RFA (NTmbpRFA) for HCC≤5cm in cirrhotic patients.

METHOD AND MATERIALS

The study involved 362 cirrhotic patients (181 per groups) observed in 4 French centers. Global RFA failure (primary RFA failure or local tumor progression) was analysed using the Kaplan Meier method after coarsened exact matching. Cox regression models were used to identify factors associated with global RF failure and overall survival.

RESULTS

Patients were well-matched according tumor size (≤30/>30mm); Tumor number (one/several); Tumor location (subcapsular and near large vessel); Serum AFP (<10; 10-100; >100ng/ml); Child-Pugh score (A/B) and platelet count (30mm and HCC near large vessel were independent factors associated with global RFA failure. The 5-years overall survival were 37.2% following MonoRFA versus 46.4% following NTmbpRFA P=0.378.

CONCLUSION

This large multicentric matched study showed that NTmbpRF provided better primary RF success and sustained local tumor response without increasing severe complications rates, for HCC≤5cm. Consequently, NTmbpRF should be proposed as the standard RF Ablative technique for treatment of HCC≤5cm.

CLINICAL RELEVANCE/APPLICATION

NoTouch MultiBipolar RFA should be proposed as the standard RF Ablative technique for treatment of HCC≤5cm.

SSA25-03 Multimodality Imaging to Assess Immediate Response following Irreversible Electroporation in Patients with Malignant Hepatic Tumors

Sunday, Nov. 27 11:05AM - 11:15AM Room: E352

Participants
Katsutoshi Sugimoto, MD, PhD, Tokyo, Japan (*Presenter*) Nothing to Disclose
Kazuhiro Saito, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Fuminori Moriyasu, MD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Takao Itoi, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the diagnostic accuracy in identifying residual tumor of contrast-enhanced ultrasound (CEUS), contrast-enhanced multiphase CT (CECT), and gadoxetic acid-enhanced MRI (EOB-MRI) in the subacute follow-up of patients with malignant hepatic tumors treated by irreversible electroporation (IRE).

METHOD AND MATERIALS

From February 2014 to January 2016, we enrolled 16 patients with 21 hepatic lesions (primary/secondary hepatic tumors, 16/5; tumor size range, 9-36 mm; mean tumor size, 19.8 mm) treated by IRE and examined by CEUS, CECT, and EOB-MRI at 1, 1, and 7 days after IRE, respectively. Follow-up examinations by EOB-MRI or CECT and CEUS were performed at 3-month intervals. Two experienced radiologists independently reviewed the images and assessed the probability of residual tumor using a five-point scale with receiver operating characteristic (ROC) curve analysis. The sensitivity and specificity were also evaluated. Verifiable local recurrence was also assessed using follow-up imaging as the reference standard.

RESULTS

The mean area under the ROC curve was significantly higher for CEUS (0.980) than for CECT (0.742: P=0.001) and EOB-MRI (0.806: P=0.002), as were the sensitivity and specificity (mean 85.7% and 85.7% for CEUS, respectively, vs 64.3% and 46.4% for CECT and 78.6% and 64.3% for EOB-MRI). The interobserver agreement rate for CEUS (0.781) was higher than for CECT (0.734) and EOB-MRI (0.577).

CONCLUSION

CEUS was found to be superior to CECT and EOB-MRI for the diagnosis of residual tumor in the subacute phase following IRE.

CLINICAL RELEVANCE/APPLICATION

Checking the ablation results in an early phase of treatment using CEUS should help to increase the likelihood of complete ablation.

SSA25-04 High-Powered Microwaves (MWS) Ablation of Intermediate Hepatocellular Carcinoma (HCC) in Cirrhosis: A Multicenter, Prospective Study

Sunday, Nov. 27 11:15AM - 11:25AM Room: E352

Participants
Maria Gabriella Merola, MD, Naples, Italy (*Abstract Co-Author*) Nothing to Disclose
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Pietro Gatti, MD, Ostuni, Italy (*Abstract Co-Author*) Nothing to Disclose
Carmine Coppola, MD, NAPLES, Italy (*Abstract Co-Author*) Nothing to Disclose
Bruno Santoro, Caserta, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesca Merola, Salerno, Italy (*Abstract Co-Author*) Nothing to Disclose
Valentina Giorgio, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

AASLD and EASLD guidelines recommend TACE in treatment of intermediate HCC in cirrhosis. The aim of our study was to report the results in treatment of intermediate HCC in cirrhotic patients using new high-powered microwaves for percutaneous ablation under US guidance.

METHOD AND MATERIALS

From 2010 to 2014, 277 cirrhotics with intermediate HCC were asked to undergo MWS percutaneous ablation instead of TACE. 215

patients (149 Child A, 66 Child B) accepted MWS ablation forming the study group. 109 patients had a single nodule (Ø 5.3-8.2 cm, mean 6.4 cm) [group A]; 70 patients had 2 nodules (Ø 3-6 cm, with at least one nodule >5cm) [group B] and 36 patients had 3-5 nodules (Ø 1.5–6.7 cm with at least one nodule >5cm) [group C]. No patient had ascites or portal venous thrombosis or extrahepatic spread of HCC. In patients with one nodule, 1-2 sessions were scheduled; for group B from 2 to 3 sessions were scheduled and for group C patients up to 4 session were scheduled. Percutaneous ablation was performed using high powered MWS device (100-180 W) at 2450MHZ, under US guidance. 10 possible factors affecting survival were analyzed.

RESULTS

All patients but one were treated according to the scheduled protocol. The complete ablation rates were 83% for the 1°ablation and 100% for the 2°ablation for 3-5 cm lesions, while 64% and 86% respectively for 5-8.2 cm lesions.1 patient (Child A; 80years; HCC Ø6cm;1 session) died for haemoperitoneum. No other major bleeding, liver rupture, or liver abscesses occurred. The 1,3 and 5-year survival rates were 89,81,60,40 and 21% respectively. At univariate analysis, age, number of nodules, Ø of HCC, number of insertions and pre-ablation bilirubin were independent factors for survival. At multivariate analysis bilirubin and number of insertions were independent factors in predicting survival.

CONCLUSION

High powered percutaneous US guided MWS ablation of intermediate HCC in cirrhotic patients is safe and effective in this stage of cancer disease. Our data, although obtained in an non-randomized trial, indicate that percutaneous ablation using new high-powered MWS should have long term survival similar to TACE in treatment of intermediate HCC in cirrhosis. Pre-ablation bilirubin and number of antenna insertions seem independent predictors for long-term survival.

CLINICAL RELEVANCE/APPLICATION

High powered percutaneous MWS ablation of intermediate HCC in cirrhotic patients is safe and effective in this stage of cancer disease.

SSA25-05 Microwave versus Radiofrequency Ablation of Hepatocellular Carcinoma: A Randomized Trial

Sunday, Nov. 27 11:25AM - 11:35AM Room: E352

Participants
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Presenter*) Nothing to Disclose
Lena-Maria Klohmann, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Tatjana Gruber-Rouh, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Renate M. Hammerstingl, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Nour-Eldin A. Nour-Eldin, MD,PhD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To prospectively determine and compare therapy response and safety of microwave (MWA) and radiofrequency ablation (RFA) of hepatocellular carcinoma (HCC) in a randomized trial.

METHOD AND MATERIALS

In this prospective study 36 patients underwent CT-guided thermal ablation: 18 received RFA and 18 MWA (31 males, 5 females; mean 64 years; range 42 to 82; SD of 9.98). Using magnetic resonance imaging (MRI) the location of the HCC and changes in size, volume, necrotic area, diffusion and ADC-value in the malignant tissue were evaluated. First MRI control was performed before thermal ablation. The follow-up contained MRI controls 24 hours after ablation and then within 12 months in three monthly intervals.

RESULTS

36 HCC lesions with a mean diameter of 2.4cm (range 0.9-5cm; MWA 2.5cm, RFA 2.2cm) were treated with thermal ablation. The mean volume 24 hours after ablation was 47.3cm3: 62cm3 for MWA and 32.7cm3 for RFA. Complete ablation was recorded in 88.9% (32/36): 83.3% (15/18) in the MWA group and 94.4% (17/18) in the RFA group. The recurrence rate within one year for both groups was 11.1% (4/36): 16.7% (3/18) for MWA and 5.6% (1/18) for RFA. The rate for new malignant formations in another location than the ablated lesion is 22.2% (4/18) for both groups. The mortality rate for this trial is 0% and no major complications were noticed.

CONCLUSION

No significant differences in mortality or complication rates between RFA and MWA were documented. The study shows that the thermal treatment with MWA generates greater ablation volumes and the 1-year follow-up of the MWA group shows a slightly higher rate of local recurrences.

CLINICAL RELEVANCE/APPLICATION

MWA and RFA present similar results with greater ablation volumes and a slightly higher recurrence rate for MWA.

SSA25-06 Increased Risk of Needle Tract Seeding after Irreversible Electroporation (IRE) of Malignant Liver Tumors

Sunday, Nov. 27 11:35AM - 11:45AM Room: E352

Participants
Martina Distelmaier, Aachen, Germany (*Presenter*) Nothing to Disclose
Alexandra Barabasch, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Heil, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Nils A. Kraemer, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
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Philipp Bruners, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

IRE has been proposed as a non-thermal ablation technique for the treatment of unresectable tumors because it offers specific

IRE has been proposed as a non-thermal ablation technique for the treatment of unresectable tumors because it offers specific advantages, notably absence of heat-sink effect or of thermal damage to adjacent vessels or bile ducts. A possible disadvantage of this method is that no ablation of the needle tract is possible. Our aim was to investigate the local efficacy and the rate of needle tract seeding after CT-guided IRE for liver metastases located adjacent to major portal and hepatic veins.

METHOD AND MATERIALS

29 patients with 43 liver malignancies, underwent percutaneous CT-guided IRE. All lesions were located immediately adjacent to major hepatic veins (20), portal vein branches (15), or both (8), and therefore not eligible for RFA or MWA. 2 - 5 IRE probes (median of 3) were placed strictly parallel under CT-guidance. All patients underwent hepatic ce-MRI according to a standardized protocol before treatment and at standardized intervals after IRE in order to systematically search for local recurrence and/or evidence of needle tract seeding.

RESULTS

Based on the immediate post-interventional CT and post-interventional MRI, complete ablation was achieved in 40/43 (93%) lesions, with a safety margin of at least 5-10 mm. All adjacent vessels remained perfused at mean follow-up time of 24 ± 7 months. In 13 of the 40 lesions (33%) where complete ablation had been achieved, local recurrence was observed between 2 and 18 months after treatment. Of these 13, only 2 cases (15%) were observed within or immediately adjacent to the ablation zone. In the remaining 11 cases (85%), metastatic growth was observed along the needle tract. Accordingly, needle tract seeding was observed in 11 of 43 lesions (26%). None of the two "true" local recurrences occurred at the side of the vessel.

CONCLUSION

None of the 40 lesions with complete ablation exhibited a local recurrence at the site of the vessel triggering the decision to use IRE rather than RFA or MWA. This suggests that IRE is indeed useful to avoid incomplete ablation of lesions due to heat sink effects. However, needle tract seeding was observed in as many as 26% of lesions treated. Therefore, improved IRE methods are urgently needed that address this issue.

CLINICAL RELEVANCE/APPLICATION

IRE is an effective method to treat liver tumors located in areas where thermal ablation is not an option.However, the high rate of needle tract seeding is a concern that deserves immediate attention.

SSA25-07 Ablation Treatment of Primary and Secondary Liver Tumors Under Contrast-Enhanced Ultrasound (CEUS) Guidance: A Multicenter Study

Sunday, Nov. 27 11:45AM - 11:55AM Room: E352

Participants
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PURPOSE

Aim of this study was to quantify the use of CEUS as guidance technique for percutaneous ablation treatment of primary and secondary liver tumors in field practice of five centers with high-volume ablation activity

METHOD AND MATERIALS

The five participating centers retrospectively selected all patients in whom therapeutic needles for Percutaneous Ethanol Injection (PEI), Radiofrequency (RF), Microwave (MW) had been positioned into the target during CEUS with a Low Mechanical Index Ultrasound Contrast Agent. The rate of CEUS-guided ablation was calculated on the whole liver ablation activity of each center between 2005 and 2015. In addition, contrast media consumption, procedure indications, therapeutic effectiveness and complications were assessed.

RESULTS

CEUS-guided ablation was carried out 101 patients (70M/ 31F; mean age 71.5 yrs) with 94 Hepatocellular Carcinoma nodules (mean size 17.3 mm) and 13 metastases (mean size 17.3 mm) by using PEI in 50 cases (46.7%), RF in 41 cases (38.3%) and MW in 16 cases (15%).CEUS-guided ablation represented 6.2% (range 1.8%-13.5%) of 1728 liver ablations performed at the participating centers. Indications to CEUS-guided ablation were: a target lesion not visible on non-enchanced ultrasound (19.6%), improvement of conspicuity of the target (29%), detection of vital area/s in nodules with either incomplete ablation after a previous treatment without CEUS guidance or local tumor progression (51.4%). A single standard dose (2,4 ml) of medium contrast was used in 73 of the treated nodules (68.2%). No complications ensued infusion of contrast medium. Minor complications (pleural effusion) were observed in 2 cases (1.8%) after ablation. Complete ablation was obtained in 73 of the treated tumors (68.2%). Altogether hyperthemic techniques (RF and MW) performed better than PEI (complete ablation rate 86% vs. 48%).

CONCLUSION

To the best of our knowledge, it is the first time that the use of CEUS as guidance technique for liver ablation has been quantified. In experienced hands such a procedure seems to have limited indications (6.2% of 1728 ablative sessions), but is deemed necessary to reach both small, ill-defined focal lesions and vital area/s in nodules with previous incomplete ablation or local tumor progression.

CLINICAL RELEVANCE/APPLICATION

Quantification of the use of CEUS-guided ablation of liver malignancies in field practice of high-volume ablative centers

SSA25-08 High Frequency versus Low Frequency Microwave Ablation in Malignant Liver Tumors: Evaluation of Local Tumor Control and Survival

Sunday, Nov. 27 11:55AM - 12:05PM Room: E352

Participants
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PURPOSE

To compare local tumor control and survival rates in patients with liver metastases treated with microwave ablation (MWA) with either a low frequency (LF) (915 MHz) or high frequency (HF) system (2.45 GHz).

METHOD AND MATERIALS

The retrospective study included 221 patients (mean age: 61.7 years) with 356 malignant hepatic lesions. 94 patients with 133 lesions underwent LF-MWA, 127 patients with 223 lesions were treated with HF-MWA. MRI was performed 24 hours after each procedure and at 3, 6, 12, 18, and 24 months post-ablation. Both groups were compared with the Fisher's exact test. Survival rates were calculated using the Kaplan-Meier test.

RESULTS

The mean initial ablation volume of LF-MWA was nearly half of HF-MWA (19.1mL vs. 39.9mL). The difference in volume between both systems was significant ($p<0.0001$). At follow-up, 39/133 lesions (29.32%) treated using LF-MWA progressed while in HF-MWA 32/223 (14.35%) progressed. The mean time to progression was 5.03 and 5.31 months for lesions treated with LF-MWA and HF-MWA systems respectively. The difference between both systems was significant ($p=0.00059$). The 1-year, 2-year and 4-year overall survival rates were 98.9%, 95.7% and 83% for LF-MWA and 100%, 97.6% and 92.9% for HF-MWA. The difference in survival rates was not significant ($p>0.05$).

CONCLUSION

Both LF- and HF-MWA generator systems are effective treatment options for malignant oligonodular liver lesions, but significantly higher ablation volumes, longer time to progression and lower progression rates were observed in HF-MWA.

CLINICAL RELEVANCE/APPLICATION

HF-MWA is superior to LF-MWA regarding ablation volumes and results in lower progression rate.

SSA25-09 Long-term Therapeutic Outcomes of Radiofrequency Ablation (RFA) for Small to Intermediate Perivascular Hepatocellular Carcinomas: RFA Only Versus Combined Transarterial Chemoembolization and RFA

Sunday, Nov. 27 12:05PM - 12:15PM Room: E352

Participants
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Myung Gyu Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Tae Seok Seo, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compared the therapeutic outcomes of perivascular hepatocellular carcinoma (HCC) between radiofrequency ablation (RFA) only and combined transarterial chemoembolization (TACE) and RFA.

METHOD AND MATERIALS

This retrospective study was approved by our institutional review board and the requirement for informed consent was waived. Between March 2000 and May 2014, 185 perivascular HCCs were selected among 635 HCCs treated by RFA. The perivascular HCC is defined HCC located less than 3 mm away from large vessels which diameter measuring ≥ 3 mm in axial CT/MR images. 185 perivascular HCCs were from 183 patients consisting of 130 men and 53 women; mean age 60.3,range, 29-83 years.The HCCs were classified into two groups according to the absence or presence of combined TACE: A group underwent RFA only (n=79) and the other group underwent combined TACE and RFA (n=106).Technical success, overall adverse event rates, recurrence rates and local tumor progression within 24 months were compared between the two groups.

RESULTS

The technical success of RFA was achieved in 178 out of 185 cases (96.2%). The median follow-up time was 46.7 months (range, 3.2 – 165). RFA only group included 79 HCCs (mean size = 1.63 cm) from 78 patients and combined TACE & RFA group, 106 HCCs (mean size = 1.91 cm) from 105 patients. The local tumor progression rates between two groups were not statistically different: RFA only group 8.9% (7/79) vs. combined TACE and RFA group 11.2% (12/106) ($P > .05$). The overall recurrence rates within 24 months between two groups were not statistically different: RFA only group 33.8% vs. combined TACE and RFA group 32.9% ($P > .95$). The adverse event rates within 24 months between two groups were not statistically different: RFA only group 28.3% vs.

combined TACE and RFA group 36.5% (P > .83).

CONCLUSION

RFA only is similar to combined TACE and RFA for the treatment of perivascular HCC in terms of local tumor progress, overall recurrence, and disease free survival.

CLINICAL RELEVANCE/APPLICATION

In the treatment of perivascular HCC, RFA only seems to be as effective as combined TACE and RFA therapy; thus TACE prior to RFA is not mandatory.

VIS-SUA

Vascular Interventional Sunday Poster Discussions

Sunday, Nov. 27 12:30PM - 1:00PM Room: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
Gretchen M. Foltz, MD, Saint Louis, MO (*Moderator*) Nothing to Disclose
Hyeon Yu, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose

Sub-Events

VI218-SD-SUA1 Interventional and Functional Outcome after Irreversible Electroporation for Surgical Renal Masses in Solitary Kidneys

Station #1

Participants
Steffen J. Diehl, MD, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Nils Rathmann, MD, Mannheim, Germany (*Presenter*) Nothing to Disclose
Michael Kostrzewa, MD, Mannheim, Germany (*Abstract Co-Author*) Institutional research agreement, Siemens AG
Arman Smakic, MD, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Stefan O. Schoenberg, MD, PhD, Mannheim , Germany (*Abstract Co-Author*) Institutional research agreement, Siemens AG
Maximilian C. Kriegmair, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To examine outcome and complications in patients with a history of RCC and a solitary kidney who were treated with irreversible electroporation (IRE) for a surgical renal mass.

METHOD AND MATERIALS

In this retrospective study 8 lesions were reviewed (5 patients: 2 female, 3 male; mean age 65 y) who underwent IRE for renal tumors in a solitary kidney with a mean follow-up period of 8.9 months (range 2 to 18). Changes of signal intensity (SI) of the treated lesions were evaluated in contrast-enhanced MRI: increase of SI > 10% was regarded as progressive disease (PD); an SI increase <10% or SI decrease was considered as tumor control (TC).To evaluate functional outcome, creatinine values and estimated glomerular filtration rate (eGFR) were compared to baseline after 1 day, 2-7 days, 3-6 weeks, and 6-12 weeks after the intervention.

RESULTS

Mean tumor diameter was 25mm (range 15-38) with an average RENAL score of 6.6 (range 4-9). There was a progressive, significant drop in treated tumor SI on subsequent follow-up imaging (mean 56-73%) suggesting an initial TC of 100%. Only one lesion (lesion #6) showed PD after 7 months of follow-up and was ablated again. Two months after additional IRE this lesion (lesion #8) again showed a significant decrease of SI (75%). Two minor acute complications occurred (SIR grade A): transient gross hematuria and stage I acute kidney failure. Overall there was no significant drop in eGFR (mean -1.88ml/min +/-5.99) after 3 months.

CONCLUSION

The data suggest that percutaneous IRE for renal mass in patients with a solitary kidney is safe and feasible. It may help to preserve renal function and offers promising oncological results in the short-/mid-term follow-up.

CLINICAL RELEVANCE/APPLICATION

Since IRE seems to be save and does not limit functional outcome in patients with a single kidney and possible malignant renal mass, IRE is a possible alternative ablation technique for patients at risk of dialysis.

VI219-SD-SUA2 Repeated Transarterial Chemoembolization with Degradable Starch Microspheres (DSMs-TACE) of Unresectable Hepatocellular Carcinoma: Preliminary Experience of a Single Center

Station #2

Participants
Fabrizio Chegai, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Stefano Merolla, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Laura Greco, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Antonio Orlacchio, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate Trans-arterial Chemo-embolization (TACE) using Degradable-Starch-Microspheres (DSMs) in term of:
Efficacy:
•tumor response rates using modified-Response-evaluation-criteria-in-solid-tumors (mRecist) criteria.
•hepatic arterial tree patency after repeated procedures
Safety :
•Intra- and post-procedural complications according to the classification of the International Society of Radiology (SIR)

METHOD AND MATERIALS

From November 2013 to Decembe 2015 we enrolled 72 HCC cirrhotic patients (52/20 M/F, mean age 66.3 years) to be treated with

three repeated DSMs-TACE procedures, performed at 4-6 week intervals on the basis of patients tolerance. Clinical and biochemical evaluation were performed before and after each procedure. Treatment response was also assessed by computed-tomography (CT) or magnetic-resonance-imaging (MRI)-scan 4-6 weeks following each procedure. The lobar technique was used in case of multiple (>3) HCC in the same lobe or when the superselective catheterization of the feeding artery was not technically feasible. Segmental or sub-segmental approach was perfromed using microcatheter case by case basis. We used different amount of DSM: 225 – 450 mg EmboCept® S with different concentration of Doxorubicin on the basis of body surface (75 mg/m2) DSMs and Doxorubicin were injected until a complete blockage of the tumor feeding branch was achieved.

RESULTS

A total of 168 DSMs-TACE procedures were performed. Complete response (CR) was observed in 20.8%, 37.5% and 58.3% patients after the first, second and third procedure, respectively. At the end of each treatment all patients experienced at least a partial response. At the end of the repeated procedures, no differences between mono or bi-lobar disease were observed in CR (64.2% vs 50%; p=ns). Patients with monolobar disease (58.3%) showed higher CR rates after the first procedure compared to those with bilobar HCC (p=0.017). In most cases treatment discontinuation was due to worsening liver function. We observed only 6 cases with vessel occlusion after 2 DSMsTACE cycle.
we observede 1 case of cholecystitis and 1 case of multiple hepatic abscess. PES was observed in 9 patients

CONCLUSION

DSMs TACE is both a safe and an effective therapy for HCC patients with BCLC A and BCLC B

CLINICAL RELEVANCE/APPLICATION

DSM TACE was Easy and fast procedure with related good downstaging rates and an overall good response to therapy, with low general toxicity and complications

VI220-SD-SUA3 Analysis of Patient Controlled Analgesia to Define the Time Course of Pain Following Uterine Artery Embolization

Station #3

Participants
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Anna M. Belli, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Effective management of the post-procedure pelvic pain after uterine artery embolisation (UAE) remains challenging and is the primary reason for overnight admission. The aim of this study is to evaluate the time course of pain in the 24 hours following UAE.

METHOD AND MATERIALS

In this single centre retrospective study, the records of patient controlled analgesia (PCA) usage and pain scores after UAE in 34 patients were reviewed and analyzed. All PCA protocols were standardized using Morphine at a concentration of 1mg/ml. PCA delivered morphine usage and pain score documented in the PCA chart using a verbal numerical rating score (1-4) were used as objective pain measurements.

RESULTS

The peak mean pain score was observed 2 hours post-procedure at 1.74 (SD+/- 1.4, Range 0-4), but gradually reduced after this time, with mean pain scores of 1.26, 1.08 and 0.71 at 3, 4 and 9 hours respectively. The mean peak morphine usage was 10.28 mg/hr (SD +/- 1.9 Range 0-9) at 45 minutes and subsequently reduced to 6.18 mg/hr , 3.85 mg/hr, 3.2 mg/hr and 1.36 mg/hr at 2, 3, 4 and 9 hours respectively. 86% of patients used less than 3mg/hr of morphine PCA by 9 hours, with 16% requiring no further morphine PCA after this time.

CONCLUSION

These results show the peak pain experienced following UAE is at 2 hours and the pain levels and morphine requirements reduce significantly following this. These results allow us to counsel patients' periprocedurally with regards to expectations of post procedure pain. They also serve as a baseline to compare more novel methods of pain control targeted at the periprocedural 1st 8 to 10 hours.

CLINICAL RELEVANCE/APPLICATION

The results allow us to focus pain control within the first 8 to 10 hours with the potential for patients to be discharged the same day, preventing unnecessary overnight hospital admissions.

VI221-SD-SUA4 A Single Center Experience: Biodegradable Biliary Stent in the Treatment of Benign Biliay Strictures

Station #4

Awards
Student Travel Stipend Award

Participants
Queralt Ordi I Camprubi, ARRT, Esplugues de Llobregat, Spain (*Presenter*) Nothing to Disclose
Iratxe Diez, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose
Mercedes Perez Lafuente, MD, Barcelona, Spain (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Benign biliary strictures represent a complication of surgical procedures that may determine an obstruction to bile flow, with consequent stasis, infection and liver damage. The aim of the study is to assess the efficacy and outcome of patients treated with percutaneous biliary stents for benign stenosis refractory to bilioplasty

METHOD AND MATERIALS

Over 21 months, between August 2014 and December 2015, 22 patients (7 women and 15 men; aged 2 to 82 years) with recurrent cholangitis due to postsurgical biliary stenosis (12 of them post-transplant strictures) underwent percutaneous implantation of polydoxanne stent (24 stents). Technical success, outcome and complications were analysed during de follow-up period (mean 11,2 months).

RESULTS

The stent was successfully deployed in 21 cases; one of the stents was broken during balloon expansion. No immediate major or minor complications occurred. During the follow-up two episode of transient cholangitis were reported as well as an hepatic abscess and a re-stenosis of the stricture.

CONCLUSION

Percutaneous placement of biodegradable stent is a new option in the treatment of benign biliary strictures, the technique is safe, effective and avoids repeated invasive procedures.

CLINICAL RELEVANCE/APPLICATION

Biodegradable biliary stent avoids multiple visits to hospital, complications and interventions to patients with benign pathology. Pediatric patients have a good outcome and no complications.

VI222-SD-SUA5 Hepatocellular Carcinoma near Large Vessel: Comparison of Microwaves, Multibipolar and Monopolar Radiofrequency Ablation

Station #5

Participants
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Mounir Bouzgarrou, MD, Merignac, France (*Abstract Co-Author*) Nothing to Disclose
Arnaud Hocquelet, Pessac, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare percutaneous ablation failure (primary ablation failure or local tumor recurrence) between micro waves (MWA), NoTouch mulitibipolar radiofrequency (NTmbpRF) and Monopolar radiofrequncy ablation (MonoRF) treating HCC≤5cm near large vessels.

METHOD AND MATERIALS

we conducted a single center, retrospective and consecutive per-nodules study from 2011 to 2015. All HCC near large vessel treated either by MWA or NTmbpRF or MonoRF were included. The Radiofrequency Ablation Failure rates were compared with log-rank test.

RESULTS

No difference was observed for tumor size between the three groups (P=0.806). 144 nodules were analysed, 44 MWA; 42 NTmnpRF and 58 MonoRF.MWA, NTmbpRFA and MonoRF 2-years LTP rates were respectively, 13.7%, 13.7% and 35.9%. MWA and NTmbpRF were both superior to MonoRF (P<0.02) without significant difference between them (P=0.88). One tumour seeding and 3 aggressive intra-segmental recurrences occurred in MWA versus none in NTmbpRF group.

CONCLUSION

Although MWA and NTmbpRF provided both better sustained local tumor control than MonoRF for HCC≤5cm near large vessel, NTmbpRF should be preferred to MWA due to the lower risk of tumor seeding and intra-segmental aggressive recurrences.

CLINICAL RELEVANCE/APPLICATION

NoTouch MultiBipolar RFA provide similar sustained local tumor control than Microwaves for hepatocellular carcinoma ≤5cm near large vessel with lower risk of tumor seeding or agressive recurrence.

VI223-SD-SUA6 Analyzing Factors Affecting the Hepatic Vein Pressure Gradient in Patients with Chronic Liver Disease

Station #6

Participants
Yasutaka Baba, MD, Hiroshima, Japan (*Presenter*) Nothing to Disclose
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Minoru Ishifuro, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Kenji Kajiwara, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Masaki Ishikawa, MD, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuo Awai, MD, Hiroshima, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation; Research Grant, Hitachi, Ltd; Research Grant, Bayer AG; Research Grant, Eisai Co, Ltd; Medical Advisor, General Electric Company; ; ; ; ;
Wataru Fukumoto, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate factors affecting the hepatic vein pressure gradient (HVPG) in patients with chronic liver disease.

METHOD AND MATERIALS

From September 2011 to September 2015, 134 patients (91 males, 43 females, average age 65) with chronic liver disease underwent HVPG to check their portal vein pressure. Chronic liver disease was due to hepatitis B virus (HBV) (n=26), hepatitis C virus (HCV) (n=47), non-B non-C hepatitis (NBNC) (n=19), nonalcoholic steatohepatitis (NASH) (n=4), alcoholism (n=27), and other factors (n=11). The HVPG was correlated with prognostic factors including patient the background, blood test results, the Child-Pugh (CP)- and the MELD score, and CT splenic volumetry. Correlations were assessed with the Spearman correlation coefficient for continuous- and the Mann-Whitney test for categorical variables. The predictive power of HVPG > 10 mmHg was evaluated with receiver operating characteristic (ROC) curves. Multivariate analysis was with the logistic regression method.

RESULTS

There was a statistically significant correlation with albumin (p=0.0097), choline esterase (ChE, p=0.0001), the CP score (p=0.0009), hemoglobin (p=0.0195), ICG15 (p<0.0001), the international normalized ratio of prothrombin time (PT-INR, (p=0.0301), the platelet count (p=0.009), prothrombin time (p=0.0102), red blood cell count (RBC, p=0.0006), T-bilirubin (p=0.0001), white blood cell count (WBC, p=0.0112), NH3 (p=0.007), and splenic volume (p=0.0017). By ROC analysis for predicting a HVPG > 10 mmHg, relevant values were albumin (AUC: 0.636, p=0.004), ChE (AUC: 0.659, p=0.0007), the CP score (AUC: 0.633, p=0.0046), albumin (AUC: 0.636, p=0.004), ICG15 (AUC: 0.680, p=0.001), the platelet count (AUC: 0.614, p=0.0242), RBC (AUC: 0.657, p=0.001), and splenic volume (AUC: 0.675, p=0.0018). By multivariate analysis, albumin (OR: 0.32, 95% CI: 0.12-0.83) and the platelet count (OR: 0.99, 95% CI: 0.98-0.99) were the best factors for predicting HVPG > 10 mmHg.

CONCLUSION

Our results indicate that albumin and the platelet count are the factors best correlated with HVPG. They can be used to predict HVPG > 10 mmHg.

CLINICAL RELEVANCE/APPLICATION

An HVPG > 10 mmHg is a poor prognostic marker in patients with chronic liver disease; it is correlated with albumin and the platelet count.

VI104-ED-SUA7 Left Gastric Artery: Anatomy, Variants and Clinical Applications

Station #7

Participants
Amir Noor, MD, New York, NY (*Presenter*) Nothing to Disclose
Edward Kim, MD, New York, NY (*Abstract Co-Author*) Consultant, Koninklijke Philips NV Advisory Board, Onyx Pharmaceuticals, Inc Advisory Board, Nordion, Inc
Robert A. Lookstein, MD, New York, NY (*Abstract Co-Author*) Consultant, Boston Scientific Corporation;
Scott Nowakowski, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Rahul S. Patel, MD, New York, NY (*Abstract Co-Author*) Consultant, Sirtex Medical Ltd Research Consultant, Medtronic, Inc Consultant, Penumbra, Inc Consultant, Terumo Corporation
Aaron M. Fischman, MD, Harrison, NY (*Abstract Co-Author*) Consultan, Surefire Medical, Inc Consultant, Terumo Corporation Speakers Bureau, Koninklijke Philips NV

TEACHING POINTS

The purpose of this exhibit:1. To review the different anatomic variations of the arterial supply of the liver and stomach2. To discuss the relevance of those anatomic variations with different hepatobiliary and gastric interventional procedures. 3. To focus on the importance of the left gastric artery and its variants, localization, and utilization in IR procedures.

TABLE OF CONTENTS/OUTLINE

ANATOMY OF THE CELIAC ARTERY AND ITS THREE BRANCHESRELATIONSHIP OF THE CELIAC TRUNCK WITH INTERVENTIONAL PROCEDURESCOMMON ANATOMICAL VARIANTS RELATED TO THE CELIAC AXIS WITH A FOCUS ON THE LEFT GASTRIC ARTERYDISCUSSION OF THE IMPORTANCE OF ANATOMICAL VARIANTS IN RELATION TO CURRENT AND FUTURE INTERVENTIONAL PROCEDURES

VI194-ED-SUA8 Advanced Interventional Techniques in the Removal of Non-retrievable and Complex Retrievable Inferior Vena Cava (IVC) Filters

Station #8

Participants
Ansar Z. Vance, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Assaf Graif, MD, Newark, DE (*Abstract Co-Author*) Nothing to Disclose
Omar Z. Chohan, DO, Newark, DE (*Abstract Co-Author*) Nothing to Disclose
Aaron L. Reposar, MD, Newark, DE (*Abstract Co-Author*) Nothing to Disclose
Mark J. Garcia, MD, Chadds Ford, PA (*Abstract Co-Author*) Boston Scientific Merit Medical
Daniel A. Leung, MD, Newark, DE (*Abstract Co-Author*) Nothing to Disclose
Kevin Lie, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
George Kimbiris, MD, Narberth, PA (*Abstract Co-Author*) Nothing to Disclose
Christopher J. Grilli, DO, Wilmington, DE (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. To review the history of and indications for IVC Filter Placement.2. Discuss the various types of IVC Filters available.3. Discuss the various interventional techniques available for the removal of non-retrievable and complex retrievable IVC Filters.4. Case-based pictorial description of the advanced endovascular maneuvers available for the removal non-retrievable and complex retrievable IVC Filters.

TABLE OF CONTENTS/OUTLINE

A. Background and Clinical Indications for IVC Filter Placement 1. History & Background 2. Clinical IndicationsB. Types of IVC Filters 1. Non-retrievable Filters 2. Retrievable FiltersC. Interventional Techniques 1. Dual Access a. Strategic b. Safety balloon 2. Sheath Options 3. Centering Techniques a. Snare-over-guidewire b. Snare-over-loop guidewire 3. Hangman Technique 4. Coaxial Double-Sheath Dissection 5. Laser-Assisted Double-Sheath Dissection 6. Endobronchial ForcepsD. Clinical Cases 1. Non-retrievable Greenfield IVC Filter Removal, placed 24 years prior 2. Non-retrievable TrapEase Filter Removal from right common iliac vein 3. Complex Celect Platinum IVC Filter Removal a. Complication of leg fracture embolized to the lung 4. Complex Gunther Tuplip IVC Filter Removal 5. Complex Optease IVC Filter RemovalE. Follow-up Protocols

VIS-SUB

Vascular Interventional Sunday Poster Discussions

Sunday, Nov. 27 1:00PM - 1:30PM Room: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
Gretchen M. Foltz, MD, Saint Louis, MO (*Moderator*) Nothing to Disclose
Hyeon Yu, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose

Sub-Events

VI224-SD-SUB1 Comparison of Microwave Absorption of [18F]-FDG and Spherical Nanocarbon to Assist in Thermal Ablation for Cancer Therapy

Station #1

Participants
Ana M. Franceschi, MD, New York, NY (*Presenter*) Nothing to Disclose
Mark DeSantis, DO, MS, Northport, NY (*Abstract Co-Author*) Nothing to Disclose
Thomas Dalessandro, MD, Northport, NY (*Abstract Co-Author*) Nothing to Disclose
Caitlin Dolan, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Evaluation of hydrogen free spherical nanocarbon (Graphonyx) injected into human breast and prostate carcinoma animal models has been discussed by Desantis et al 2014. It is known that Graphonyx spherical nanocarbon increases the absorption of microwave energy specifically into tumor cells. This study evaluated the use of [18F]-FDG vs spherical nanocarbon as primary ablation time sequence in egg whites.

METHOD AND MATERIALS

Microwave antenna ablation time sequence in liquid egg whites was evaluated using 3 parameters: plain egg whites, egg whites with [18 F]-FDG additive and egg whites with spherical nanocarbon. In the 'treatment' group: FDG, nanocarbon and viscous carrier were introduced into egg whites. Medwaves Avecure generators with MRI safe microwave probes were used for thermal ablation with short cycle power using 15 watts at up to 300 sec as baseline settings. Target temperature within the egg white was 60IC.

RESULTS

To achieve an adequate ablation zone, the liquid egg whites take at least 300 seconds for significant denaturing of proteins. With introduction of [18 F]-FDG, the ablation time was reduced to 270 seconds, however, with spherical nanocarbon this time was reduced to 40 seconds.

CONCLUSION

Spherical Nanocarbon maximizes energy transfer with conversion of microwave energy causing thermal ablation. Some shortening of protein denaturing time was also noted with [F18]-labeled FDG. By using shorter treatment times and lower power output of the microwave generator spherical nanocarbon reduce the heat sink effect and surrounding tissue damage further.

CLINICAL RELEVANCE/APPLICATION

Nanocarbon-assisted microwave therapy using MRI safe microwave probes displays significant thermal energy transfer in comparison to [F18]-FDG. Shorter treatment times may be beneficial in cancer therapy.

VI225-SD-SUB2 Remote Ischemic Conditioning Temporarily Improves heart and Brain Antioxidant Defense

Station #2

Awards
Student Travel Stipend Award

Participants
Felipe L. Costa, MD , Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Abdallah de Paula Houat, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Pedro Panizza, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Claudia D. Leite, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Research Grant, General Electric Company
Giovanni G. Cerri, MD, PhD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Marcos R. Menezes, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The syndrome of ischemia and reperfusion (IR) is the main contributor to the mortality and morbidity after a revascularization procedure. In addition to early reperfusion, tissue conditioning by alternating intervals of brief IR episodes is currently the best approach to limit tissue damage. Tissue conditioning is currently being clinically applied locally, through direct intermittent artery clamping. This technique can also be applied in other tissues but those under ischemic distress, what has been called remote ischemic conditioning (RIC), where brief IR cycles in the leg can attenuate a remote IR injury. RIC does not require direct intermittent clamping of an artery, so it could be easily applied during endovascular procedures. RIC induced-protection mechanisms are barely understood, so we evaluated if it works in the heart and brain, through the enhancement of cells antioxidant defense.

METHOD AND MATERIALS

21 Wistar rats were assigned into 3 groups: SHAM: same procedure as in the remaining groups was performed, but no remote ischemic conditioning was carried out. RIC 10: RIC protocol was carried out. 10 minutes after the end of RIC protocol, heart and brain were harvested. RIC 60: Similar procedure as performed in RIC 10, but the heart and brain were harvested 60 min after the end of RIC protocol. RIC protocol consisted of 3 cycles of 5 min left hind limb ischemia followed by 5 min left hind limb perfusion, lasting 30 min in total. Heart and brain samples were used to measure the tissue Antioxidant Capacity.

RESULTS

RIC increased heart and brain antioxidant capacity after 10 minutes (0.746 ± 0.160 / 0.801 ± 0.227 mM/L) when compared to SHAM (0.523 ± 0.078 / 0.404 ± 0.124 mM/L). 60 minutes after RIC, no enhancement on heart or brain antioxidant capacity was detected (0.551 ± 0.073 / 0.455 ± 0.107 mM/L).

CONCLUSION

This is the first demonstration that remote ischemic conditioning enhances heart and brain antioxidant defenses, creating a short window of protection against IR injury. Proper timing and better understand of its mechanisms can turn RIC into an important tool to attenuate IR injury in endovascular procedures.

CLINICAL RELEVANCE/APPLICATION

Remote ischemic conditioning temporarily increases heart and brain antioxidant capacity and might helpful during endovascular procedures to attenuate ischemia and reperfusion injury.

VI226-SD-SUB3 Three Dimensional Magnetic Resonance Black-Blood Thrombus Imaging for the Diagnosis of Deep Vein Thrombosis: Initial Experience

Station #3

Participants
Hanwei Chen, Guangzhou, China (*Presenter*) Nothing to Disclose
Li Wang, MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Chen Huang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Guoxi Xie, Shenzhen, China (*Abstract Co-Author*) Nothing to Disclose
Jianke Liang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Wei Deng, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Zhuonan He, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yufeng Ye, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Xueping He, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Qi Yang, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Debiao Li, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Zhaoyang Fan, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate a three dimensional (3D) magnetic resonance (MR) black-blood thrombus imaging (BTI) technique for the diagnosis of deep vein thrombosis (DVT).

METHOD AND MATERIALS

This IRB-approved study was performed on a 3T system (Siemens Tim Trio) with two standard 6-channel body coils and an integrated spine coil. Informed consent was obtained from all subjects. The BTI was conducted in 18 DVT patients (from subacute to chronic stage) to evaluate its diagnostic performance through a comparison with two clinically used MR techniques, contrast-enhanced MR venography (CE-MRV) and 3D gradient-echo with magnetization preparation (MPRAGE). Scan parameters of BTI included: 3D coronal scan with a 352-mm craniocaudal coverage, spatial resolution of 1.1×1.1×(1.1-1.3) mm3, scan time < 5 min. Two radiologists blinded to patients' clinical information and imaging protocols independently made diagnosis of DVT (presence or absence) and provided diagnosis confidence scores (1–poor, 4–excellent) on a per-segment basis for BTI, MPRAGE, and CE-MRV, respectively. Using the consensus diagnosis of CE-MRV as the reference, the sensitivity (SE), specificity (SP), positive and negative predictive values (PPV and NPV), and accuracy (ACC) of BTI and MPRAGE were calculated. Diagnostic agreement with the reference and interreader agreements for each technique were determined using Cohen κ test.

RESULTS

BTI allowed for direct visualization of the entire thrombus within the black-blood lumen regardless of the thrombus stage. In contrast, MPRAGE was sensitive only to part of the thrombus that presumably was at a subacute stage and contained high-T1-signal met-hemoglobin. Higher SE (90.4% vs. 67.6%), SP (99.0% vs. 97.4%), PPV (95.4% vs. 85.6%), NPV (97.8% vs. 92.9%) and ACC (97.4% vs. 91.8%) were obtained by BTI in comparison with MPRAGE. Good diagnostic confidence and excellent diagnostic and interreader agreements were achieved by BTI (3.42±0.73, κ=0.92 & κ=0.89, respectively), which were considerably higher to MPRAGE (2.31±0.62, κ=0.71 & κ=0.64, respectively).

CONCLUSION

BTI allows direct visualization of DVT within dark venous lumen and has the potential to be a reliable screening tool for the assessment of DVT without the use of contrast medium.

CLINICAL RELEVANCE/APPLICATION

BTI has the potential to be a reliable screening tool for detecting DVT without the need for contrast medium.

VI227-SD-SUB4 The Maximum Diameter of the Pancreaticoduodenal Arcade on CT Angiograms Can Predict the Blood Flow from the Superior Mesenteric- To the Proper Hepatic Artery in Patients with Median Arcuate Ligament Syndrome

Station #4

Participants
Wataru Fukumoto, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Nobuo Kitera, RT, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Kenji Kajiwara, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Masaki Ishikawa, MD, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasutaka Baba, MD, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuo Awai, MD, Hiroshima, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation; Research Grant, Hitachi, Ltd; Research Grant, Bayer AG; Research Grant, Eisai Co, Ltd; Medical Advisor, General Electric Company; ; ; ; ;
Hidenori Mitani, Hiroshima, Japan (*Presenter*) Nothing to Disclose

PURPOSE

When the median arcuate ligament compresses the celiac axis it is known as median arcuate ligament syndrome (MALs). CT angiography (CTA) is useful for diagnosing MALs; its reported incidence is 1-4% in patients undergoing CT studies. Although most patients with MALs are asymptomatic, it can lead to abdominal pain, pancreaticoduodenal artery aneurysms, and hepatic ischemia after pancreaticoduodenectomy. Under the hypothesis that MALs is symptomatic in patients with physiological blood flow from the superior mesenteric- to the proper hepatic artery (SMA, PHA) we assessed whether CTA findings can predict the degree of blood flow from the SMA to the PHA.

METHOD AND MATERIALS

We retrospectively reviewed superior mesenteric arteriograms (SMAGs) from 1013 patients and identified 23 with physiological blood flow from SMA to the PHA due to MALs (20 men, 3 women; median age 69 years, range 47-90 years). They were classified as type A (scant flow from the SMA to the PHA, n=8) and type B (visible flow from the SMA to the PHA, n=15). We recorded the maximum and minimum diameter of the celiac axis and calculated its stenosis ratio (maximum / minimum diameter) on CTA images. We also measured the maximum diameter of the pancreaticoduodenal arcade (PDA).

RESULTS

The stenosis ratio of the celiac axis was 2.66 (SD 1.04) for type A and 1.86 (SD 1.62) for type B ($p=0.16$, t-test). The maximum diameter of the PDA was 2.1 (SD 1.0)- and 4.6 (SD 1.4) mm in type A and B, respectively ($p<0.01$). When the maximum diameter of the PDA exceeded 4 mm, sensitivity was 80% and specificity was 88% for type B.

CONCLUSION

The maximum diameter of the PDA on CTA images can predict blood flow from the SMA to the PHA.

CLINICAL RELEVANCE/APPLICATION

The maximum diameter of the PDA on CTA images may correlate with symptomatic MALs.

VI228-SD-SUB5 Evaluation of Optimal keV for both CT Portal Venography and Liver Parenchyma Observation using Advanced Monoenergetic Technique

Station #5

Participants
Wang Gang, Baotou, China (*Presenter*) Nothing to Disclose
Zhang Haocheng, Baotou, China (*Abstract Co-Author*) Nothing to Disclose
Zhang Sijing, Baotou, China (*Abstract Co-Author*) Nothing to Disclose
Wang Xiuli, Baotou, China (*Abstract Co-Author*) Nothing to Disclose
Yu Yang, MENG, Shenyang, China (*Abstract Co-Author*) Employee, Siemens AG;

PURPOSE

Portal venography has been proved to be much more distinct in virtual monochromatic images which incredibly increased the CNR of vein under low keV. However, which keV setting is optimal for both portal venography and liver parenchyma observation especially using the advance monoenergetic technique is still uncertain. The aim of this study is to find out the best keV setting which could balance portal vein contrast and parenchyma SNR at the same time.

METHOD AND MATERIALS

We consecutively selected 126 patients who underwent multi-phase liver enhancement scanning in our hospital and assigned them into two groups randomly. 65 of them received dual energy portal venography using the 3rd generation DSCT scanner (SOMOTAM Force); while others were scanned using single energy under SOMOTAM Definition AS (120kV, Quality ref. current 250 mAs, FBP kernel B30f, pitch 1 and rotation time 0.5s). Portal vein attenuation was compared between 40, 50, 60, 70keV images and conventional 120kV images. Contrast enhancement was assessed by calculating portal vein to liver parenchyma CNR in the same axial slice. Meanwhile, noise of the images was evaluated by calculating SD and SNR in liver parenchyma.

RESULTS

All monochromatic images from 40~70keV get a higher CT value than the single energy images (552.54±100.98HU@40keV vs. 174.61±33.14HU@120kV, $p<0.05$). Portal vein contrast to the background was also found best at 40keV which goes up to 1.78±0.65. However, mean attenuation SD and SNR at liver parenchyma was much better when keV setting goes up. The best SD and SNR were found at 70keV (10.13±0.97 and 9.62±2.06) which is significantly different from other groups.

CONCLUSION

Low keV monochromatic image can significantly improve the contrast of portal vein while maintaining a superior low noise level.

CLINICAL RELEVANCE/APPLICATION

To observe portal vein and liver parenchyma lesions at the same time we would highly recommended using 50keV images which would make good balance between CNR and SNR.

VI229-SD-SUB6 Correlative Research on Transitional Region Residual Cancer HIF-1α and Ki-67 Expressions after Microwave Ablation Therapy of Colorectal Liver Metastases Tumor

Station #6

Participants
Guoning Zhang, Shenyang, China (*Presenter*) Nothing to Disclose
Zhaoyu Liu, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Zhihui Chang, BMedSc, MMed, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Chuanzhuo Wang, BMedSc, MMed, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Discuss on transitional region residual cancer HIF-1α and Ki-67 expression and correlation, to clear the value of hypoxia and tumor cell proliferation on liver metastases cancer transitional region residual cancer development after microwave ablation therapy.

METHOD AND MATERIALS

30 compliant SD rats accepted CRC HT-29 planting on left lobe of liver,when HRCT showed all SD rats were seen liver tumor with diameter of 2-3 cm ,then randomly and evenly divided into two groups,15 rats each in microwave ablation group (receiving microwave ablation) and control group (sham microwave ablation). 5 SD rats were sacrificed at day 1,7 and 14 in each group after microwave ablation therapy. Meanwhile cut high temperature coagulation necrosis tissue and 1 cm on the edge area tissue as residual cancer samples in microwave ablation group, and cut tumor tissue in control group as samples. Apply immunohistochemistry SP to test HIF-1α and Ki-67 expression respectively, and analysis experiment data differences by SPSS software.

RESULTS

①Immunohistochemistry showed: In control group, at each time point the large number of HIF-1α and Ki-67 expression were seen, and with cancer cell proliferating, expression levels were significantly increased. In microwave ablation therapy group, after Day 1&7, HIF-1α and Ki-67 expression intensity was significantly lower than the control group($P<0.05$). But at day 14, microwave ablation group HIF-1α and Ki-67 expression levels increased to the level only slightly lower than the control group ($P> 0.05$).②Correlative analysis:HIF-1α and Ki-67 expression levels have a significant positive correlation ($P <0.05$).

CONCLUSION

①HIF-1a and Ki-67 showed high positive expression in CRLM, and they had a significant correlation, indicating that hypoxia and tumor cell proliferation can promote the residual cancer deterioration progress each other. HIF-1α and Ki-67 It can be used as simple to evaluate degree of cancer deterioration progress. ②In the first 7 days after microwave ablation therapy of CRLM, residual cancer tissue showed inhibition state, the degree of hypoxia-induced tumor angiogenesis and tumor cell proliferation was lower. While at day 14,it showed an increase on tumor angiogenesis, and tumor cell proliferation was significantly enhanced.

CLINICAL RELEVANCE/APPLICATION

Although residual tumor is suppressed after microwave ablation in a short term, it still needs further clinical treatment.

VI279-SD-SUB7 Technical Development: MRI-TRUS Fusion for Electrode Positioning during Irreversible Electroporation for Treatment of Localized Prostate Cancer

Station #7

Participants
Alexander D. Baur, MD, Berlin, Germany (*Presenter*) Speaker, Bayer AG
Federico Collettini, MD, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Judith Enders, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Andreas Maxeiner, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Carsten Stephan, MD, PhD, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Bernhard Gebauer, MD, Berlin, Germany (*Abstract Co-Author*) Research Consultant, C. R. Bard, Inc ; Research Consultant, Sirtex Medical Ltd; Research Grant, C. R. Bard, Inc; Research Consultant, PAREXEL International Corporation; Travel support, AngioDynamics , Inc
Bernd K. Hamm III, MD, Berlin, Germany (*Abstract Co-Author*) Research Consultant, Toshiba Corporation Stockholder, Siemens AG Stockholder, General Electric Company Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Siemens AG Research Grant, General Electric Company Research Grant, Elbit Imaging Ltd Research Grant, Bayer AG Research Grant, Guerbet SA Research Grant, Bracco Group Research Grant, B. Braun Melsungen AG Research Grant, KRAUTH medical KG Research Grant, Boston Scientific Corporation Equipment support, Elbit Imaging Ltd Investigator, CMC Contrast AB
Thomas Fischer, MD, Berlin, Germany (*Abstract Co-Author*) Speaker, Toshiba Corporation; Advisory Board, Toshiba Corporation

PURPOSE

To introduce a new technical approach for image-guided positioning of needle-like electrodes for irreversible electroporation (IRE) in patients with localized prostate cancer (PCa) using a magnetic resonance imaging (MRI) transrectal ultrasound (TRUS) fusion technique.

METHOD AND MATERIALS

Patients undergoing IRE of the prostate for treatment of biopsy-proven localized PCa between October 2014 and November 2015 participating in a prospective study were included. Three to 4 needle-like monopolar 19 G electrodes were inserted into the prostate through a brachytherapy grid using a transperineal approach. Multiparametric MRI of the prostate acquired before IRE was fused with TRUS images acquired during IRE using a rigid image fusion algorithm. On MRI the target volume was delineated; the exact position of the electrodes was visualized in real-time on ultrasound images. Goal was to enclose the target volume in its maximal extension within the electrodes and therefore within the estimated ablation zone. The distance between electrodes was measured on ultrasound imaging. Based on these measurements the proprietary software installed on the IRE unit was able to

calculate the voltage necessary to generate the electric field for ablation.

RESULTS

In 10 consecutive patients with localized prostate cancer undergoing IRE using the described technical approach satisfactory positioning of the electrodes around the target volume was achieved. The target lesion as well as a safety margin was covered within the estimated ablation zone whilst critical structures (e.g. neurovascular bundle, urethra, rectum) were excluded to the greatest possible extent. In all patients a loss of tissue perfusion within the ablation zone was documented by contrast-enhanced TRUS one day after IRE. The extension of the ablation zone corresponded well with the estimated ablation zone in all patients.

CONCLUSION

In patients with localized prostate cancer MRI-TRUS fusion allows exact positioning of the electrodes under real-time image guidance. This technical approach combines the advantages of optimal visualization of the target lesion on MRI with the ability of TRUS to acquire imaging in real-time with a mobile device.

CLINICAL RELEVANCE/APPLICATION

MRI-TRUS fusion allows improved positioning of the electrodes used for IRE under real-time image guidance and thereby improved control of the shape and extensions of the ablation zone in the prostate.

VI196-ED-SUB8 The Many Faces of Pediatric Renovascular Hypertension

Station #8

Participants
Arkadiy Palvanov, MD, New Hyde Park, NY (*Presenter*) Nothing to Disclose
Jacqueline Siegel, New Hyde Park, NY (*Abstract Co-Author*) Nothing to Disclose
David N. Siegel, MD, Woodmere, NY (*Abstract Co-Author*) Consultant, St. Jude Medical , Inc

TEACHING POINTS

Renovascular hyptertension (RVH) accounts for up to 10% of children with secondary hypertension (HTN). Unlike adults, in whom the most common cause of RVH is atherosclerotic disease, the most common cause of pediatric RVH is fibromuscular dysplasia (FMD), with less common causes including congenital vascular malformations, arteritis and neurofibromatosis type I (NF-I). Renal vein renin sampling and digital subtraction angiography (DSA) are performed when renovascular disease is suspected as the etiology of HTN in a child. IR procedures such angioplasty, stent placement, embolization, and alcohol ablation are potential curative therapy options for a child with RVH.

TABLE OF CONTENTS/OUTLINE

Discuss the definition and background information of RVH, including the causes, risk factors, pathophysiology, presentation, natural history and prognosis. Present various etiologies for RVH, including FMD, renal arterial venous malformation (AVM), and NF-I. Discuss renal vein renin sampling, which in conjunction with DSA can accurately and definitively diagnose and localize this condition. Use a variety of cases of RVH to demonstrate different types of renal vascular abnormalities. Discusss different treatment approaches and present cases to demonstrate successful interventions, resulting in cure or improvement of RVH in this patient population. Summary

VSIO11

Interventional Oncology Series: Renal and GU Tumors

Sunday, Nov. 27 1:30PM - 6:00PM Room: S405AB

GU IR

AMA PRA Category 1 Credits ™: 4.50
ARRT Category A+ Credits: 2.00

FDA Discussions may include off-label uses.

Participants
Debra A. Gervais, MD, Boston, MA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To appraise the benefits of partial nephrectomy, active surveillance, and tumor ablation (including multiple technology platforms) for RCC. 2) To assess results of renal tumor ablation including published literature and early registry findings. 3) To appraise the role of imaging and biopsy in clinical management decisions in patients considered for tumor ablation. 4) To describe the role of tumor ablation in GU tumors outside the kidney such as prostate tumors, adrenal masses, gynecologic tumors, and RCC metastases.

ABSTRACT

Sub-Events

VSIO11-01 Tumor Ablation and the Renal Mass-Changing Management Paradigms Beyond Guidelines

Sunday, Nov. 27 1:30PM - 1:45PM Room: S405AB

Participants
Debra A. Gervais, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under the main course title.

Honored Educators

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

Debra A. Gervais, MD - 2012 Honored Educator

VSIO11-02 T1b- Tumor Ablation

Sunday, Nov. 27 1:45PM - 2:00PM Room: S405AB

Participants
Thomas D. Atwell, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under the main course title.

VSIO11-03 New versus Old Technology for Renal Tumor Ablation: Are Outcomes Impacted?

Sunday, Nov. 27 2:00PM - 2:15PM Room: S405AB

Participants
Stephen B. Solomon, MD, New York, NY (*Presenter*) Research Grant, General Electric Company

LEARNING OBJECTIVES

View learning objectives under the main course title.

VSIO11-04 Trajectory of Recovery Following Renal Tumor Ablation Based on Patient Reported Outcomes

Sunday, Nov. 27 2:15PM - 2:25PM Room: S405AB

Participants
Georgianna Schultz, RN, Rochester, MN (*Presenter*) Nothing to Disclose
Thomas D. Atwell, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Lavonne Speer, RN, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Kristin Saari, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Grant D. Schmit, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Kathleen Yost, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Anil N. Kurup, MD, Rochester, MN (*Abstract Co-Author*) Research Grant, Galil Medical Ltd; Royalties, UpToDate, Inc
Robert Thompson, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine characteristics of patient recovery following renal tumor ablation based on patient reported outcomes (PROs).

METHOD AND MATERIALS

We derived a battery of questions felt to best measure outcomes following renal tumor ablation using the National Institute of Health's Patient Reported Outcome Measurement Information System (PROMIS) short forms, Brief Pain Inventory (BPI) and 0-10 numerical rating scales (NRS). Outcomes included patient reported pain, physical function (PF), and social activity (SA). Baseline measurements were obtained the day prior to ablation. Subsequent outcomes were then measured at days 1-7 following treatment and 30 days following treatment.

RESULTS

From 2/10/2016 to 3/29/2016, 25 patients had agreed to participate. On day 1 (T1) following ablation, 11/23 (48%) of patients felt that they had completely recovered from the ablation procedure, and average pain NRS question mean score (range 0-10) was 1.52, compared to 0.08 at baseline. 20 patients completed the assessment 7 days (T7) following ablation, with average pain, overall PWB, and overall SA NRS questions improved compared to the T1 assessment, but not quite returned to baseline levels. However, the differences between T7 and pre-procedure scores were much lower than the clinical meaningful difference for a 0-10 scale of 2 points. Seven patients have completed the 30 day assessment at the time this interim dataset was created. Average pain had a mean score of 0.00 which means all 7 patients rated their pain as 0=no pain. PROMIS PWB and SA short forms showed meaningful improvement from T7 to T30 and were essentially consistent with baseline scores.

CONCLUSION

Based on patient reported outcome measurements, pain following renal tumor ablation is minimal. Patients report very little impact on PF and SA, and any such impact resolves quickly following treatment. Continued assessment of PROs will provide evidence to direct quality patient care and assist in patient education.

CLINICAL RELEVANCE/APPLICATION

Patient reported outcomes may allow a procedural practice to track impact of treatment on different aspects of patient well-being. Specific impacts may then be addressed to improve the quality of one's practice.

VSIO11-05 Renal Tumor Ablation Registries and Early ARMOR Findings

Sunday, Nov. 27 2:25PM - 2:40PM Room: S405AB

Participants
Jeremy C. Durack, MD, New York, NY (*Presenter*) Scientific Advisory Board, Adient Medical Inc; Investor, Adient Medical Inc;

LEARNING OBJECTIVES

1) Understand the benefits and drawbacks of registry studies and how registries contribute to our knowledge of renal ablation outcomes.

ABSTRACT

VSIO11-06 Partial Nephrectomy and Tumor Ablation: The Urologist Perspective

Sunday, Nov. 27 2:40PM - 2:55PM Room: S405AB

Participants
Sarah P. Psutka, MD, MSc, Chicago, IL, (spsutka@cookcountyhhs.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the indications for partial nephrectomy and tumor ablation for small renal masses. 2) Describe partial nephrectomy techniques, risks, and benefits. 3) Compare and contrast the potential risks and complications of partial nephrectomy vs. tumor ablation. 4) Discuss the comparative oncologic outcomes following both partial nephrectomy and tumor ablation. 5) Describe decision-making strategies and decision-aids that may be utilized to optimize the individualized selection of treatment for a small renal mass, taking into account patient-specific factors and competing risks of comorbidities.

ABSTRACT

VSIO11-07 Decision Making: Active Surveillance - When to Follow and When to Intervene

Sunday, Nov. 27 2:55PM - 3:10PM Room: S405AB

Participants
Stuart G. Silverman, MD, Brookline, MA, (sgsilverman@partners.org) (*Presenter*) Author, Wolters Kluwer nv

LEARNING OBJECTIVES

View learning objectives under the main course title.

VSIO11-08 Decision Making: Nephrometry Revisited - The Truth about Nephrometry and Ablation

Sunday, Nov. 27 3:10PM - 3:25PM Room: S405AB

Participants
Grant D. Schmit, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under the main course title.

VSIO11-09 Maximum tumor diameter is superior to the R.E.N.A.L. nephrometry and P.A.D.U.A. scores for prediction of local recurrence following renal cell carcinoma ablation

Sunday, Nov. 27 3:25PM - 3:35PM Room: S405AB

Participants
Aaron W. Maxwell, MD, Providence, RI (*Presenter*) Nothing to Disclose
Grayson L. Baird, PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Damian E. Dupuy, MD, Providence, RI (*Abstract Co-Author*) Research Grant, NeuWave Medical Inc Board of Directors, BSD Medical Corporation Stockholder, BSD Medical Corporation Speaker, Educational Symposia

PURPOSE

To evaluate the performance of the R.E.N.A.L. nephrometry and P.A.D.U.A. scoring systems and other tumor biometrics with respect to prediction of local tumor recurrence following thermal ablation for renal cell carcinoma.

METHOD AND MATERIALS

This HIPAA-compliant study was performed with a waiver for informed consent following institutional review board approval. A retrospective evaluation of 207 consecutive patients (131 male, 76 female; mean age 71.9 ± 10.9 years) with 217 biopsy-proven renal cell carcinoma tumors treated with thermal ablation was conducted. Serial post-ablation CT or MR imaging was used to evaluate for local tumor recurrence. For each tumor, R.E.N.A.L. nephrometry and P.A.D.U.A. scores were calculated using imaging-derived tumor morphology data. Several additional tumor biometrics and combinations thereof were also measured, including maximum tumor diameter. Harrell's C index and hazard regression techniques were used to quantify associations with local tumor recurrence.

RESULTS

The R.E.N.A.L. (H.R.=1.43, p=0.003) and P.A.D.U.A. (H.R.=1.80, p<0.0001) scores were significantly associated with recurrence by regression techniques but demonstrated only poor to fair discrimination by Harrell's C index (C=0.68 and 0.75, respectively). Maximum tumor diameter showed the highest discriminatory strength of any individual variable evaluated (C=0.81) and was also significantly predictive by regression techniques (H.R.=2.98, p<0.0001). For every 1 cm increase in diameter, the estimated rate of recurrence risk increased by 198%.

CONCLUSION

Maximum tumor diameter demonstrates superior performance relative to existing tumor scoring systems and other evaluated biometrics for prediction of local tumor recurrence following renal cell carcinoma ablation.

CLINICAL RELEVANCE/APPLICATION

Maximum tumor diameter alone should be considered for use in place of existing scoring systems when stratifying patients according to predicted local tumor recurrence risk prior to thermal ablation for renal cell carcinoma.

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/

Damian E. Dupuy, MD - 2012 Honored Educator

VSIO11-10 Ablation of Renal Cancer Metastases

Sunday, Nov. 27 3:40PM - 3:55PM Room: S405AB

Participants
Matthew R. Callstrom, MD, PhD, Rochester, MN, (Callstrom.matthew@mayo.edu) (*Presenter*) Research Grant, Thermedical, Inc Research Grant, General Electric Company Research Grant, Siemens AG Research Grant, Galil Medical Ltd

LEARNING OBJECTIVES

1) Describe patients that are appropriate for ablation for renal cell metastases. 2) Describe the relative role of ablation with other treatments for renal cell metastases. 3) Describe outcome of the use of ablation for the treatment of renal cell metastases.

VSIO11-11 Ablation of Cystic Renal Masses: Special Considerations and Outcomes

Sunday, Nov. 27 3:55PM - 4:10PM Room: S405AB

Participants
Steven S. Raman, MD, Santa Monica, CA, (sraman@mednet.ucla.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1. Background on Cystic Renal Masses2. Imaging of Cystic Renal Masses3. Reasons for intervention and ablation4. Tips and Tricks for Optimal Ablation5. Outcomes

ABSTRACT

Cystic renal masses account for less than 10% of renal malignancies and are generally indolent. In this talk, I will discuss treatment of cystic renal masses in the context of their demographics and clinical behavior.

VSIO11-12 Renal Mass Ablation Imaging Follow Up: Challenging Cases

Sunday, Nov. 27 4:10PM - 4:25PM Room: S405AB

Participants
Anil N. Kurup, MD, Rochester, MN, (kurup.anil@mayo.edu) (*Presenter*) Research Grant, Galil Medical Ltd; Royalties, UpToDate, Inc

LEARNING OBJECTIVES

1) Protocol CT and MRI scans for post renal mass ablation follow up. 2) Recognize residual/recurrrent renal cell carcinoma and its mimics following renal mass ablation. 3) Detect common and uncommon complications related to renal mass ablation.

ABSTRACT

VSIO11-13 Advances in Renal Mass Biopsy: Implications for Decision Making

Sunday, Nov. 27 4:25PM - 4:40PM Room: S405AB

Participants
William W. Mayo-Smith, MD, Boston, MA (*Presenter*) Author with royalties, Reed Elsevier; Author with royalties, Cambridge University Press

LEARNING OBJECTIVES

View learning objectives under the main course title.

VSIO11-14 Embolization of Renal Masses and Metastases: Update

Sunday, Nov. 27 4:40PM - 4:55PM Room: S405AB

Participants
Kamran Ahrar, MD, MBA, Houston, TX, (kahrar@mdanderson.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Outline current clinical indications for embolotherapy in patients with renal cell carcinoma and its metastases. 2) Describe the use of different embolic agents for embolization of renal tumors and its metastases. 3) List potential complications of embolotherapy in patients with renal cell carcinoma and its metastases.

LEARNING OBJECTIVES

View learning objectives under the main course title.

VSIO11-15 MRI Guided Ablation of Localized and Recurrent Prostate Cancer

Sunday, Nov. 27 4:55PM - 5:10PM Room: S405AB

Participants
David A. Woodrum, MD, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under the main course title.

VSIO11-16 Biophysics, Mechanics and Technique of Irreversible Electroporation (IRE) of Prostate Cancer - Why and How We Do It Differently from (Almost) Everybody Else

Sunday, Nov. 27 5:10PM - 5:20PM Room: S405AB

Participants
Michael K. Stehling, MD, PhD, Offenbach, Germany (*Presenter*) Investor, InterScience GmbH
Enric Guenther, Dipl Phys, Frankfurt, Germany (*Abstract Co-Author*) Investor, InterScience GmbH
Stephan Zapf, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Rachid El-Idrissi, Offenbach, Germany (*Abstract Co-Author*) Nothing to Disclose
Nina Klein, MSc, Offenbach am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Boris Rubinsky, PhD, Berkeley, CA (*Abstract Co-Author*) Consultant, InterScience GmbH

PURPOSE

We have employed Irreversible Electroporation (IRE) to treat prostate cancer (PCa) in over 380 patients within 5.5 years. Our technique, based on the biophysics of IRE and our practical experience, differs from that employed others, who emulate brachytherapy. We demonstrate the rationale and technical details of our approach and explain, why we consider it superior.

METHOD AND MATERIALS

Computer simulations, in-vitro and in-vivo studies: Based on mass collected impedance data we carried out theoretical, gel-phantom and animal studies to understand the E-field geometry under non-standard electrode geometries (non-parallel, unequal exposure length, etc.), and the effects of the electric current, e.g. electrolysis with gas formation, changes in pH and thermal effects. Mechanics and geometry of electrode placement: Contrary to others, we do not use a brachytherapy grid. This affords higher accuracy electrode positions adjusted to the prostate's shape. Also, grid and prostate move relative to each other during IRE, due to muscle contractions.Diagnostic work-up and follow-up: We employ multi-parametric MRI for treatment planning and follow-up. In most patients, we employ additional 3D-mapping biopsy to determine tumour and Gleason score distribution.

RESULTS

During IRE electric currents induce electrolysis, causing gas formation, pH changes, generation of cytotoxic chemicals and temperature rises. These effects can be minimized by adjusting the IRE pulse parameters.Placement of the IRE electrodes without a grid affords higher accuracy (1-2 vs. 5-9 mm) of the electrode positions. It allows non-parallel, shifted and angled electrode geometries better adjusted to the shape of the prostate without affecting the ablation reliability. It also avoids electrode displacement during IRE.Optimal ablation field planning requires MRI and 3D-biopsy which provide complementary information in most cases.

CONCLUSION

Based on biophysics, mechanics and experience we have develop an optimized IRE technique for the treatment of prostate cancer.

Techniques following the brachytherapy approach are suboptimal and potentially harmful to the patient.

CLINICAL RELEVANCE/APPLICATION

Irreversible Electroporation (IRE) is a powerful but complex technology. Understanding of the biophysics and mechanics is required to optimize the interventional technique to minimize toxicity and achieve optimal clinical results in the treatment of prostate cancer.

VSIO11-17 Ablation for Benign and Malignant Gynecologic Tumors

Sunday, Nov. 27 5:20PM - 5:35PM Room: S405AB

Participants
Peter J. Littrup, MD, Providence, RI (*Presenter*) Founder, CryoMedix, LLC; Research Grant, Galil Medical Ltd; Research Grant, Endo International plc; Consultant, Delphinus Medical Technologies, Inc

LEARNING OBJECTIVES

View learning objectives under the main course title.

VSIO11-18 Effect of Radiofrequency Ablation (RFA) Heating Parameters and the Suppression of Resultant Heat Shock Proteins on Induced Systemic Tumor Growth in a Small Animal Tumor Model

Sunday, Nov. 27 5:35PM - 5:45PM Room: S405AB

Participants
Gaurav Kumar, PhD, Boston, MA (*Presenter*) Nothing to Disclose
S. Nahum Goldberg, MD, Jerusalem, Israel (*Abstract Co-Author*) Consultant, AngioDynamics, Inc; Research support, Cosman Medical, Inc; Consultant, Cosman Medical, Inc;
Tatyana Levchenko, Pharm D, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Marwan Moussa, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Svetlana Gourovich, BSC, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To study variable hepatic RFA heating parameters on activation of heat shock proteins (HSPs) and their effect on modulating distant tumor growth.

METHOD AND MATERIALS

First, effect of RFA parameters on local HSP70 expression and cellular infiltration was studied. 24 F344 rats received hepatic RFA(21g electrode, 1 cm tip) at one of three RFA doses that induced the same-sized ablation: 60ICx10min, 70ICx5min, or 90ICx2min, or sham electrode placement without RFA(4 arms, n=6/group). Immunohistochemistry(IHC) of HSP70 at 24h and α-SMA (myofibroblasts), CD68(macrophages), and CDC47(cell proliferation) at 7d was performed (n=3/group). Next, to study RFA dose effects on distant tumor growth, animals with subcutaneous R3230 adenocarcinoma(10±1mm) were assigned to 3 different RF doses or sham (n=6/arm). Post-RFA tumor growth rates, cellular proliferation(Ki-67), and microvascular density(MVD) were compared at 7d. Finally, each RF dose was combined with an adjuvant HSP inhibitor (micellar quercetin, 2mg/ml) to study local HSP70 suppression on hepatic RFA-induced distant tumor growth.

RESULTS

Hepatic RFA at 70ICx5 and 60ICx10 had more periablational HSP70 compared to 90ICx2m (rim: 334.5±79.3μm vs. 230.9±52.6μm, $p<0.001$), with similar trends for local α-SMA, CD68, and CDC47 ($p<0.01$ for all). Lower RF heating (70ICx5 and 60ICx10) also resulted in larger distant tumors at 7d (19.2±0.8mm for both) compared to sham(13.5±0.5mm,$p<0.001$ for all). By comparison, higher RF heating (90ICx2) led to less distant tumor growth at 7d (16.4±0.7mm, $p<0.01$ for both), though more than sham(13.5±0.5mm, $p<0.01$). Ki-67 and MVD correlated with tumor growth ($p<0.01$ for all). Anti-HSP70 MicQ blocked distant tumor growth at both low-RF (60ICx10: RF/MicQ 14.5±0.6mm vs. RF 19.1±0.6mm, $p<0.001$) and high-RF (90ICx2:RFA/MicQ 14.4±0.5mm vs. RFA:16.4±0.7mm,$p<0.01$) arms.

CONCLUSION

Different hepatic RF heating parameters alter the extent of periablational HSP70 expression, which in turn stimulates variable distant tumor growth in small animals. Modulation of RF heating parameters alone or in combination with adjuvant nanodrug HSP inhibition can reduce these unwanted, off-target systemic tumorigenic effects.

CLINICAL RELEVANCE/APPLICATION

Modulating RFA heating parameters with or without adjuvant anti-HSP70 drugs can mitigate the 'off-target' tumorigenic effects that can substantially effect clinical practice.

VSIO11-19 Adrenal Mass Ablation

Sunday, Nov. 27 5:45PM - 6:00PM Room: S405AB

Participants
Muneeb Ahmed, MD, Wellesley, MA, (mahmed@bidmc.harvard.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under the main course title.

ABSTRACT

RC114

Morbidity and Mortality

Sunday, Nov. 27 2:00PM - 3:30PM Room: S502AB

IR

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

Participants
Michael D. Darcy, MD, Saint Louis, MO (*Moderator*) Research funded, Cook Group Incorporated
Michael J. Lee, MD, Dublin, Ireland, (mlee@rcsi.ie) (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

I am a moderator

ABSTRACT

Moderator

Sub-Events

RC114A Oncologic M and M

Participants
Afshin Gangi, MD, PhD, Strasbourg, France, (gangi@unistra.fr) (*Presenter*) Proctor, Galil Medical Ltd

RC114B Most Memorable M and M

Participants
Michael D. Darcy, MD, Saint Louis, MO (*Presenter*) Research funded, Cook Group Incorporated

RC114C Vascular M and M

Participants
William Lea, MD, Milwaukee, WI (*Presenter*) Nothing to Disclose

RC114D Nononcologic Liver M and M

Participants
Michael J. Lee, MD, Dublin, Ireland (*Presenter*) Nothing to Disclose

RC131

Interventional Stroke Treatment: Practical Techniques and Protocols (An Interactive Session)

Sunday, Nov. 27 2:00PM - 3:30PM Room: S103AB

ER NR IR

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

Participants
Joshua A. Hirsch, MD, Boston, MA (*Moderator*) Consultant, Medtronic plc; Data Safety Monitoring Board, Johnson & Johnson;

LEARNING OBJECTIVES

1) Describe the diagnostic evaluation and decision making algorithms leading to urgent endovascular treatment of acute stroke. 2) Review endovascular techniques for the treatment of acute stroke from microcatheter set up to intraarterial thrombolysis to mechanical thrombectomy. 3) Discuss case examples of endovascular treatment including patient selection, technique, and pitfalls.

ABSTRACT

Rapid advances in the evaluation, selection, treatment and management of the acute stroke patient necessitates an ongoing educational event highlighing the newest information, techniques and strategies for obtaining the best outcomes for our patients. In this session, all of these topics will be covered in a practical "how to" and case based approach which is designed to help the practitioner implement best practices. The course is useful for those performing imaging, treatment or both. Analysis of the latest ongoing trials, devices and techniques will be presented. Endovascular tips and tricks will be discussed, as well as pitfalls in the treatment of these patients.

Sub-Events

RC131A Devices and Data that Support IA Treatment as the Standard of Care for Ischemic Stroke

Participants
Allan L. Brook, MD, Bronx, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

RC131B Optimizing Patient Selection with Imaging

Participants
Ramon G. Gonzalez, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the essential ischemic stroke physiology parameters that are essential in selecting patients for endovascular treatment of a large vessel occlusion. 2) Be familiar with the imaging methods that can measure ischemic stroke physiology parameters and their relative accuracy. 3) Use the best available evidence, recognize the optimal imaging approach to select patients with acute ischemic stroke for endovascular treatment.

RC131C Minimally Invasive Surgery for ICH - The Next Frontier

Participants
David J. Fiorella, MD, PhD, Stony Brook, NY (*Presenter*) Institutional research support, Siemens, AG; Institutional research support, Terumo Corporation; Institutional research support, Sequent Medical, Inc; Consultant, Medtronic plc; Consultant, Penumbra, Inc; Consultant, Sequent Medical, Inc; Consultant, Johnson & Johnson; Stockholder, Vascular Simulations LLC; Consultant, Vascular Simulations LLC; Owner, TDC Technologies; Owner, CVSL; Royalties, Johnson & Johnson; ; ;

LEARNING OBJECTIVES

1) Understand the essential ischemic stroke physiology parameters that are essential in selecting patients for endovascular treatment of a large vessel occlusion. 2) Be familiar with the imaging methods that can measure ischemic stroke physiology parameters and their relative accuracy. 3) Use the best available evidence, recognize the optimal imaging approach to select patients with acute ischemic stroke for endovascular treatment.

ABSTRACT

Properly selected patients with acute ischemic stroke caused by large vessel occlusion (LVO) may be effectively and safely treated endovascularly with modern thrombectomy devices. We have developed a high-precision imaging tool for selecting such patients. It is an experience and evidence-based clinical triage tool that uses advanced imaging to identify INDIVIDUAL patients most likely to benefit from endovascular stroke therapy. It was based on over a decade of using advanced imaging (CT, CTA, CT perfusion, DWI, MR perfusion) in acute stroke patients and a critical review of the literature and has been validated in clinical trials.

The approach focuses on answering the following key questions using modern imaging: 1. Is there a hemorrhage? Noncontrast CT
2. Is there an occlusion of the distal ICA and/or proximal MCA? CTA
3. Is irreversible brain injury below a specific threshold (e.g. <70ml)? DWI Perfusion imaging is not employed unless patients cannot undergo MRI, or they do not meet the criteria for intervention. Investigations to understand the reasons for the unsuitability of perfusion CT to substitute for DWI have revealed theoretical and practical shortcomings of CTP. A major problem is

the low signal-to-noise (SNR) ratio of CT perfusion that results in a poor contrast-to-noise (CNR) ratio in severely ischemic brain. In a comparison between DWI and CTP in over 50 consecutive patients with LVA, Schaefer, et al. showed that the mean CNR of DWI was >4 while it was <1 for CTP derived CBF. The poor CNR results in large measurement error: using Bland-Altman analyses it was found that the 95% confidence interval was ~+/- 50 ml for ischemic lesion volume measurements in individual patients.

The Cleveland Clinic adopted a nearly identical algorithm and their results were published. They reported that after the new algorithm was adopted, there was a ~50% reduction in mortality and a ~3-fold increase in good outcomes, despite a ~50% decrease in the number of procedures. A recent prospective observational trial at the MGH using stentrievers and this imaging approach demonstrated >50% favorable outcomes (mRS 0-2) that is similar to recent randomized clinical trials. However, only 3 patients were evaluated for every patient that was treated, a screening to treatment ratio that is much lower than in recently published clinical trials.

1. Gonzalez RG, Copen WA, Schaefer PW, Lev MH, Pomerantz SR, Rapalino O, et al. The Massachusetts General Hospital acute stroke imaging algorithm: an experience and evidence based approach. Journal of neurointerventional surgery. 2013;5 Suppl 1:i7-12.
2. Wisco D, Uchino K, Saqqur M, Gebel JM, Aoki J, Alam S, et al. Addition of hyperacute MRI AIDS in patient selection, decreasing the use of endovascular stroke therapy. Stroke; a journal of cerebral circulation. 2014;45(2):467-72.
3. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. Lancet. 1986 Feb 8;1(8476):307-10.4. Schaefer PW, Souza L, Kamalian S, Hirsch JA, Yoo AJ, Kamalian S, Gonzalez RG, Lev MH. Limited reliability of computed tomographic perfusion acute infarct volume measurements compared with diffusion-weighted imaging in anterior circulation stroke. Stroke. 2015 Feb;46(2):419-24.

RC152

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

Sunday, Nov. 27 2:00PM - 3:30PM Room: E264

US IR

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

FDA Discussions may include off-label uses.

Participants
Stephen C. O'Connor, MD, Boston, MA, (stephen.o'connor@bhs.org) (*Presenter*) Nothing to Disclose
Veronica J. Rooks, MD, Honolulu, HI (*Presenter*) Nothing to Disclose
Kristin M. Dittmar, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Carmen Gallego, MD, Madrid, Spain, (cgallego@salud.madrid.org) (*Presenter*) Nothing to Disclose
Mabel Garcia-Hidalgo Alonso, MD, Majadahonda , Spain (*Presenter*) Nothing to Disclose
James W. Murakami, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Sara E. Smolinski, MD, Springfield, MA (*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; Author with royalties, Cambridge University Press
John D. Lane, MD, Bayside, WI (*Presenter*) Nothing to Disclose
Neil T. Specht, MD, Trumbull, CT, (saint2@optonline.net) (*Presenter*) Nothing to Disclose
Manish N. Patel, DO, Cincinnati, OH, (manish.patel@cchmc.org) (*Presenter*) Nothing to Disclose
Njogu Njuguna, MD, Springfield, MA (*Presenter*) Nothing to Disclose
Hollins P. Clark, MD, Winston Salem, NC (*Presenter*) Research Consultant, Galil Medical Ltd

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.

ABSTRACT

RC203

Imaging of Cardiac Valves

Monday, Nov. 28 8:30AM - 10:00AM Room: N229

CA CT IR MR

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

Participants
Albert De Roos, MD, Leiden, Netherlands (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

ABSTRACT

Sub-Events

RC203A CT Imaging of Native Valves

Participants
Gudrun Feuchtner, MD, Innsbruck, Austria, (Gudrun.Feuchtner@i-med.ac.at) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the full spectrum of CT imaging findings in native valvular disease (from stenosis, regurgitation to infective endocarditis). 2) Understand technical basics and state-of the art imaging of heart valves by cardiac CT. 3) Discuss when and why use cardiac CT for diagnosis of valvular disease and patient management.

ABSTRACT

While echocardiography is the primary screening modality for valvular disease, it has some inherent limitations. Cardiac CT provides incremental value in the assessment of native valvular disease and allows for 3D - and 4D-imaging of valvular function. The specific settings in clinical practice ("when-and-why") using cardiac CT, patient management and multimodality imaging (including PET/CT) will be discussed.Topics of this course are: 1) the assessment of native valvular disease (stenosis, regurgitation and prolapse) and congenital abnormalities by cardiac CT 2) cardiac CT in infective endocarditis 3) CT for differential diagnosis/characterization of valvular masses.

RC203B MRI of Native Valves

Participants
Gautham P. Reddy, MD, Seattle, WA (*Presenter*) Nothing to Disclose

Honored Educators

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

Gautham P. Reddy, MD - 2014 Honored Educator

RC203C The Role of Imaging Prior to TAVR

Participants
Jonathon A. Leipsic, MD, Vancouver, BC, (jleipsic@providencehealth.bc.ca) (*Presenter*) Speakers Bureau, General Electric Company; Speakers Bureau, Edwards Lifesciences Corporation; Consultant, Heartflow, Inc; Consultant, Circle Cardiovascular Imaging Inc; Consultant, Edwards Lifesciences Corporation; Consultant, Neovasc Inc; Consultant, Samsung Electronics Co, Ltd; Consultant, Koninklijke Philips NV; Consultant, Arineta Ltd; Consultant, Pi-Cardia Ltd;

LEARNING OBJECTIVES

1) Understand the role of pre-procedural imaging and in particular MDCT in TAVR planning. 2) Discuss new data highlighting novel imaging parameters that help improve clinical outcomes. 3) Discuss the role of MDCT sizing for next generation TAVR devices.

ABSTRACT

NA

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Jonathon A. Leipsic, MD - 2015 Honored Educator

RC203D Mitral Valve Interventions

Participants

Philipp Blanke, MD, Freiburg, Germany, (phil.blanke@gmail.com) (*Presenter*) Consultant, Edwards Lifesciences Corporation; Consultant, Neovasc Inc ; Consultant, Tendyne Holdings, Inc; Consultant, Circle Cardiovascular Imaging Inc

RC211

Update on Radionuclide Therapies

Monday, Nov. 28 8:30AM - 10:00AM Room: S504CD

IR NM OI

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

Participants

Sub-Events

RC211A New Guidelines for I-131 Therapy of Thyroid Cancer

Participants
Don C. Yoo, MD, E Greenwich, RI (*Presenter*) Consultant, Endocyte, Inc

LEARNING OBJECTIVES

1) Describe why thyroid cancer is increasing. 2) Review guidelines for the use of I-131 in the treatment of thyroid cancer. 3) Review the controversies in thyroid cancer treatment.

ABSTRACT

The purpose of this educational activity is to review the reasons why the incidence of thyroid cancer has risen so rapidly over the last 40 years and discuss the role of radioiodine ablation in patients with thyroid cancer. Issues that will be discussed include controversies in the extent of thyroid surgery and the appropriate use of radioiodine ablation in patients with thyroid cancer which is controversial in low risk and intermediate risk patients.

The incidence of thyroid cancer in the United States has almost tripled since the early 1970s with unchanged mortality principally due to overdiagnosis. The extent of surgery performed for thyroid cancer is controversial especially in small cancers but only patients with complete thyroidectomy are candidates for radioiodine ablation. Recently lower doses of I-131 have been shown to be effective for radioiodine ablation of remnant thyroid tissue after thyroidectomy. High risk patients will benefit from radioiodine ablation with decreased recurrence and improved mortality. Radioiodine ablation in low risk patients is very controversial and has not been shown to improve mortality.

RC211B Lu177-DOTATATE Therapy for Neuroendocrine Tumore

Participants
Ronald C. Walker, MD, Nashville, TN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the selection process for patients likely to benefit from 177Lu-DOTATATE therapy. 2) Learn how to safely administer 177Lu-DOTATATE therapy. 3) Understand the risks and benefits from 177Lu-DOTATATE therapy. 4) Recognize the side effects from 177Lu-DOTATATE therapy and ways to mitigate them. 5) Know how and when to assess for treatment response to 177Lu-DOTATATE therapy.

ABSTRACT

Peptide receptor radionuclide therapy (PRRT) is a revolutionary treatment for patients with neuroendocrine tumors that express somatostatin receptors, including patients with progressive disease on standard treatments who are not candidates for surgical extirpation. In patients with sufficient uptake of somatostatin analogs on imaging (Krenning score 2 or greater), PRRT can result in significant improvement in overall survival and progression free survival. This lecture will review the patient selection process and summarize the treatment protocol, radiation safety issues, and assessment of treatment response.

RC211C Hepatic Artery Infusion Therapy with Y90 Microspheres

Participants
Charles Y. Kim, MD, Durham, NC (*Presenter*) Consultant, Halyard Health, Inc; Consultant, Cryolife, Inc; Consultant, Merit Medical Systems, Inc

LEARNING OBJECTIVES

1) Review range of malignancies treated with Y90 microsphere infusion. 2) Discuss the types of Y90 therapy and dosimetric considerations. 3) Describe the procedures and technical steps involved in Y90 therapy. 4) Recognize pertinent scintigraphic findings associated with Y90 therapy.

ABSTRACT

Intra-arterial Yttrium-90 (Y90) therapy is an important treatment modality for a variety of hepatic tumors. While numerous types of embolotherapies are employed by interventional radiologists for treatment of cancer, Y90 therapy is unique in its multimodality and multi-procedural nature. Not only does this treatment effect rely on deposited ionizing radiation therapy, but scintigraphic imaging is also an integral component of treatment.

Two types of Y90 therapies are available, made by two different manufacturers. The differences between the two types are subtle, but there are differences in administration and manufacturer-recommended dosimetric calculation. These various differences will be highlighted.

Y90 therapy is comprised of several steps and is frequently subclassified into a “planning” phase and “treatment” phase. In the planning phase, detailed angiographic imaging is performed to delineate arterial anatomy , determine tumoral distributions, and

redistribute vascular flow if indicated. Scintigraphic imaging is an integral component of this planning phase, in order to help identify angiographically occult arterial anomalies, confirm appropriate infusion site, and to quantify the hepatopulmonary shunt fraction. From this information, as well as other factors, the appropriate treatment doses can be determined. In the treatment phase(s), the Y90 dose is administered to the appropriate portions of the liver with subsequent scintigraphic imaging for confirmation.

RC212

Open and Endovascular Aortic Repair: Imaging Essentials

Monday, Nov. 28 8:30AM - 10:00AM Room: E351

VA IR

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

FDA Discussions may include off-label uses.

Participants

Sub-Events

RC212A Aortic Root: Surgical Procedures and Complications

Participants
Kate Hanneman, MD, FRCPC, Toronto, ON, (kate.hanneman@uhn.ca) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe various surgical techniques for repair of the aortic root. 2) Differentiate between normal and abnormal imaging findings after aortic root surgery. 3) Identify post-operative complications including dehiscence and pseudoaneurysms.

ABSTRACT

RC212B New Thoracic and Abdominal Endografts

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

RC212C What 3D Reconstructions are Needed for Endografting?

Participants
Michael A. Winkler, MD, Lexington, KY, (michael.winkler@uky.edu) (*Presenter*) Research support, Teleflex Incorporated

LEARNING OBJECTIVES

1) Optimize exam protocols and axial image reconstruction to potentiate 3D processing. 2) Comprehend 3D processing used for the planning and design of branched, fenestrated, and parallel endografts. 3) Comprehend indications for 3D processing of visceral, intersegmental and iliofemoral arteries in conjunction with endograft planning. 4) Develop standardized 3D processing workflows.

ABSTRACT

RC212D Endograft Complications: What the Radiologist Needs to Know

Participants
Terri J. Vrtiska, MD, Rochester, MN, (vrtiska.terri@mayo.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Determine the significance of early versus delayed endograft complications. 2) Describe types of endoleaks, prevalence and significance. 3) Summarize imaging follow-up versus treatment of endograft complications.

ABSTRACT

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Terri J. Vrtiska, MD - 2016 Honored Educator

RC214

Interventional Series: Venous Disease

Monday, Nov. 28 8:30AM - 12:00PM Room: S406B

CH VA IR

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

FDA Discussions may include off-label uses.

Participants
Robert J. Lewandowski, MD, Chicago, IL, (r-lewandowski@northwestern.edu) (*Moderator*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc
Brian S. Funaki, MD, Riverside, IL (*Moderator*) Data Safety Monitoring Board, Novate Medical Ltd
Charles E. Ray JR, MD, PhD, Chicago, IL (*Moderator*) Advisory Board, Novate Medical Ltd; Editor, Thieme Medical Publishers, Inc; Consultant, W. L. Gore & Associates, Inc; Consultant, Medtronic plc; ; ; ; ;

LEARNING OBJECTIVES

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

ABSTRACT

Sub-Events

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

Monday, Nov. 28 8:30AM - 8:45AM Room: S406B

Participants
Akhilesh K. Sista, MD, New York, NY, (Akhilesh.Sista@nyumc.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Learning objectives:1) Be able to distinguish between the Wells criteria and the simplified PESI score.2) Be able to distinguish between massive, submassive, and low-risk PE3) Know the major prospective trials of CDT for pulmonary embolism

LEARNING OBJECTIVES

View learning objectives under main course title.

RC214-02 PE Treatment Options and PERT

Monday, Nov. 28 8:45AM - 9:00AM Room: S406B

Participants
Sanjay Misra, MD, Rochester, MN (*Presenter*) Data Safety Monitoring Board, Flexible Stenting Solutions, Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

RC214-03 Unenhanced MR Pulmonary Angiography and Cine-MRI Short Axis View in Monitoring the Therapeutic Effect of Patients with Pulmonary Embolism

Monday, Nov. 28 9:00AM - 9:10AM Room: S406B

Participants
Sishu Yuan, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Zi Wang, Wuhan, China (*Presenter*) Nothing to Disclose

PURPOSE

To evaluate the consistency of the obstruction index obtained by unenhanced MR angiography applying spatial labeling with multiple inversion pulses sequence (SLEEK) imaging, MR cardiovascular measurements (right ventricular ejection fraction, ratio of right to left ventricular diameter, and ratio of pulmonary artery to aorta diameters) and computed tomographic obstruction index. To quantitively evaluate the value of MR obstruction index, MR cardiovascular measurements in monitoring the effect of pulmonary embolism (PE) treated by anticoagulation and/or thrombolysis.

METHOD AND MATERIALS

Thirty-two patients with computed tomographic pulmonary angiography (CTPA) diagnosed PE underwent SLEEK MRA and cardiac magnetic resonance scanning within 48 hours after CTPA. After thrombolysis and/or anticoagulation therapy for 30 days, all the patients underwent follow-up evaluation. CT and MR obstruction index, MR cardiovascular measurements were calculated before and after the therapy. By using the spearman analysis, therapeutic effect was evaluated with CT obstruction index and MR obstruction index, MR cardiovascular measurements.

RESULTS

For 30 out of 32 patients, CT obstruction index, MR obstruction index, right ventricular ejection fraction, and ratio of right to left ventricular diameter improved after therapy($P<0.001=$, ratio of pulmonary artery to aorta diameters showed no obvious change. Significant correlations existed between CT obstruction index and MR obstruction index, right ventricular ejection fraction, ratio of

right to left ventricular diameter (r=0.911, -0.882 and 0.666, respectively), but there were no significant correlations between CT obstruction index and ratio of pulmonary artery to aorta diameters.

CONCLUSION

MR imaging is a promising noninvasive technique not only for the diagnosis of pulmonary embolism, but also for the evaluation of therapeutic effects.

CLINICAL RELEVANCE/APPLICATION

MR imaging is a promising noninvasive technique not only for the diagnosis of pulmonary embolism, but also for the evaluation of therapeutic effects.

RC214-04 The Selection of Blood Suppression Inversion Time in Unenhanced MR Pulmonary Angiography in Diagnosis of Pulmonary Embolism

Monday, Nov. 28 9:10AM - 9:20AM Room: S406B

Participants
Sishu Yuan, Wuhan, China (*Presenter*) Nothing to Disclose
Zi Wang, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To study the detection accuracies in diagnosis of pulmonary embolism (PE) with different blood suppression inversion time (BSP-TI) in unenhanced MR angiography by applying spatial labeling with multiple inversion pulses sequence (SLEEK) imaging, and evaluate the image quality.

METHOD AND MATERIALS

61 patients (38 males and 23 females) diagnosed with pulmonary embolism (PE) using computed tomographic pulmonary angiography (CTPA) underwent SLEEK MR angiography within 48 hours. Taking the results of as CTPA a reference, accuracy for PE detection were calculated and compared SLEEK MRA sequences with different BSP-TIs, the images quality were also evaluated.

RESULTS

When BSP-TI=900ms, the best image quality was obtained. Diagnose accuracy for PE of different BSP-TIs (BSP-TI=500ms, 700ms, 900ms, 1100ms, 1300ms, 1500ms) were 62.3%, 89.3%, 90.4%, 84.6%, 77.0%, 69.3%, respectively. However, if there was atelectasis or pulmonary infection, BSP-TI=1300ms and 1500ms may help to better depict the pulmonary artery and PE.

CONCLUSION

For most of patients, the best image quality and the hightest diagnose accuracy of PE was obtained when BSP-TI=900ms. However, if there was atelectasis or pulmonary infection, evaluating BSP-TI could help to show the pulmonary artery and embolus in that area.

CLINICAL RELEVANCE/APPLICATION

For most of patients, the best image quality and the hightest diagnose accuracy of PE was obtained when BSP-TI=900ms. However, if there was atelectasis or pulmonary infection, evaluating BSP-TI could help to show the pulmonary artery and embolus in that area.

RC214-05 Risk of Venous Thromboembolism Following a Single Negative Proximal Compression Ultrasound

Monday, Nov. 28 9:20AM - 9:30AM Room: S406B

Awards
Student Travel Stipend Award

Participants
Myles M. Mitsunaga, MD, Honolulu, HI (*Presenter*) Nothing to Disclose
Shannon Kogachi, MS, Honolulu, HI (*Abstract Co-Author*) Nothing to Disclose
Hyo-Chun Yoon, MD, PhD, Honolulu, HI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

There is ongoing discussion regarding the optimal ultrasound scanning protocol for diagnosing deep vein thrombosis (DVT): imaging of the proximal veins with one additional proximal venous scan 1 week after the initial scan, versus a one-time whole-leg compression ultrasound, evaluating both proximal and distal infrapopliteal veins. At our institution, we have performed only a single, one-time proximal compression ultrasound limited to the femoral and popliteal veins (single proximal CUS) without a serial examination. Purpose: To determine the 3-month rate of venous thromboembolism (VTE) and clinical outcomes of symptomatic inpatients and ambulatory patients with normal findings on single proximal CUS.

METHOD AND MATERIALS

Single proximal CUS results and clinical data of all inpatient and ambulatory patients with suspected acute (DVT) were retrospectively reviewed during a 12-month period between January and December 2014. 3 month follow-up data were reviewed for all these patients who received all their care from a single geographically isolated health maintenance organization.

RESULTS

1295 patients with suspected deep vein thrombosis underwent single proximal CUS during the 12-month period. 111 of 1295 (8.6%) patients were positive for acute DVT at the initial proximal CUS. Of the remaining 1184 patients with initially negative proximal CUS sampled at 3-months follow-up, 1075 (90.8%) had no VTE event, 11 (0.9%) suffered from a subsequent VTE event (confirmed by a subsequent positive CUS or pulmonary embolism study), 53 (4.5%) died from causes unrelated to VTE, and 45 (3.8%) were lost to follow-up.

CONCLUSION

Overall, our 3-month cumulative rate of VTE following a single negative proximal CUS was 11 of 1184 or 0.9% (95%, confidence interval 0.4-1.5). Our confidence interval overlaps with those of serial proximal CUS protocols.

CLINICAL RELEVANCE/APPLICATION

Single proximal CUS is sufficient to exclude acute DVT in the vast majority of patients, rendering serial proximal CUS unnecessary for most patients.

RC214-06 Chronic Venous Recanalization

Monday, Nov. 28 9:30AM - 9:45AM Room: S406B

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

LEARNING OBJECTIVES

1) Patient selection and work-up. 2) Strategy and devices to recanalize complex central venous occlusions. 3) How to avoid and how to be prepared for complications. 4) RF wire technique details.

ABSTRACT

Recanalization of chroninc venous occlusionsMarcelo Guimaraes, MD, FSIRChronic and complex central venous occlusions (brachiocephalic, SVC and IVC) are typically associated with symptoms and the recanalization may be challenging. The recanlization with RF wire technique will be presented and patient selection, work-up, technical details, how to avoid and manage complications and results will be discussed.

RC214-07 Debate: Submassive PE: Should Catheter-directed Therapy be Used?

Monday, Nov. 28 9:45AM - 10:00AM Room: S406B

Participants
Steven M. Zangan, MD, Chicago, IL (*Presenter*) Nothing to Disclose
John A. Kaufman, MD, Portland, OR (*Presenter*) Advisory Board, Bio2 Technologies, Inc; Consultant, Cook Group Incorporated; Consultant, Guerbet SA; Stockholder, Hatch Medical LLC; Stockholder, VuMedi, Inc; Stockholder, Veniti, Inc; Royalties, Reed Elsevier; Advisory Board, Delcath Systems, Inc; Researcher, W. L. Gore & Associates, Inc; Researcher, EKOS Corporation; Stockholder, EndoShape, Inc; Advisory Board, AV Medical Technologies Ltd; Advisory Board, Javelin Medical

LEARNING OBJECTIVES

1) To define submassive pulmonary embolism. 2) To examine current treatment algorithms for pulmonary embolism. 3) To assess current literature regarding catheter directed therapy for submassive pulmonary embolism. 4) To identify complications of catheter directed thrombolysis.

RC214-08 May-Thurner and Paget-Schroetter - Commonalities and Differences

Monday, Nov. 28 10:15AM - 10:30AM Room: S406B

Participants
Charles E. Ray JR, MD, PhD, Chicago, IL (*Presenter*) Advisory Board, Novate Medical Ltd; Editor, Thieme Medical Publishers, Inc; Consultant, W. L. Gore & Associates, Inc; Consultant, Medtronic plc; ; ; ; ;

RC214-09 IVC Filters: New Evidence and Ongoing Trials

Monday, Nov. 28 10:30AM - 10:45AM Room: S406B

Participants
Matthew S. Johnson, MD, Indianapolis, IN, (matjohns@iupui.edu) (*Presenter*) Research Consultant, Boston Scientific Corporation; Research Consultant, Cook Group Incorporated; Research Consultant, CeloNova BioSciences, Inc; Research Consultant, BTG International Ltd; Research support, BTG International Ltd; ;

LEARNING OBJECTIVES

ABSTRACT

RC214-10 Retrospective Analysis of Dwell Times and the Use of Advanced Retrieval Techniques (ART) in Patients Undergoing Inferior Vena Cava Filter (IVCF) Retrieval Procedures: A Single-center Experience

Monday, Nov. 28 10:45AM - 10:55AM Room: S406B

Participants
Laura p. Pletsch Borba, Porto Alegre, Brazil (*Presenter*) Nothing to Disclose
Vanessa F. Furtado, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Melissa Chittle, MS, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
George R. Oliveira, MD, East Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Thomas G. Walker, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Zubin Irani, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Gloria M. Salazar, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the impact of increased dwell times in the use of ATR and procedural complications in patients undergoing IVCF

removal.

METHOD AND MATERIALS

In this IRB-HIPPA compliant study, a retrospective review of medical records was performed of patients undergoing IVCF retrieval between January 2011 and April 2016, at the Division of Interventional Radiology. The following data was collected: demographics, indications for IVCF, use of intravascular ultrasound (IVUS) on placement, dwell times (days), procedural complications, and imaging studies (CT abdomen). All complications were classified according to societal guidelines. All results are given in percentages, mean, ±SD, and range. Statistical analysis was performed with Fisher's exact and Mann-Whitney tests.

RESULTS

148 patients were identified: 81 male(age:53.83±15.45) and 67 female(age:55.06±17.26); who had the following indications for IVCF: 45.6% absolute, 14.3% relative and 40.1% prophylactic. A total of 143 patients underwent successful IVCF retrieval procedure at the first attempt (96.6%). A second attempt was performed in 5 patients with an 80% (n=4) success rate and one patient underwent filter retrieval at the third attempt. ART was performed in 8.1% (n=12) patients, in the first procedure, which included use of endobronchial forceps or the use of endovascular maneuvers. The overall complication rate was 6.8% (n=10), including: leg embedded into caval wall (n=7), emboli trapped in the filter (n=2), filter tilt (n=6), filter unable to retrieve (n=5) and need for controlled filter fracture during the procedure (n=1). Mean filter dwell time was 145.30(3–716) days. Increased dwell times (>100 days) was significantly associated with the use of ART ($p<.05$). Retrieval complications were significantly associated with ART ($p<.05$). Use of IVUS was not associated to retrieval complications or ATR.

CONCLUSION

IVCF can be successfully retrieved at the first procedure, with a 96.6% success rate, with the addition of ART. Increased dwell time was significantly associated with the use of ART. Consideration of ART should be done earlier in filters with dwell times higher than 100 days.

CLINICAL RELEVANCE/APPLICATION

IVCF retrieval rates remain low nationally with implications for patient outcomes. We sought to evaluate the impact of prolonged indwelling time in the use of ATR in filter retrieval procedures.

RC214-11 Keen Endovascular sNare Strategy (KENS) - Fluoroscopic Procedure Time as a Prognosticator of IVC Filter Retrieval Success

Monday, Nov. 28 10:55AM - 11:05AM Room: S406B

Awards
Student Travel Stipend Award

Participants
Jin Qian, MD, Burlington, VT (*Presenter*) Nothing to Disclose
James B. Allison, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose
Richard Watts, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Christopher S. Morris, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose
Anant D. Bhave, MD, Richmond, VT (*Abstract Co-Author*) Nothing to Disclose
Joseph T. Shields, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine if there is a reliable time point during an IVC filter retrieval attempt after which the success rate for removal becomes unlikely without using advanced techniques, which are defined as any technique other than loop snare removal.

METHOD AND MATERIALS

IRB approval was obtained for the retrospective analysis of IVC filter retrieval procedures performed between 2011 and 2015 by the authors' institutional IR division. The fluoroscopic time, retrieval technique, type of filter, and operator experience were analyzed. Mann-Whitney rank-sum tests were used to compare the difference between the group using standard technique and those requiring advanced technique. Cumulative success rates of the two were plotted against the fluoroscopic time. A time point after which continued attempts with standard retrieval method would result in diminishing returns was determined.

RESULTS

The overall filter retrieval success rate was 93.0%. Standard technique was successful in 99.2% of cases, while advanced techniques were only successful in 57.1% of attempts. Procedures using advanced techniques were associated with longer fluoroscopic time than the standard technique (mean time 1665 sec; 95% CI: 1252, 2078 vs. 330 sec; 95% CI: 278, 383, $X2 = 384$, p-value<0.0005). Transition points were determined at 612 seconds (94.2% success) for standard technique and 1386 seconds (48.0% success) for advanced technique when the success rates taper off. A ROC curve revealed that at 654 seconds (sensitivity=0.952, specificity=0.950), most operators in our department had completed the procedure using the standard technique or had switched to an advanced technique.

CONCLUSION

IVC filter retrievals are less likely to be successful if standard retrieval techniques require more than 10 minutes of fluoroscopic time. If the fluoroscopic time is greater than 23 minutes, advanced techniques are also unlikely to succeed and the operator should consider aborting the procedure to avoid further radiation to the patient.

CLINICAL RELEVANCE/APPLICATION

Operators with different level of experience performing IVC filter retrieval can refer to our data in determining optimal times to change technique or terminate the procedure when a particular method is not successful. This may apply to academics or private practice settings. It will limit the patient and operator radiation doses in instances where the benefit of continued attempts will likely be limited.

RC214-12 Electric Field Ablation of Venous Thrombosis Prevents Clot Organization and Increases Vein Patency:

Novel Deep Vein Thrombosis Intervention

Monday, Nov. 28 11:05AM - 11:15AM Room: S406B

Participants
Rahmi Oklu, MD, PhD, Scottsdale, AZ (*Presenter*) Nothing to Disclose
Hassan Albadawi, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of this study was to examine whether targeted low voltage electric fields could cause non-thermal decellularization of venous thrombus and promote natural resolution.

METHOD AND MATERIALS

Electric field (EF) parameters were optimized using neutrophils, HUVECS and blood clots formed within microfluidic chambers fabricated by replica molding of PDMS and standard photolithography techniques. Rheological analysis and temperature measurements were made using Anton Paar MCR 301 rheometer and IT-21, Ø=0.4 mm, PhysiTemp system, respectively; in vitro and in vivo currents were measured using PicoScope 4224 Oscilloscope. Once non-thermal EF conditions were optimized in vitro, in vivo experiments on venous thrombosis using a rat bilateral femoral vein ligation model was performed. Following groin exposure, all visible side branches including the inferior epigastric and the muscular branch were ligated except for the profunda femoris vein. One side was subjected to EF while the other side did not receive treatment serving as the control. After 3 or 7 days, the ligated veins were processed for histology, immunohistochemistry (NETs, collagen, MPO, tissue factor), Western blotting (tissue factor) and cytokine analysis from tissue lysates (27 growth factors). Patency, nucleated cell counts, vein circumference and immunostaining were measured using ImageJ.

RESULTS

Live/dead cell assays using microfluidic chambers and ex-vivo 6 mm PDMS realistic vessel like structures revealed non-thermal, optimal cell death (>90%) at 60-120 V/mm. Using Instron testing system, the ability to clot fresh blood was not affected at EF up to 460V/mm. At day 3 and at day 7, EF treated venous thrombi compared to sham control groups demonstrated wide patency ($P<0.0001$); reduced collagen levels ($P=0.003$); decreased nucleated cells ($P<0.0001$); decreased neutrophils, macrophages and NETs ($P< 0.0001$); decreased tissue factor, IL-4, TGF-β1, TGF-β2, and TGF-β3 ($P<0.05$) and the average circumference of the veins was similar ($P=0.18$) suggesting that the treatment did not cause venous aneurysms.

CONCLUSION

Non-thermal EF ablation of nucleated cells within DVT significantly impacts the organization capability of the thrombus, promoting natural clearance.

CLINICAL RELEVANCE/APPLICATION

EF ablation for treatment of DVT may potentially decrease the incidence of post-thrombotic syndrome associated with conventional anticoagulant therapies.

RC214-13 DVT Iysis: An Update

Monday, Nov. 28 11:15AM - 11:30AM Room: S406B

Participants
Kush R. Desai, MD, Chicago, IL, (kdesai007@northwestern.edu) (*Presenter*) Speakers Bureau, Cook Group Incorporated; Consultant, Cook Group Incorporated

LEARNING OBJECTIVES

Venous thrombolysis is a rapidly evolving space. Several devices/approaches have been recently introduced, improving procedural ease and patient outcomes. Prospective data on the benefits of thrombolysis in the prevention of post-thrombotic syndrome is forthcoming as well. In this session, we will review the history, rationale, and data behind deep venous thrombolysis, followed by a discussion of current practice, emerging technologies, and future directions.

ABSTRACT

LEARNING OBJECTIVES

1) Venous thrombolysis is a rapidly evolving space. Several devices/approaches have been recently introduced, improving procedural ease and patient outcomes. Prospective data on the benefits of thrombolysis in the prevention of post-thrombotic syndrome is forthcoming as well. In this session, we will review the history, rationale, and data behind deep venous thrombolysis, followed by a discussion of current practice, emerging technologies, and future directions.

ABSTRACT

N/A

RC214-14 IVC Filters: Past, Present, and Future

Monday, Nov. 28 11:30AM - 11:45AM Room: S406B

Participants
John A. Kaufman, MD, Portland, OR (*Presenter*) Advisory Board, Bio2 Technologies, Inc; Consultant, Cook Group Incorporated; Consultant, Guerbet SA; Stockholder, Hatch Medical LLC; Stockholder, VuMedi, Inc; Stockholder, Veniti, Inc; Royalties, Reed Elsevier; Advisory Board, Delcath Systems, Inc; Researcher, W. L. Gore & Associates, Inc; Researcher, EKOS Corporation; Stockholder, EndoShape, Inc; Advisory Board, AV Medical Technologies Ltd; Advisory Board, Javelin Medical

RC214-15 Debate: Retrievable Filters: Get Them All Out!

Monday, Nov. 28 11:45AM - 12:00PM Room: S406B

Participants
Bulent Arslan, MD, Chicago, IL (*Presenter*) Advisory Board, Nordion, Inc Advisory Board, Angiotech Pharmaceuticals, Inc Speakers Bureau, Nordion, Inc Speakers Bureau, W. L. Gore & Associates, Inc Consultant, Bayer AG
Robert J. Lewandowski, MD, Chicago, IL, (r-lewandowski@northwestern.edu) (*Presenter*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc

LEARNING OBJECTIVES

1) Understand the importance of removing IVC filters that are no longer required. 2) Name the risks of potentially retrievable IVC filters. 3) Cite literature demonstrating safety and efficacy of removing IVC filters with advanced techniques.

RC250

Fallopian Tube Catheterization (Hands-on)

Monday, Nov. 28 8:30AM - 10:00AM Room: E260

GU OB IR

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

FDA Discussions may include off-label uses.

Participants
Amy S. Thurmond, MD, Portland, OR, (thurmondas@gmail.com) (*Presenter*) Nothing to Disclose
Ronald J. Zagoria, MD, San Francisco, CA, (ron.zagoria@ucsf.edu) (*Presenter*) Nothing to Disclose
A. Van Moore Jr, MD, Charlotte, NC (*Presenter*) Nothing to Disclose
Anne C. Roberts, MD, La Jolla, CA (*Presenter*) Nothing to Disclose
David M. Hovsepian, MD, Stanford, CA, (hovsepian@stanford.edu) (*Presenter*) Nothing to Disclose
James E. Silberzweig, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Obtain hands-on experience with fallopian tube catheterization using uterine models and commercially available catheters and guidewires. 2) Review the evolution of interventions in the fallopian tubes. 3) Learn safe techniques for fallopian tube recanalization for promoting fertility, and fallopian tube occlusion for preventing pregnancy. 4) Discuss the outcomes regarding pregnancy rate and complications. 5) Appreciate ways to improve referrals from the fertility specialists and expand your practice.

ABSTRACT

Fallopian tube catheterization using fluoroscopic guidance is a relatively easy, inexpensive technique within the capabilities of residency trained radiologists. Fallopian tube cathterization can be used to dislodge debris from the tube in women with infertility,or to place FDA-approved tubal occlusion devices in women who do not desire fertility. The fallopian tube is the 1 mm gateway between the egg and the sperm. Noninvasive access to this structure for promoting, and preventing, pregnancy has been sought for over 160 years. This hands-on course allows participants use commercially available catheters and devices in plastic models for fallopian tube catheterization, and to speak directly to world experts about this exciting procedure.

SSC16

Vascular Interventional (Percutaneous Ablation Outside of the Liver)

Monday, Nov. 28 10:30AM - 12:00PM Room: E352

IR US

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

FDA Discussions may include off-label uses.

Participants
Ronald S. Arellano, MD, Boston, MA (*Moderator*) Nothing to Disclose
Naganathan B. Mani, MD, Chesterfield, MO (*Moderator*) Nothing to Disclose

Sub-Events

SSC16-01 Biopsy Results do not Significantly Alter Management Among Patients Undergoing Thermal Ablation of Suspicious Renal Masses

Monday, Nov. 28 10:30AM - 10:40AM Room: E352

Awards
Student Travel Stipend Award

Participants
Michelle S. Tsang Mui Chung, MD, Providence, RI (*Presenter*) Nothing to Disclose
Aaron W. Maxwell, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Grayson L. Baird, PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Li-Juan Wang, MD,PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
William W. Mayo-Smith, MD, Boston, MA (*Abstract Co-Author*) Author with royalties, Reed Elsevier; Author with royalties, Cambridge University Press
Damian E. Dupuy, MD, Providence, RI (*Abstract Co-Author*) Research Grant, NeuWave Medical Inc Board of Directors, BSD Medical Corporation Stockholder, BSD Medical Corporation Speaker, Educational Symposia

PURPOSE

To evaluate the diagnostic yield of image-guided percutaneous biopsy of suspicious renal masses in patients referred for thermal ablation, and to determine the role of biopsy in guiding post-ablation patient management.

METHOD AND MATERIALS

A single-institution retrospective review was conducted to identify patients referred for thermal ablation of suspicious renal masses. Patients were divided into groups according to whether or not biopsy was performed. Lesions were categorized according to size, malignancy/benignity and pathology, and biopsied lesions were further grouped according to need for post-procedural follow-up. Local recurrence and complication rates were determined, and relevant diagnostic and procedural fees were used to compare overall costs.

RESULTS

A total of 406 ablation events in 339 patients were identified from April, 2000 to April, 2015. Ablation was performed without biopsy for 69 (17.0%) lesions. Of the 337 biopsied lesions, 175 (51.9%) were biopsied concomitantly with ablation. There were 22 non-diagnostic biopsies (6.5%) for an overall diagnostic yield of 93.5%. Among diagnostic biopsies, 272 (86.3%) were malignant/suspicious and 43 (13.7%) were benign/likely benign. Post-ablation follow-up was supported by biopsy results in 299 (94.9%) cases when including oncocytic neoplasms. Among lesions with at least 12 months of imaging follow-up (n=271, 66.7%), local recurrence was noted in 25 cases (9.2%); recurrence rate was not significantly different between groups. There were 42 (10.3%) complications and no deaths. No difference in complication rates was found between same- and separate-day biopsy/ablations ($X2 = 5.7$, $p=0.22$), nor between patients that did and did not undergo biopsy ($X2 = 4.7$, $p=0.32$). Assuming five years of follow-up, foregoing biopsy would have yielded $7,065 in average cost reduction per patient in our cohort.

CONCLUSION

Image-guided percutaneous biopsy of suspicious renal masses has a high diagnostic yield and low morbidity. Post-ablation management is seldom altered by biopsy results. Routine pre-ablation biopsy is of limited clinical value while incurring additional health care costs and can safely be avoided in most patients.

CLINICAL RELEVANCE/APPLICATION

Routine pre-ablation biopsy seldom alters patient management and can safely be avoided in most patients referred for thermal ablation of suspicious renal masses.

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/

Damian E. Dupuy, MD - 2012 Honored Educator

SSC16-02 Percutaneous CT-Guided Renal Cryoablation: A Long-Term Follow-up and Low Morbidity for Nearly Any Tumor Location

Monday, Nov. 28 10:40AM - 10:50AM Room: E352

Participants
Hussein D. Aoun, MD, Dearborn, MI (*Presenter*) Nothing to Disclose
Peter J. Littrup, MD, Providence, RI (*Abstract Co-Author*) Founder, CryoMedix, LLC; Research Grant, Galil Medical Ltd; Research Grant, Endo International plc; Consultant, Delphinus Medical Technologies, Inc
Barbara A. Adam, MSN, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Mohamed M. Jaber, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Fatima Memon, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Matthew Prus, BS, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Mark J. Krycia, BS, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

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

METHOD AND MATERIALS

CT and/or CT-US fluoroscopic-guided percutaneous cryoablations were performed in 357 procedures on 382 tumors (347 primary, 17 metastasis and 18 benign) in 302 patients noting tumor size and location. Outcomes were also assessed based on nephrometry score and body mass index (BMI). Multiple tumors were ablated in 59 patients. Follow-up CT or MRI evaluated for local recurrences or new multicentric tumors. Hydrodissection and ureteral stent placement was performed to protect adjacent vital structures. Complications were graded according to the Clavien-Dindo grading system.

RESULTS

All procedures were performed under conscious sedation and were virtually painless. Average tumor and ablation size was 2.9 cm and 5.0 cm, respectively, with the largest 10.3 cm. Hydrodissection was performed in 247 procedures. Major complication (grade >3) rate attributable was 2.8% (10/357) with a slightly greater risk in patients with high nephrometry score ($p< 0.025$) or obese BMI ($p<0.025$). Of the major complications, 3 (3/10) were related to hemorrhage requiring transfusion. Prior to protective techniques in our early experience, a ureteral stricture, prior to ureteral stent placement for central tumors, and bowel injury were observed, but not after. Mean follow-up was 2 years with 114 tumors having > 3 year follow-up, 57 tumors having > 5 year follow-up and 23 tumors having > 7 year follow-up. Local recurrence rate was 2.9% (11/382), with 9 technical failures and 2 tract recurrences. Of the local recurrences, 9 were re-ablated (2 tract and 7 technical) without residual disease on follow-up for a secondary efficacy of 99%. There was no statistical significance of recurrences between T1a vs T1b tumors, nephrometry score or patient BMI.

CONCLUSION

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

CLINICAL RELEVANCE/APPLICATION

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

SSC16-03 New Perspectives in Magnetic Resonance Guided Focused Ultrasound (MRgFUS) for Localized Prostate Cancer

Monday, Nov. 28 10:50AM - 11:00AM Room: E352

Participants
Vincenzo Noce, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Fabrizio Andrani, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Michele Anzidei, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Hans Peter Erasmus, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Alessandro Napoli, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess safety and feasibility of non-invasive high intensity 3T MR guided focused Ultrasound (MRgFUS) treatment of localized prostate cancer in a phase I, treat and resection designed exploratory study.

METHOD AND MATERIALS

12 patients, aged 47–78 years, with biopsy proven focal T2 prostate cancer (low-to-intermediate risk: Gleason max 3+4 and PSA max 12), confirmed on a previous multiparametric MR exam (Discovery 750, GE) including dynamic contrast enhanced (DCE) imaging (Gd-BOPTA, Bracco), underwent MRgFUS ablation (ExAblate, InSightec). All patients underwent also to radical laparoscopic prostatectomy; MRgFUS ablation was carried out on the MR identifiable lesion (max 2) using a specific energy (2900-8300 J) for each patient and real time MR thermometry monitor for correct treatment location. Non-perfused volume (VPV) in the post-ablative MRI was than compared with excision pathology for necrosis assessment.

RESULTS

. Histological examination demonstrated extensive coagulative necrosis at the site of sonication surrounded by normal prostatic tissue with inflammatory changes; these features positively compared with immediate post-ablative MRI scan and NPV. At histology 11 patients were free of residual viable tumor within the treated area while in only 1 patient, 10% of residual tumor was observed within the NPV. There was a variable amount of isolated cancer tissue (Gleason max 5, 3+2) within the non-treated parenchyma that was neither identifiable at MRI nor at biopsy. No significant complications were observed in all subjects during or immediately after the procedure.

CONCLUSION

MR guided Focused Ultrasound appear as a safe and effective modality to determine >90% necrosis of treated prostate cancer; more prospective studies in larger cohort are needed to extend success rate and to validate the procedure.

CLINICAL RELEVANCE/APPLICATION

MRgFUS has potential in focal therapy in localized prostate tumors without significant complications

SSC16-04 Therapeutic effect of Focused Ultrasound Combined with Chemo-agent for Pancreatic Cancer Xenograft Model

Monday, Nov. 28 11:00AM - 11:10AM Room: E352

Participants
Eun-Joo Park, PhD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Yun Deok Ahn, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Yuri Cheon, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

As focused ultrasound (FUS) has been widely studied in anti-cancer drug delivery, there is growing interests in the effects of how FUS enhances the results of chemotherapy. To investigate whether non-thermal effect of FUS more effective in enhancing the combined chemotherapy, in vivo studies using human pancreatic cancer xenograft model was designed. In addition, the feasibility of combined treatment of FUS with chemotherapy was studied as a potential treatment protocol for pancreatic cancer.

METHOD AND MATERIALS

Immunodeficient mouse inoculated with CFPAC-1 were used as the pancreatic xenograft model. For the first step experiments, animals were treated in six groups: control, gemcitabine (GEM)-only, FUS#1-only, FUS#2-only, GEM+FUS#1, and GEM+FUS#2. Weekly treatments were performed for three weeks and post-treatment monitoring was followed for five weeks. In the second step, animals in GEM-only and GEM+FUS#2 groups were treated for four treatment cycles which consisted of three weekly treatments and one week monitoring.

RESULTS

Tumor growth rate of animals treated with FUS-only was lower than the rate of control group while it was higher than GEM-only group. Animals treated with GEM+FUS showed reduction of tumor growth after two treatments. In GEM+FUS#2 group, tumor size reduced until fifth week after the treatment procedure was completed. Additional study, for both treatment groups, tumor size reduced during the weekly treatments in each cycle and increased again during the monitoring period. Tumor in both groups showed similar growth pattern for each treatment cycle. However, the re-growth rate of tumor in GEM+FUS#2 group was lower than GEM-only group. Especially, three out of 10 mouse in GEM+FUS#2 group showed complete response (CR).

CONCLUSION

From this study, it has been shown that mechanical effects of FUS are more effectively enhance therapeutic effects of chemotherapy. Additionally, the results of repeated treatment show the potential as a new treatment protocol for pancreatic cancer.

CLINICAL RELEVANCE/APPLICATION

For an alternative of cancer treatment, combined therapy of FUS and chemo-agent has promising potential.

SSC16-05 Vascular Complications on Short-term Follow-up Computed Tomography Associated with Irreversible Electroporation (IRE) of Locally Advanced Pancreatic Cancer

Monday, Nov. 28 11:10AM - 11:20AM Room: E352

Awards
Student Travel Stipend Award

Participants
Paige N. Hopewell, MD, PhD, Louisville, KY (*Presenter*) Nothing to Disclose
Brittany J. Schulz, MD, Louisville, KY (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

Irreversible electroporation (IRE) is a relatively recent development in the palliative treatment of locally advanced pancreatic cancer by inducing apoptosis using selective high-voltage electric fields to create nanoscale permanent defects in the cell membrane. Despite IRE's advantages for use in vascular-rich organs (e.g., excellent tissue selectivity and sharp ablation zone margins of only a few cell layers thick), this study presents our institutional multi-year experience with vascular complications following pancreatic IRE ablation on short-term follow-up CT.

METHOD AND MATERIALS

An IRB-approved institutional registry identified patients with locally advanced pancreatic cancer treated with technically-complete IRE. Follow-up CT was performed within the first two weeks and at two to three month intervals. Helical CT was performed on either 64- or 128-slice multidetector units with two board-certified attending body imaging radiologists performing independent retrospective interpretations documenting any relevant findings which could be reasonably construed as sequelae of the procedure.

RESULTS

Between 3/2011-11/2015, 36 patients were eligible for retrospective review. Vasculature abnormalities were the most common finding (51% of the total occurrences, 23/36 patients) including post-procedural narrowing (50%), pseudoaneurysm formation

(22%), occlusion of a major peripancreatic vessel (17%), and splenic infarct (11%).

CONCLUSION

Although IRE is regarded for treatment of tumors in highly vascular organs such as the pancreas, vascular sequelae were observed most frequently in our series. Despite the majority of animal and human studies demonstrating effective cell death by IRE without affecting adjacent blood vessels, other studies report direct and indirect vascular damage in the ablation zone. The vascular complications observed in our study are postulated to be secondary to a combination of direct and indirect vascular damage as well as inflammatory changes in the ablation bed and extrinsic changes associated with the evolving tumor (e.g., mass effect, altered neovascularization, and variations in residual tumor necrosis).

CLINICAL RELEVANCE/APPLICATION

Despite regard for IRE's ability to target tumor cells while sparing adjacent structures, short-term CT follow-up at our institution showed vascular complications to be the most common post-ablative sequelae occurring in over half of all patients treated with IRE for locally advanced pancreatic cancer.

SSC16-06 Radiofrequency Hyperthermia Promotes the Therapeutic Effects on Breast Cancer when Combined with Heat Shock Protein Promoter-controlled Herpes Simplix Virus Thymidine Kinase Gene Therapy: Toward Interventional Molecular Imaging-guided Gene Therapy

Monday, Nov. 28 11:20AM - 11:30AM Room: E352

Participants
Jingfeng Luo Jr, PhD, Hangzhou, China (*Presenter*) Nothing to Disclose
Xiaotian Wu, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Fei Zhou, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yali Zhu, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yurong Zhou, PhD, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Xi Hu, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jihong Sun, MD, PhD, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Xiaoming Yang, MD, PhD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

We attempted to explore a new technique for effective treatment of breast cancers by fully combining the advantages of image-guided minimally invasive interventional oncology, radiofrequency technology, and direct intratumoral gene therapy.

METHOD AND MATERIALS

lentiviral vectors were first constructed using a heat shock protein (HSP) promoter, PHSP, to precisely control overexpression of thymidine kinase (TK) gene (PHSP-TK). Serial in-vitro experiments were performed to confirm radiofrequency hyperthermia (RFH)-enhanced PHSP-TK/lentiviral transduction/expression. Serial in-vivo experiments were then carried out to validate the feasibility of interventional RFH-enhanced direct intratumoral PHSP-TK/ganciclovir (GCV) gene therapy. Both in-vitro and in-vivo experiments were divided into different groups with various treatments, including (i) combination therapy (PHSP-TK plus RFH at 45 ▮); (ii) gene therapy alone; (iii) RFH alone; and (iv) saline as a control. Therapeutic effects were evaluated by magnetic resonance imaging (MRI) and confirmed by subsequent laboratory correlation.

RESULTS

Of in-vitro experiments, combination treatment with PHSP-TK plus RFH resulted in significantly higher TK gene transduction/expression and a lower cell proliferation rate (3.8% ± 0.2%) than other treatment groups (control at 100±3.22%, RFH-only at 49.8±2.0%, PHSP-TK-only at 92.6±6.4%, $p<0.0001$). Of in-vivo experiments, MRI confirmed a significant reduction of relative tumor volume with combination therapy (74.41±13.73), compared with control, RFH, and PHSP-TK groups on day 14 after gene therapy (828±0.72, 658.09±149.10, and 503.58±26.29, $p<0.05$), which correlated well by histology and apoptosis analysis.

CONCLUSION

This study has confirmed that interventional RFH can promote HSP promoter-mediated TK gene expression in human breast cancers, which thereby enhances the efficacy of TK/GCV gene therapy. This technical development may open new avenues for effective management of breast cancers by simultaneous integration of interventional oncology, RF technology, and direct intratumoral gene therapy (rather than systemic therapy).

CLINICAL RELEVANCE/APPLICATION

RFH can enhance the PHSP-TK gene therapeutic effects on breast cancer, and this method is recommended when other treatments are invalid.

SSC16-07 Percutaneous Soft Tissue Cryoablation of the Head and Neck: A Safe and Effective Treatment Option

Monday, Nov. 28 11:30AM - 11:40AM Room: E352

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

PURPOSE

To assess the technical feasibility and local outcomes of cryoablation for head and neck masses. We hypothesize that head and neck cryoablation responds similarly in terms of recurrence, complication and/or healing rates, regardless of anatomic location and tumor type.

METHOD AND MATERIALS

45 CT and/or US-guided, percutaneous cryotherapy procedures were performed for 61 tumors from primary (27) and metastatic cancers (34), in 22 patients. In general, cases were selected to avoid major cranial nerves, skin, and endoluminal involvement. Tumor number and type, prior treatment regimens, ablation volumes, location, abutting vessels >3mm, recurrences, and procedural complications were noted. Complications were graded according to Common Terminology Criteria for Adverse Events Version 4.0 (CTCAE). Local tumor recurrence and involution was monitored over time with 1, 3, 6, 12 month and annual scans thereafter.

RESULTS

Percutaneous cryoablation was performed under conscious sedation, with only one patient requiring intubation due to anticipated pharyngeal swelling post-procedure. The 27 primary tumors consisted solely of squamous cell carcinoma and the metastases were from lung (15), renal (4), sarcoma (7), and other (8) in origin. Of the 45 total procedures, 10 procedures involved multiple tumors ablated in the same session. Average diameters of tumor and ablation zone were 2.4 cm and 4.2 cm, respectively. Major complications (CTCAE Grade >3) occurred after 4 procedures (8.9%). Of the 4 complications, one was a facial skin debridement as a result of thorough cryoabalation coverage. One patient whose tumor extended through the skin had a planned resection and flap reconstruction of the ablation zone. Mean follow-up was 1.9 years (range: 0.1-6.2 years). There was a slight statistically significant increase in local recurrence rates for primary and metastatic tumors, 18.5% (5/27) and 2.9% (1/34) ($p<0.05$), respectively.

CONCLUSION

CT/US guided PCA is a safe, effective local cancer control option for patients with oligo-metastatic soft tissue disease or recurrent primary tumors in the head and heck region. With appropriate precautions, local healing is excellent.

CLINICAL RELEVANCE/APPLICATION

Cryoablation of head and neck tumors contributes to improved local control for many tumor types, particularly for those having "escaped" other treatments.

SSC16-08 Magnetic Resonance Guided Pulsed High-intensity Focused Ultrasound Surgery for the Palliation of Pain Caused by Bone Metastases

Monday, Nov. 28 11:40AM - 11:50AM Room: E352

Participants
Qingguo Wang, Shanghai, China (*Presenter*) Nothing to Disclose
Han Wang, MD, PhD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Jianjun Gu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Na Tang, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the safety and efficacy of magnetic resonance guided focused ultrasound surgery (MRgFUS) for pain palliation caused by bone metastases.

METHOD AND MATERIALS

Ninety-five patients with painful bone metastases were screened for this study from June 2014 to September 2015. Thirty-five patients underwent MRgFUS suffering with pain of numeric rating scale (NRS) ≥4. All patients didn't recieved radiotherapy or chemotherapy for pain palliation in the past two weeks. The NRS, the standard question of Brief Pain Inventory (BPI-QoL), and the standard question of Europe Organization for Research and Treatment of Cancer Quality of Life Questionnaire- Bone Metastases 22 (EORTC QLQ-BM22) were respectively recorded before and 1-week, 1-month, 3-month after the treatment. The related adverse events of MRgFUS were observed and recorded in 3 months after the treatment.

RESULTS

(1) Thirty-five metastatic bone lesions in 35 patients were treated by MRgFUS and the treatment data was as follows: the mean treatment time was (83.94±27.87) minutes, the mean sonication number was 12.74±7.30. (2) Adverse events included: pain in therapy area in 3 patients and sciatica in 1 patient, which were obviously reduced after physiotherapy. (3) The NRS before treatment and at 1-week, 1-month, and 3-month after treatment respectively was 6.17±1.68, 4.31±2.33, 3.75±2.4, 3.10±2.23.The NRS significantly decreased after treatment ($P<0.01$). (4) The total BPI-QoL score before treatment and at 1-week, 1-month, and 3-month after treatment respectively was 38.40±15.64, 29.94±18.37, 28.52±19.22, and 22.75±18.56. The total BPI-QoL score significantly decreased after the treatment ($P<0.01$). (5) After treatment, at 3-month, the mean BPI-QoL score improvement in patients with solitary bone metastasis was statistically superior to that in patients with multiple bone metastases at ($P<0.05$). (6) At 1-week and 1-month, the meanΔBPI-QoL score improvement in paitents with osteogenic bone metastasis was statistically superior to other two groups ($P<0.05$).

CONCLUSION

MRgFUS can be used as a non-invasive, safe, and effective method for treating painful bone metastases.

CLINICAL RELEVANCE/APPLICATION

MRgFUS has clinical benefits of pain palliation and improving patient's quality of life after the treatment at least to 3 months and can be a good alternative for conventional treatments.

SSC16-09 Role of MRI Chest in the Assessment of Tumor Response Post Microwave Ablation of Pulmonary Metastases

Monday, Nov. 28 11:50AM - 12:00PM Room: E352

Participants
Nour-Eldin A. Nour-Eldin, MD,PhD, Frankfurt Am Main, Germany (*Presenter*) Nothing to Disclose
Benjamin Kaltenbach, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Nagy N. Naguib, MD, MSc, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose

Mohammed A. Alsubhi, BMBS, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the value contrast enhanced (CE-MRI) follow-up in the assessment of tumor response of microwave (MW) ablated pulmonary metastases by correlating the results with CE-CT.

METHOD AND MATERIALS

This prospective study included 130 ablation sessions for pulmonary metastases in 80 patients. CE-MRI Chest scanning was performed 1week before the ablation and at 24hours, 3, 6, 9 and12months post ablation. Thin section CT Volumetric measurement of the lesions was performed at the same time periods as a second parameter for comparison. The lesion MRI enhancement intensity in each study was estimated, and the ratio to the paraspinal muscle enhancement intensity at the same level was measured (Lesion Muscle Signal (LMS ratio).The correlations between post ablation follow-up CT volume of tumors and CE-MRI LMS ratio at the follow-up periods were assessed.

RESULTS

The preablation tumor volumes range: 0.30-6.1cm (mean: 1.5cm^3, SD:1.3). LMS ratio < 1was associated with post ablation reduction of tumor volume (denoting scaring),while LMS ratio>1were noted in: preablation due to high contrast enhancement of the tumor,in24h post ablation due to the inflammatory response associated with the thermal ablation and due to tumor residue or progress. Weak correlation was detected between the LMS-ratios and CT-volumetric changes in 24h post ablation. Strong correlation between the LMS ratios was estimated between the follow up periods of 3months(SpearmanR:0.62,p=0.0021),6months (SpearmanR:0.66,p=0.001),9months(SpearmanR:0.61,p<0.001)and 12months (Spearman R:0.7, p<0.00001).

CONCLUSION

CE-MRI follow up of the MW ablated lung tumors can be used effectively to assess the tumor response to ablation using LMS ratio as a parameter of assessment.

CLINICAL RELEVANCE/APPLICATION

CE-MRI may be used for the evaluation of tumor response post pulmonary ablation therapy.

VIS-MOA

Vascular Interventional Monday Poster Discussions

Monday, Nov. 28 12:15PM - 12:45PM Room: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
James T. Bui, MD, Chicago, IL (*Moderator*) Nothing to Disclose

Sub-Events

VI230-SD-MOA1 Transarterial Chemoembolization (TACE) in Hepatocellular Carcinoma (HCC): Intraprocedural Blood Volume Measurement using Fast Cone-Beam CT for Monitoring the Response

Station #1

Participants
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Presenter*) Nothing to Disclose
Stefan Tietz, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Nour-Eldin A. Nour-Eldin, MD,PhD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Nagy N. Naguib, MD, MSc, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the response criteria of transarterial chemoembolization (TACE) in hepatocellular carcinoma (HCC) by measuring parenchymal blood volume (PBV) using C-arm cone-beam Dyna CT, monitoring changes in PBV after repeated TACE and correlating these with the changes in tumor diameter in MRI.

METHOD AND MATERIALS

In a retrospective study 39 patients diagnosed with a HCC received 100 sessions of TACE (2-6 sessions/patient, mean: 3) with PBV using fast-protocol and MRI in 4-week intervals. During TACE treatment Dyna CT (Axiom Artis Zeego, Siemens, Healthcare Forchheim Germany) was monitored using fast-protocol for managing timing and infusion of contrast agent as follows: Start of contrast injection at 0s, injector mode with 3.5s X-ray delay. This allowed fill run at exactly 9s. Total scan time was 12s. After examination Dyna CT scans were processed by software (syngo InSpace) on a research workstation (Syngo XWP, Siemens AG Healthcare Sector) and PBV maps were printed. Then MRI was examined for the maximum diameter of the lesion and blood volume was calculated in the overlapping PBV.

RESULTS

Statistical analysis was realized by software (BiAS, Darmstadt, Germany); survival was analyzed with the Kaplan-Maier-Method and the Log-Rank-Test.
For all patients a coefficient of correlation of r=0.4 was taken into account. This demonstrates a fair correlation between PBV and size in MRI (Landis and Koch: fair) with a power of 1-beta=0.80 and a level of significance of alpha=0.05. First results showed no significant correlation between change of size in MRI and change of PBV (rho= 0.27, p=0.08) using Spearman's rank correlation. Analyzing the relation of initial PBV and change in PBV showed strong significant correlation (rho=0.61, p=0.000029).

CONCLUSION

The current preliminary data underline that intraprocedural PBV allows predicting and monitoring treatment response to TACE.

CLINICAL RELEVANCE/APPLICATION

Intraprocedural PBV is a promising predictor for treatment response to TACE.

VI231-SD-MOA2 Application of Casein Particle as a New Embolic Material for Vascular Interventional Radiology: An Experimental Study in a Rabbit Model

Station #2

Participants
Shobu Watanabe, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Norihisa Nitta, MD, Kyoto, Japan (*Presenter*) Nothing to Disclose
Shinichi Ota, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuki Tomozawa, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Akinaga Sonoda, MD, PhD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Kiyoshi Murata, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Milk casein micelles are a natural nano-delivery system. They are part of the milk transport system in which nutrients are passed from the mother to a suckling offspring as a primary source of amino acids and calcium phosphates for neonates.Many of the structural and physicochemical properties of caseins facilitate their functionality in drug delivery systems and reported that β-casein nanoparticles can entrap and deliver hydrophobic chemotherapeutics such as mitoxantrone, vinblastine, irinotecan, docetaxel, and paclitaxel.In this study, we used casein particles (CPS) as an emboric material and evaluated the embolic effect and pathology of embolized arteries of CPS and gelatin microspheres (GMS) in a rabbit model.

METHOD AND MATERIALS

12 rabbits were divided into 2 groups and the renal artery was embolized using each embolus material (CPS and GMS). Complete embolization of the lobular arteries and filling of the distal parts of the lobar arteries was considered as the end point of the

embolization. 3 rabbits in each group were sacrificed 2, and 5 days later and kidneys were extracted.Pathological specimens were constructed in 3-mm interval by a coronal section and changes in arterial walls (wall distension, inflammatory change, and fibrosis) were evaluated.

RESULTS

In microscopic specimens, wall distension was observed in all cases.The degree of the wall distension, however, was stronger in the casein particle, and the embolic range was relatively extensive. Mold-shaped repletion was also recognized. Inflammatory change was most remarkable after 2 days, and fibrosis was most remarkable after 5 days.

CONCLUSION

There was no difference in the embolic effects of CPS and GMS. And there was also no significant difference in pathological changes in arterial walls and around the embolization materials (CPS and GMS).

CLINICAL RELEVANCE/APPLICATION

Further studies are necessary, casein particle might become an accepted alternative embolic material to other gelatin materials in the future.

VI232-SD-MOA3 Lower Extremity Ultrasonography in the Evaluation of Hospitalized Patients Suspected of Deep Vein Thrombosis: Developing a Setting-Specific Risk Stratification Model

Station #3

Participants
Emily C. Alper, BA, Boston, MA (*Presenter*) Nothing to Disclose
Ivan Ip, MD, MPH, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose
Patricia Balthazar, MD, Framingham, MA (*Abstract Co-Author*) Nothing to Disclose
Gregory Piazza, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
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Ronilda Lacson, MD, PhD, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose
Ramin Khorasani, MD, Boston, MA (*Abstract Co-Author*) Consultant, Medicalis Corp

PURPOSE

Although validated in outpatient settings, the Wells score for deep venous thrombosis (DVT) has high failure rate and low efficiency among hospitalized patients.The purpose of this study is to develop an inpatient-specific risk stratification model for pre-test probability of DVT in hospitalized patients.

METHOD AND MATERIALS

This HIPAA-compliant, observational study was conducted at a 793-bed quaternary care, academic hospital. All adult inpatients suspected of having DVT undergoing lower-extremity venous duplex ultrasound studies (LEUS) during the study period were included. Relevant risk factors (e.g. demographics) were collected from the order entry and medical records. Samples were divided into a model derivation cohort and a validation cohort. A prediction rule for DVT was derived using recursive partitioning algorithm. Our primary outcome was presence of proximal DVT; secondary outcome was presence of any DVT (proximal or distal).

RESULTS

2,960 hospitalized patients underwent LEUS during the study period: 1,135 in the derivation group. 343 (11.6%) had proximal DVT (137 [12.1%] in the derivation group, 206 [11.3%]) in the validation group); 603 (20.3%) had lower extremity DVT regardless of location (241 [21.1%] derivation, 362 [19.8%] validation). Significant predictors were obtained from the most accurate and parsimonious recursive partitioning model and points were empirically assigned for significant predictors and added together to determine a score: history of DVT (4 pt), active cancer (1 pt), hospital stay of >5 days before imaging (1 pt), and age >45 years (1 pt). Patients were considered low risk (score=0), moderate, or high (score >4). In the validation cohort, 2.9% in the low risk group had proximal DVT, 7.8% in the moderate group, and 33.9% in the high risk group ($p<0.0001$). Negative predictive value (NPV) of the score to predict proximal DVT was 97.1%; sensitivity was 98.1%. By comparison, with Wells criteria, the NPV was 94.1%; sensitivity was 94.2.

CONCLUSION

In adult hospitalized patients, a scoring system based on specified risk factors can be used to predict risk of DVT and identify those at low risk for DVT.

CLINICAL RELEVANCE/APPLICATION

In assessing patients at risk for developing DVT, a novel inpatient-specific scoring system for hospitalized patients was more accurate than Well's criteria for this patient population.

VI233-SD-MOA4 Peer Review Designed for Interventional Radiology - Feasibility and Usefulness in Assessing Performance and Practice in Interventional Radiology

Station #4

Awards
Student Travel Stipend Award

Participants
Michael Luo, MD, Boston, MA (*Presenter*) Nothing to Disclose
Seth J. Berkowitz, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
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Ammar Sarwar, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
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Olga R. Brook, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Existing radiology peer review systems are designed for diagnostic radiology and are not directly applicable for the assessment of performance in interventional radiology (IR) practice. We evaluated an IR peer review system based on the capture of peer review data during daily board rounds.

METHOD AND MATERIALS

This was an IRB-approved HIPAA-compliant retrospective review of a prospectively entered web-based peer review system within a multi-physician academic interventional radiology group. During daily board rounds recent cases were discussed between attending physicians and assessed for clinical decision-making and patient care (agree; acceptable alternative; inappropriate) and procedure technique appropriateness (agree; acceptable alternative; inappropriate) with details provided in free-text format. Technical success, short-term complications, learning opportunities and near misses were also noted.

RESULTS

665 cases were entered into the IR peer review system in a 21 month period, out of 5906 IR cases performed. The majority of the cases represented advanced procedures: 180/665 (27%) arterial cases, 149/665(22.4%) biliary cases, 67/665(10%) renal cases, 49/665(7.4%) TIPS cases. Average number of IR attendings present in each case review was 3.38±1.06 with average of 14 cases reviewed by each attending per month. The majority of cases (627/665, 94.3%) were technically successful. There were 9/665(1.4%) major and 35/665(5.3%) minor complications. 40/665(6%) cases were graded as acceptable alternative for technique and 4/665(0.6%) cases were graded as inappropriate technique. 6/665(0.9%) cases were graded as acceptable alternative for clinical management, and there were no cases of inappropriate clinical decision making. 8/665(1.2%) near misses and 66/665(9.9%) learning opportunities were entered. In a comparison period of 11 months prior to implementation of IR peer review, 150 cases were submitted to diagnostic peer review by IR attendings, with only 34 IR cases.

CONCLUSION

IR specific peer review system effectively captures outcomes and clinical practice variation of image guided procedures. It allows prompt determination and documentation of clinical decision-making process and patient care outcomes, technical appropriateness, near-miss cases and short-term complications.

CLINICAL RELEVANCE/APPLICATION

IR peer review system is feasible and effective means of assessing performance in the practice of interventional radiology.

Honored Educators

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

Jonathan B. Kruskal, MD, PhD - 2012 Honored Educator
Jonathan B. Kruskal, MD, PhD - 2016 Honored Educator

VI234-SD-MOA5 Percutaneous Cryoablation for Pelvic Bone Metastases

Station #5

Participants
Takashi Yamanaka, MD, Tsu, Japan (*Presenter*) Nothing to Disclose
Atsuhiro Nakatsuka, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Masafumi Takafuji, Tsushi Edobashi 2 choume 174, Japan (*Abstract Co-Author*) Nothing to Disclose
Yuichi Sugino, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
Naritaka Matsushita, MD, Tsu, Japan (*Abstract Co-Author*) Nothing to Disclose
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PURPOSE

To retrospectively evaluate safety and clinical utility of percutaneous cryoablation for pelvic bone metastases.

METHOD AND MATERIALS

Consecutive 16 patients (9 male and 7 female) with a mean age ± standard division of 53.8 ± 12.9 years (range 27–71 years) underwent percutaneous cryoablation under real-time CT fluoroscopy guidance for 17 pelvic bone metastases between January 2012 and December 2015. The mean target tumor diameter was 6.2 ± 3.5 cm (range; 1.5 cm to 15 cm). Feasibility, safety, and clinical outcomes were evaluated. Treatment response was evaluated using a modified-RECIST criteria. Pain was evaluated using a visual analog scale (VAS) score in patients having painful tumors.

RESULTS

Total 17 treatment sessions for 17 tumors were performed and planed protocol were completed in all patients. There was no major complication related to procedures. Therapeutic response was complete response in 4 tumors (23.5%, 4/17), partial response in 8 tumors (47.1%, 8/17), and stable disease in 5 tumors (29.4%, 5/17), resulting in response rate of 70.6% (12/17). During a median follow-up periods of 10.9 months, 1- and 2- year overall survival rate were 83.6% (95% confidential interval (CI); 47.9–95.7%) and 66.9% (95% CI; 24.2–89.2%). In all 8 patients having painful tumors, mean VAS score significantly decreased from 4.5 ± 2.6 (range 1.0–8.0) to 2.3 ± 2.6 (range 0–7.0) (p=0.012) at 1-week after.

CONCLUSION

Percutaneous cryoablation is a feasible, safe and useful therapeutic option for pelvic bone metastases which leads pain relief in patients having painful tumors and might help to patient's prognosis.

CLINICAL RELEVANCE/APPLICATION

Percutaneous cryoablation for pelvic bone metastases leads pain relief in patients having painful tumors and might help to patient's prognosis.

VI235-SD-MOA6 Complications Following US-guided Core-needle Biopsy for Thyroid Lesions: A Retrospective Study of 6169 Consecutive Patients with 6687 Thyroid Nodules

Station #6

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

PURPOSE

To present the spectrum of clinical adverse events of ultrasound (US)-guided core needle biopsy (CNB) for thyroid lesions and to illuminate the potential complications with preventive measures.

METHOD AND MATERIALS

Institutional review board approval was obtained for this retrospective study. From January 2008 to March 2013, 6,169 patients underwent US-guided CNB of 6,687 thyroid nodules at a single institution. We assessed the number and types of major and minor complications, and evaluated the factors associated with complications.

RESULTS

The authors observed 53 complications in 50 patients (0.81%), including 4 major and 49 minor complications. The major complications were massive hematoma (n = 2), pseudoaneurysm (n = 1), and voice change leading to disability of more than 30 days (n = 1). The minor complications were small to moderate hematoma (n = 42), carotid injury (n = 2), voice change that recovered within 30 days (n = 3), tracheal puncture (n = 1), and dysphagia (n = 1). Edema (n = 12), vertebral puncture (n = 3), and vasovagal reaction (n = 1) were recorded as side effects. There were no patients with permanent problems resulting from complications and procedure-related death. The presence of a co-procedure was the only significant factor associated with complication after thyroid CNB (P = 0.023).

CONCLUSION

US-guided CNB for thyroid lesions is a safe procedure with a low complication rate in a large population. However, comprehension of various complications with a management plan is necessary to prevent potential complications or properly manage those that occur.

CLINICAL RELEVANCE/APPLICATION

1. The complication rate after ultrasound (US)-guided core needle biopsy (CNB) for thyroid lesions was 0.81% (50/6,169), and the major complication rate was 0.06 % (4/6,169).2. Vascular injury was the most common complication (47/6,169; 0.76%).3. Understanding the various complications, knowledge of techniques and management to prevent complications will minimize complications and sequelae in patients undergoing CNB of thyroid nodules..

VI136-ED-MOA7 Acute Aortic Syndrome, Differential Diagnosis and Imaging Findings

Station #7

Participants
Amr M. Daous, MD, Detroit, MI (*Presenter*) Nothing to Disclose
Hiren Rangunwala, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Anum Aslam, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Karan N. Patel, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Jasmine Koo, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Naveen Malay, MD, MBBS, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1- Learn the main differential diagnosis of acute aortic syndrome2- Recognize imaging findings on enhanced and unenhanced cross sectional imaging for each of the differential diagnoses.3- Be able to classify the diseases based on location and know the implication of such classification on management and treatment options.

TABLE OF CONTENTS/OUTLINE

Purpose: Aortic disease is commonly encountered when reading crosssectional imagingbut a lot of residents are not comfortable or knowledgeable enough to recognize, understand and describe aortic findings accurately and precisely. Our goal is to simplify and summarize the main imaging findings associated with the different diagnoses related to acute aortic syndrome and educateresidents on the importance of accurate reporting and assessment of findings. In each of the diagnoses listed below, we will be explaining the pathophysiology, demonstrating imaging findings, and describing management options.Table of Contents: 1-Aortic dissection 2-Penetrating ulcer 3-Intramural hematoma 4-Aortitis 5-Intraluminal aortic thrombus 6-Intimal tear

VI183-ED-MOA8 Percutaneous Biliary Interventions: What the Radiologist Needs to Know

Station #8

Participants
Maria Khalid, MD, Boston, MA (*Presenter*) Nothing to Disclose

Marina C. Bernal Fernandez, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Michael J. Hsu, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anthony S. Armetta, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Katherine M. Gallagher, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Stephan W. Anderson, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Rajendran Vilvendhan, MD, Newton Lower Falls, MA (*Abstract Co-Author*) Nothing to Disclose
Vijay Ramalingam, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. Interventional radiology (IR) plays an important role in management of biliary pathologies, particularly in patients who cannot be treated by an endoscopic approach. IR offers precise anatomic definition of biliary pathology via percutaneous transhepatic cholangiography (PTC), biliary access through percutaneous transhepatic drainage, and other treatment options including balloons, stents, and drain placement.
2. Common biliary interventions occur in the setting of malignant and benign biliary obstructions, percutaneous management of bile leaks, and PTC assisted ERCP.
3. Biliary drainage is important in the management of biliary obstruction, especially in the setting of cholangitis. PTC-assisted ERCP is a combined approach consisting of PTC biliary drainage and internalizing the drainage tube using an endoscope.
4. Biliary leaks can occur as a complication of hepatobiliary surgery. In cases in which surgical repair or endoscopic management are not an option, bile flow can be diverted from the defect through percutaneous transhepatic biliary drainage.

TABLE OF CONTENTS/OUTLINE

I. Techniques of biliary drainage
II. Clinical applications with cases:
a. Malignant and non-malignant biliary obstructions (i.e. choledocholithiasis, strictures, cholangiocarcinoma, pancreatic cancer)
b. Percutaneous management of bile leaks
c. Rendezvous procedures with ERCP

VIS-MOB

Vascular Interventional Monday Poster Discussions

Monday, Nov. 28 12:45PM - 1:15PM Room: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
James T. Bui, MD, Chicago, IL (*Moderator*) Nothing to Disclose

Sub-Events

VI236-SD-MOB1 Does Preserved Peripheral Portal Vein Patency have an Impact on Survival in Patients with Advanced-stage HCC and Portal Vein Thrombosis treated with TACE?

Station #1

Awards
Student Travel Stipend Award

Participants
Boris Gorodetski, MD, Berlin, Germany (*Presenter*) Nothing to Disclose
Julius Chapiro, MD, New Haven, CT (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV
Ming De Lin, PhD, Cambridge, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
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Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC

PURPOSE

Our study sought to evaluate the impact of preserved peripheral portal vein patency (PVP) on the outcome of patients with hepatocellular carcinoma (HCC) and portal vein thrombosis (PVT) treated with trans-arterial chemoembolization (TACE).

METHOD AND MATERIALS

This retrospective analysis included a total of 74 HCC patients with PVT who were treated either with conventional (N=50) or drug-eluting beads (N=24) TACE. Patients with a Child-Pugh score (CP) of C, a tumor burden >50% and extrahepatic metastasis were excluded. PVP was defined as patent (N=10) if the portal vein on segmental level was opacified on both lobes on baseline contrast-enhanced MR or CT imaging and non-patent (N=64) if at least one segmental vein was not opacified. The extent of PVT has been categorized as a) 2. order only (N=8), b) 1. order only (N=7), c) main + 1. order (N=44), d) main + hepatic vein (N=9) and e) 1. order + hepatic vein (N=6). A Kaplan-Meier survival analysis for PVP was performed. A Cox proportional hazard regression model for time to death and PVP was adjusted for other covariates as potential confounders.

RESULTS

The demographics were as follows: CP A [N=37 (50%)], Eastern Cooperative Oncology Group performance status [ECOG PS 0,1-2,>2; N=21 (28.4%), N=49 (66.2%), N=4 (5.4%), respectively] infiltrative tumor type [N=43 (58.1%)], bilobar tumor infiltration [N=59 (79.7%)] and tumor diameter >5cm [N=61 (82.4%)]. The median overall survival was 13.1 (95% CI, 9.7-n/a) and 6.1 (95% CI, 4.0-12.7) months for patent and non-patent PVP, respectively. In the Cox hazard regression analysis PVP (patent vs. non-patent; HR, 0.15; p=0.014), ECOG PS (>2 vs. 0-2; HR, 6.4, p=0.017) and PVT localization (main + hepatic artery vs. rest; HR, 2.6; p=0.047) were identified as independent predictive factors.

CONCLUSION

In patients with CP A/B, tumor burden ≤50% and without extrahepatic metastasis patent PVP is a prognostic factor for prolonged survival. An ECOG PS >2 and the simultaneous invasion of the main portal and hepatic vein are poor prognostic factors for survival.

CLINICAL RELEVANCE/APPLICATION

Preserved peripheral portal vein patency has a beneficial impact on survival in patients with HCC and PVT treated with TACE.

VI237-SD-MOB2 The Development of Double Balloon Catheter for Bleeding Control in Patients with Placenta Accreta during Cesarean Hysterectomy, in a Swine Model

Station #2

Participants
Hiroshi Kondo, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Masayoshi Yamamoto, MD, Tokorozawa, Japan (*Presenter*) Nothing to Disclose
Yukichi Tanahashi, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Marie Osawa, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Takahiro Yamamoto, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Shigeru Furui, MD, Itabashi-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Life-threatening hemorrhage often occurs in cases of placenta percreta during cesarean section. Temporary balloon occlusion of the iliac artery is one potential therapy to control bleeding during cesarean delivery in patients with placenta accreta. However, it

is controversial where the balloon catheter should be positioned, especially, common iliac artery (CIA) or internal iliac artery (IIA). To resolve this matter, we have developed a double balloon catheter which can occlude CIA, IIA or both.

METHOD AND MATERIALS

A 6Fr diameter double balloon prototype catheter was developed. The balloons were located 30mm and 70mm from the tip of catheter. The experiment was performed on a swine. The balloon catheters were inserted and placed in the branch of external iliac artery. The distal and proximal balloons were located in the branch of external iliac artery and the external iliac artery, respectively. The pressure of the tip of catheter, side hole located between double balloons, and systemic blood pressure were monitored before and after the inflation of each balloon and both.

RESULTS

No balloon rupture, catheter migration and embolism of the lower extremities were experienced. The arterial pressure of the tip of catheter was decreased 37.1%, 31.2% and 30.9% with the inflation of both, proximal and distal balloon, respectively. That of side hole was decreased 39.6%, 32.7% and 1.9% with the inflation of both, proximal and distal balloon, respectively.

CONCLUSION

The double balloon occlusion might be more efficient to decrease the blood flow of the branch of external iliac artery than previous balloon occlusion procedure.

CLINICAL RELEVANCE/APPLICATION

The double balloon catheter is safe and can occlude the iliac artery more consistently and efficiently, compared with conventional single balloon catheter.

VI238-SD-MOB3 Ultrasound for DVT - is a Repeat Examination Necessary? Data from 9623 Examinations at a Single Institution

Station #3

Awards
Student Travel Stipend Award

Participants
Flora C. Daley, BMBS, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose
Janette Smith, MBBChir, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Annie Davenport, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Caroline Lewis, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Ann Taylor, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Gillian O'Brien, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Edmund M. Godfrey, MBBCh, FRCR, Cambridge, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Patients with suspected deep venous thrombosis (DVT) are imaged with ultrasound (US). If the exam is negative, patients are imaged again after a short interval to exclude a missed or propagating thrombus. The aim of this study was to assess the incidence of DVT at the primary and secondary US and evaluate if these rates vary across different "at risk" groups.

METHOD AND MATERIALS

A database of patients referred to an ambulatory thrombosis service at a large tertiary center was interrogated to identify patients presenting with suspected DVT between January 2008 and November 2015. Demographics, symptoms, risk factors (recent surgery or trauma, current infection, pregnancy or recent delivery, malignancy, history of DVT or intravenous drug use (IVDU)) and the US results were recorded. US comprised of compression ultrasonography of the proximal lower limb veins. Patients were selected for a repeat US on the basis of a raised d-dimer, strong clinical suspicion of DVT or a high Wells' score. The incidence, odds ratio (OR), 95% confidence interval and P-value for each group was calculated for each ultrasound.

RESULTS

7314 patients underwent an initial US. A DVT was detected in 14.4% (Male 52%, mean age 67 yrs). The highest incidence of DVT found at initial US was in the IVDU group (63.9%, OR 13.17; 95% c.i. 26.14 to 6.63, p<0.001) followed by patients with malignancy (36.2%, OR 4.22; 95% c.i. 5.82 to 3.06, p<0.001). Patients with current infection had the lowest incidence (3.7%, OR 0.28; 95% c.i. 0.48 to 0.17, p<0.001). 2309 patients had a repeat US with a 2.3% incidence of DVT. The highest incidence was observed in patients with malignancy (8.8%, OR 5.63; 95% c.i.19.51 to 1.63, p=0.006) and in those with a past history of DVT (6.1%, OR 3.75; 95% c.i. 6.88 to 2.05, p<0.001).

CONCLUSION

Patients with clinical signs or symptoms of DVT should be referred for US. In selected patients, a repeat US after 7-14 days should be used to exclude missed or propagating thrombus. The overall incidence of DVT at repeat US was 2.3%, but in patients with a history of previous DVT or malignancy, it was 6.1% and 8.8% respectively.

CLINICAL RELEVANCE/APPLICATION

This data confirms the importance of a repeat US in selected patients with suspected DVT. Further research to improve selection of patients who would benefit most from a repeat ultrasound is required.

VI239-SD-MOB4 Combined Effect of GNRH Agonist Therapy and Uterine Artery Embolization in Symptomatic Uterine Fibroids: MRI Evaluation of the Necrotic Area Reabsorption Time and Clinical Outcome after 2 Years

Station #4

Participants
Fernando Smaldone, MD, L'Aquila, Italy (*Presenter*) Nothing to Disclose
Francesco Arrigoni, Coppito, Italy (*Abstract Co-Author*) Nothing to Disclose

Fabiana Ferrari, MD, LAquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Sonia Iafrate, LAquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Masciocchi, MD, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Ilaria Capretti, L Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the combined effects of gonadotropin-releasing hormone (GnRH) agonists therapy and UAE for a faster reabsorption time in women affected by symptomatic uterine fibroids

METHOD AND MATERIALS

We treated 42 women (mean age, 41 years) affected by symptomatic uterine fibroids. We divided our patients into two groups: 17/42 women were submitted to GnRH-agonists therapy after 1 month from the treatment (Group A); 25/42 did not receive any therapy after UAE (Group B).All patients were submitted to c.e. MRI to evaluate the necrotic area extension after 1 month and 2 years to assess the different reabsorption time of the necrotic area. The variation of symptomatology was assessed using the SSS-Questionnaire after 2 years

RESULTS

The mean value of necrotic area extension was 94.5%. After 2 years from UAE, in the group A, 11/17 patients (64.7%) showed faster necrotic area reabsorption with a mean value of 85%; in six out of 17 women (35.3%) reabsorption of 65% was observed. After 2 years, in the group B, 17/25 (68%) showed a mean value of necrotic area reabsorption of 60%; only 8/25 patients (32%) showed a reabsorption of the necrotic area of 85%.All patients did not complain of significant complications and presented a similar improvement of symptomatology after 2 years.

CONCLUSION

GnRH-agonists after UAE treatment can be a useful therapy to promote a faster reabsorption of necrotic area with a consequent recovery of the uterine wall.

CLINICAL RELEVANCE/APPLICATION

The use of GnRH agonists in association to UAE treatment seems to reduce the reabsorption time of the necrotic area with good improvement of symptomatology

VI240-SD-MOB5 Percutaneous Image-Guided Cryoablation of T1 Renal Cell Carcinoma: Outcomes in 285 Patients

Station #5

Awards
Student Travel Stipend Award

Participants
Farzad Sedaghat, MD, Boston, MA (*Presenter*) Nothing to Disclose
Kemal Tuncali, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Paul B. Shyn, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Servet Tatli, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Vincent M. Levesque, MA, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Stuart G. Silverman, MD, Brookline, MA (*Abstract Co-Author*) Author, Wolters Kluwer nv

PURPOSE

To describe our 13-year experience and outcome of image-guided percutaneous cryoablation of T1 renal cell carcinomas.

METHOD AND MATERIALS

285 patients, 180 (65%) males, 105 (37%) females, 38-92 yrs, (mean 66.8 yrs) with solitary renal cell carcinomas were treated with percutaneous image-guided cryoablation from August 1, 2000 through December 31, 2013. Lesions (260 T1a , 25 T1b, median size 2.5 cm, range, 0.6 - 6.5 cm), were ablated using one to seven (median three) cryoprobes. CT (n=155) or MRI (n=130) was utilized for imaging-guidance and iceball monitoring. In selected cases, adjacent normal structures were displaced from the treatment site by percutaneous instillation of saline and/or manual displacement of bowel. MRI was obtained at 24 hrs to assess for early complications. In addition to a review of the medical record, MRIs were repeated at 3 to 6 month intervals for the first year, and every 6 to 12 months thereafter (median 26 mos; range 3-143 mos) to assess for treatment efficacy and additional complications.

RESULTS

Primary efficacy was 97.8%; all recurrences were successfully treated. Overall complication rate was 14%, including 9 CTCAE grade 1 (e.g., pain, perinephric hematoma), 17 grade 2 (e.g., myoglobinemia, urinary retention), 11 grade 3 (e.g., UTI, anemia, pneumonia), and 3 grade 4 complications (CVA, aspiration pneumonia, hypertensive emergency).

CONCLUSION

Percutaneous image guided cryoablation of T1 renal cell carcinoma resulted in highly successful intermediate to long term outcomes.

CLINICAL RELEVANCE/APPLICATION

Image-guided cryoablation is clinically efficacious and a viable alternative to partial nephrectomy.

VI241-SD-MOB6 CT-Guided Localization of Small Pulmonar Nodules using Microcoil Implantation prior to Video-Assisted Thoracoscopic Surgical Resection

Station #6

Participants

LI-BAO HU, PhD, Beijing, China (*Presenter*) Nothing to Disclose
Jian Gao, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the safety and effectiveness of CT-guided placement of microcoils used to direct video-assisted thoracoscopic surgical (VATS) excision of small lung nodules.

METHOD AND MATERIALS

Three hundred and sixty-five consecutive patients with 372 undiagnosed pulmonary nodules (<30 mm) were enrolled. All the nodules were marked preoperatively using CT-guided placement of microcoils. The microcoils were implanted adjacent to the nodules with or without the superficial end coiled beyond the pleural surface, which decided by the specific site of the pulmonary nodule. All patients accepted VATS after the localization the same day or the next day. Histopathologic diagnosis was performed immediately after resection.

RESULTS

CT-guided microcoil placement was successful in 369 nodules (369/272, 99.19%), and 3 (3/372, 0.81%) microcoils were found to fallen off from the lung during the operation. All nodules were successfully removed at VATS excision.Asymptomatic pneumothorax occurred in 48 (12.90%)patients, and mild pulmonary hemorrhage occurred in 27(9.93%) patients. However, none of these patients required further surgical treatment.

CONCLUSION

Preoperative localization of small pulmonary nodules using percutaneous CT-guided microcoil implantation is a safe and effective technique that increases the success rate of VATS excision.

CLINICAL RELEVANCE/APPLICATION

Preoperative localization of small pulmonary nodules using percutaneous CT-guided microcoil implantation with or without the superficial end coiled beyond the pleural surface can facilitate the resection of small pulmonary nodule wherever the nodule grows.

VI213-ED-MOB7 Hepatic Imaging Following Intra-arterial Embolotherapy

Station #7

Participants
Joseph R. Kallini, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Frank H. Miller, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Siemens AG
Ahmed Gabr, MD, MBBCh, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Riad Salem, MD, MBA, Chicago, IL (*Abstract Co-Author*) Research Consultant, BTG International Ltd Research Grant, BTG International Ltd
Robert J. Lewandowski, MD, Chicago, IL (*Abstract Co-Author*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc

TEACHING POINTS

(1) To discuss salient findings on cross-sectional imaging of hepatocellular carcinoma treated with different forms of intra-arterial embolotherapy (e.g. chemoembolization and ytrrium-90 radioembolization).(2) To discuss size-based tumor response criteria (WHO and RECIST), necrosis/enhancement criteria (EASL and mRECIST), and the limitations of each.

TABLE OF CONTENTS/OUTLINE

OVERVIEW OF INTRA-ARTERIAL PROCEDURES Bland embolization and trans-arterial chemoembolization Trans-arterial radioembolization POST-PROCEDURAL IMAGING MODALITIES General Considerations Computed Tomography Magnetic Resonance Imaging and Diffusion Weighted Imaging Fluorodeoxyglucose-Positron Emission Tomography (FDG-PET) Contrast-Enhanced Ultrasonography MEASURES OF TREATMENT RESPONSE Limitations of current tumor response criteria European Association for the Study of the Liver Guidelines (EASL) Modified RECIST criteria (mRECIST) Three-dimensional volumetric methods Primary Index Lesion Tumor markers IMAGING FINDINGS AFTER INTRA-ARTERIAL THERAPY Trans-arterial embolization and chemoembolization Trans-arterial radioembolization CONCLUSION

Honored Educators

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

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

VSIO21

Interventional Oncology Series: Hepatocellular Carcinoma and Cholangiocarcinoma

Monday, Nov. 28 1:30PM - 6:00PM Room: S406B

GI IR

AMA PRA Category 1 Credits ™: 4.50
ARRT Category A+ Credits: 5.00

FDA Discussions may include off-label uses.

Participants
Riccardo A. Lencioni, MD, Pisa, Italy, (rlencioni@med.miami.edu) (*Moderator*) Research Consultant, BTG International Ltd; Research Consultant, Guerbet SA; Research Consultant, Bayer AG

LEARNING OBJECTIVES

1) To understand the spectrum of interventional oncology treatments currently available for liver cancer patients. 2) To discuss the results of recent clinical studies investigating interventional oncology treatments for liver cancer. 3) To describe the role of interventional oncology in the multidisciplinary management of patients with liver cancer.

ABSTRACT

Sub-Events

VSIO21-01 HCC: Medical Oncologist's Perspective

Monday, Nov. 28 1:30PM - 1:50PM Room: S406B

Participants
Ghassan K. Abou-Alfa, MD, New York, NY, (abou-alg@mskcc.org) (*Presenter*) Research Grant, Abbott Laboratories; Research Grant, Amgen Inc; Research Grant, AstraZeneca PLC; Research Grant, Bayer AG; Research Grant, Eli Lilly and Company; Research Grant, Exelixis, Inc; Research Grant, F. Hoffmann-La Roche Ltd; Research Grant, Immunomedics, Inc; Research Grant, Incyte Corporation; Research Grant, Momenta Pharmaceuticals; Research Grant, Myriad Genetics, Inc; Research Grant, Novartis AG; Research Grant, OncoMed Pharmaceuticals, Inc; Research Grant, Polaris Group; Research Grant, Vicus Therapeutics, LLC; Consultant, Aduro BioTech, Inc; Consultant, Astellas Group; Consultant, Onxeo SA; Consultant, Boston Scientific Corporation; Consultant, Boston Therapeutics, Inc; Consultant, Bristol-Myers Squibb Company; Consultant, CASI Pharmaceuticals Inc; Consultant, Celgene Corporation; Consultant, Cipla Ltd; Consultant, Eli Lilly and Company; Consultant, Gilead Sciences, Inc; Consultant, IntegraGen SA; Consultant, AstraZeneca PLC; Consultant, Merrimack Pharmaceuticals, Inc; Consultant, Momenta Pharmaceuticals; Consultant, Novartis AG; Consultant, Onxeo SA; Consultant, AbbVie Inc; Consultant, sanofi-aventis Group; Consultant, Silenseed Ltd; Consultant, SillaJen, Inc; Consultant, Vicus Therapeutics, LLC

LEARNING OBJECTIVES

1) Recognize the two disease state, the cancer itself and the generally associated cirrhosis of hepatocellular carcinoma (HCC). 2) Recognize the current standards of care used for advanced and metastatic HCC. 3) Learn about the current clinical trials combining local plus systemic therapy for locally advanced and metastatic HCC.

ABSTRACT

As the understanding of the science of advanced hepatocellular carcinoma (HCC) deepens, and with the therapeutic advances we are living, the perspectives of the different disciplines onto the management of HCC seem to converge. An understanding of the two diseases in one that inflict patients with HCC is critical. Recognizing the cirrhosis is a must to help guide therapy and assess outcome. The advent of sorafenib has been followed by a whole armamentarium of clinical trials that so far has not yielded any positive outcome that moves the needle of improved survival further to the right. This is at least the case until the time of writing this abstract on the first of March 2016. While specialists wait to see the impact if any of immunotherapy in HCC, another novel approach continues to be underway: Combining local and systemic therapy. While has yielded so far discouraging results with the combination of TACE sorafenib, the study of this approach is not over yet, as investigators are visiting this approach with novel therapeutics including checkpoint inhibitors and extending it to other stages of disease, especially the metastatic setting. It won't be long time before interventional radiologists and medical oncology may need to sit with the patient and deliver therapy at the same time.

VSIO21-02 RFA Plus Lyso Thermosensitive Liposomal Doxorubicin Improves Survival Using Metric of RFA Duration per Tumor Volume: Retrospective Analysis of Prospective Randomized Controlled Trial

Monday, Nov. 28 1:50PM - 2:00PM Room: S406B

Participants
Haydar Celik, PhD, Bethesda, MD (*Presenter*) Nothing to Disclose
Paul Wakim, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
John W. Karanian, PhD, Laurel, MD (*Abstract Co-Author*) Nothing to Disclose
William F. Pritchard Jr, MD, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Meryll Castro, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, W. L. Gore & Associates, Inc ; Researcher, Cook Group Incorporated; Patent agreement, VitalDyne, Inc; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; ; ; ;
Shelby Leonard, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Won Y. Tak, Daegu, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Nicholas Borys, Lawrenceville, NJ (*Abstract Co-Author*) Sr. Vice President, Celsion Corporation; Officer, Celsion Corporation
Riccardo A. Lencioni, MD, Pisa, Italy (*Abstract Co-Author*) Research Consultant, BTG International Ltd; Research Consultant, Guerbet SA; Research Consultant, Bayer AG

PURPOSE

Lyso-thermosensitive liposomal doxorubicin (LTLD) releases cytotoxic doxorubicin locally in the region of mild hyperthermia (40–42 °C). The purpose of this study is to evaluate a novel treatment parameter, burn time per tumor volume (min/ml), for correlation with clinical outcomes of RFA with LTLD.

METHOD AND MATERIALS

HEAT study is a double-blind, randomized controlled phase III trial of RFA-only vs RFA+LTLD. Patients with 3-7 cm diameter hepatocellular carcinoma (HCC) were included in the HEAT study, but only single lesions were used for this analysis (RFA only n=210 vs. RFA+LTLD n=227). The effect of burn time per tumor (pre-treatment) volume on progression free survival (PFS) and overall survival (OS) was analyzed using multiple covariate Cox proportional hazard model.

RESULTS

Average burn time per volume for RFA+LTLD patients was 22.7% less than RFA-only patients. Furthermore, Cox multiple covariate analysis was utilized to test the interaction of two different parameters: treatment groups (RFA-only vs. RFA+LTLD) and burn time per tumor volume. OS was found to be significant (p=0.038, Hazard Ratio=0.85): increase in the burn time per tumor volume improves survival in the RFA+LTLD patients compared to RFA only patients. On the other hand, a similar result was not observed for PFS (p=0.389, HR=1.059). Each group (RFA only and RFA+LTLD) was also individually analyzed for effects of burn time per tumor volume. For RFA+LTLD patients, one unit increase in RFA duration per tumor volume improved OS of RFA+LTLD patients by 19.6% (p=0.017, Hazard Ratio=0.836, CI=0.722-0.968, n=227). Conversely, burn time per tumor volume did not significantly affect RFA-only patients (p=0.57, Hazard Ratio=0.99, n=210).Kaplan-Meier analysis showed even more dramatic differences in a subgroup of patients (147/437) with the burn times per tumor volume larger than 2.5 min/ml (Fig).

CONCLUSION

LTLD may improve overall survival as RFA duration per unit tumor volume increases. This is a post hoc study, therefore should be confirmed with prospective studies. Defining optimal device use to maximize drug deposition may require correlating the drug pharmacokinetics with duration of RFA.

CLINICAL RELEVANCE/APPLICATION

Longer burn times may optimize LTLD drug effects. Burn time per tumor volume may be a better measure for RFA+LTLD assessment.

VSIO21-03 HCC: Interventional Oncologist's Perspective

Monday, Nov. 28 2:00PM - 2:20PM Room: S406B

Participants
Riccardo A. Lencioni, MD, Pisa, Italy, (rlencioni@med.miami.edu) (*Presenter*) Research Consultant, BTG International Ltd; Research Consultant, Guerbet SA; Research Consultant, Bayer AG

LEARNING OBJECTIVES

1) To understand the spectrum of interventional oncology treatments currently available for liver cancer patients. 2) To discuss the results of recent clinical studies investigating interventional oncology treatments for liver cancer. 3) To describe the role of interventional oncology in the multidisciplinary management of patients with liver cancer.

ABSTRACT

VSIO21-04 Sorafenib-loaded Theranostic Microspheres for the Transarterial Chemoembolization of a Liver

Monday, Nov. 28 2:20PM - 2:30PM Room: S406B

Participants
Hyo-Cheol Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Kyu Ri Son, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Woo Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyun-Jong Cho, Chuncheon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To develop poly(lactic-co-glycolic acid) (PLGA) microspheres that can co-encapsulated sorafenib and triiodobenzoic acid (TIBA) for simultaneous transarterial embolization (TAE) and local delivery of sorafenib.

METHOD AND MATERIALS

Sorafenib and TIBA-loaded PLGA microspheres (SOF/TIBA/PLGA) were fabricated using a modified oil-in-water method. After fabrication, the microspheres were characterized for size, biodegradability, drug release profiles, CT imaging properties in vitro. After these initial in vitro characterization, a rat hepatoma model was employed to enable in vivo studies investigating pharmacokinetics, tumor responses after TAE, and CT-monitoring capability.

RESULTS

The mean diameter of developed MSs was 28.5 ± 2.1 μm and the average of sorafenib encapsulation efficiency was 58.20% in this study. The mean contents of sorafenib and iodine in MSs were 5.11% and 23.15%, respectively. In vitro drug release study demonstrated that sorafenib release on day 1, 4, and 28 were 35.07 ± 0.59%, 46.64 ± 1.32%, and 67.41 ± 5.00%, respectively. According to the in vivo studies, PLGA MSs were detectable on post-procedural CT images. Both tumor concentration of sorafenib and tumor-to-liver drug concentration ratio were significantly higher in the SOF/TIBA/PLGA group compared with the sorafenib oral administration group ($p < .05$). Tumor growth rate, addressed one week after the procedure, was significantly lower in the SOF/TIBA/PLGA group compared with the blank PLGA MSs group and control group (no treatment) ($p < .05$).

CONCLUSION

SOF/TIBA/PLGA was promising materials for TAE of liver tumors, as providing sufficient anticancer effect, angiogenesis inhibition, and imageability.

CLINICAL RELEVANCE/APPLICATION

Sorafenib-loaded PLGA microsphere can be used for chemoembolization of HCC patients.

VSIO21-05 TACE in 2016: Techniques, Results, Practice Patterns

Monday, Nov. 28 2:30PM - 2:50PM Room: S406B

Participants
Jean-Francois H. Geschwind, MD, Westport, CT, (jeff.geschwind@yale.edu) (*Presenter*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC

LEARNING OBJECTIVES

1. Understand the indications for TACE for HCC2. Know the side effects, toxicities, and expected results of TACE for HCC patients3. Understand the potential for combining TACE with systemic therapies

ABSTRACT

VSIO21-06 Spectral Photon-counting CT: Spatial Differentiation of Static Contrast versus Radiopaque Image-able Drug Eluting Microspheres

Monday, Nov. 28 2:50PM - 3:00PM Room: S406B

Participants
Amir Pourmorteza, PhD, Bethesda, MD (*Presenter*) Researcher, Siemens AG
Ayele Negussie, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Rolf Symons, MD, Washington, DC (*Abstract Co-Author*) Nothing to Disclose
William F. Pritchard Jr, MD, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Elliot B. Levy, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, W. L. Gore & Associates, Inc ; Researcher, Cook Group Incorporated; Patent agreement, VitalDyne, Inc; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; ; ; ;
David A. Bluemke, MD, PhD, Bethesda, MD (*Abstract Co-Author*) Research support, Siemens AG

PURPOSE

Spectral CT makes it possible to differentiate two or more high atomic number contrast agents (CA) or drug delivery vectors that otherwise cannot be separately resolved using single energy CT or fluoroscopy. Here we demonstrate the feasibility of using a single spectral photon-counting CT (PCCT) scan to image and localize both custom and FDA-cleared microspheres mixed in one of two FDA-cleared CA's to assess the spatial heterogeneity of microspheres vs CA, which would be desirable after transarterial embolization (TAE).

METHOD AND MATERIALS

Two combinations of microspheres and vascular CAs were studied: I+Gd (LC Bead LUMI iodinated microspheres and gadolinium-based CA (Magnevist, Bayer)) and Bi+I (custom fabricated bismuth-engineered microspheres and iodinated CA (Isovue 300, Bracco)). Vascular phantoms were fabricated with beads inside 4-mm plastic tubes (resembling small vessels) with vascular CA diluted to approximate clinical concentrations. A prototype whole-body PCCT scanner (Siemens Healthcare) was used. Using test tubes with calibrated dilutions of CAs, we searched for energy thresholds that maximized the separation between the CA inside the bead and the vascular CA, while minimizing image noise. The lower threshold was set at 22 keV and the higher threshold was swept around the k-edge energies of Gd and Bi (50, 90 keV). Images were reconstructed with color maps correlating to these different PCCT detections.

RESULTS

The high energy threshold was incremented by 3keV steps at 80 and 140 kVp tube voltage settings. The following threshold and tube voltage settings provided optimized material separation and image noise tradeoff (I+Gd: 52 keV at 80 kVp and Bi+I: 75 keV at 140 kVp). Linear material decomposition of the PCCT images showed clear differentiation between beads and vascular CA.

CONCLUSION

The results show the feasibility of tuning the spectra thresholds of a PCCT scanner in order to differentiate radiopaque microspheres from adjacent static columns of contrast following embolization. Such differentiation may optimally inform endpoints in embolization or locations of tumor at risk for under-dosing or under-treatment. Future work will include in vivo experiments in a large animal model.

CLINICAL RELEVANCE/APPLICATION

Photon-counting CT may be used to characterize the outcome of TAE by localization and differentiation of microspheres and vascular columns of contrast between microspheres in a single scan.

VSIO21-07 Y90 Radioembolization: Current Indications and Protocols

Monday, Nov. 28 3:00PM - 3:20PM Room: S406B

Participants
Riad Salem, MD, MBA, Chicago, IL (*Presenter*) Research Consultant, BTG International Ltd Research Grant, BTG International Ltd

VSIO21-08 Prospective Trial using Internal Pair-production Positron-emission Tomography (PET) after Radioembolization to Determine the Effects of Yttrium-90 (90Y) Dose on Liver Toxicity

Monday, Nov. 28 3:20PM - 3:30PM Room: S406B

Participants
Keith T. Chan, MD, MS, Seattle, WA (*Presenter*) Spouse, Employee, Health Advocacy Strategies, LLC
Adam M. Alessio, PhD, Seattle, WA (*Abstract Co-Author*) Research Grant, General Electric Company
Sandeep Vaidya, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Guy E. Johnson, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Wayne L. Monsky, MD, PhD, Sacramento, CA (*Abstract Co-Author*) Research Consultant, NexGen Medical Systems, Inc
Sharon W. Kwan, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Ann E. Wilson, MS, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
David H. Lewis, MD, Seattle, WA (*Abstract Co-Author*) Research funded, Eli Lilly and Company
Siddharth A. Padia, MD, Seattle, WA (*Abstract Co-Author*) Consultant, BTG International Ltd; Research Grant, Koninklijke Philips NV

PURPOSE

90Y internal pair-production PET can quantify the radiation dose delivered to non-tumoral hepatic parenchyma after radioembolization. This study prospectively correlates radiation dose in normal liver to treatment-related toxicity.

METHOD AND MATERIALS

A single-arm prospective trial was performed at a single institution under IRB approval. 35 patients with unresectable intrahepatic malignancies were enrolled. Inclusion criteria were: ECOG performance status 0–2, Child-Pugh A or B, and first 90Y radioembolization treatment. Time-of-flight PET imaging without additional tracer administration was performed the same day after 90Y treatment. Volumetric analysis of the non-tumor liver parenchyma was performed using a proprietary software and 90Y dose calculated. Patients were evaluated at 30 and 90 days post-treatment. Hypoalbuminemia, hyperbilirubinemia, elevation of AST and ALT, and leukopenia were assessed using multivariate models as indices of liver toxicity, with CTCAE Grade ≤1 change in laboratory values compared to Grade ≥2.

RESULTS

34 patients (median age 60, range 42–79) were included. 79% had HCC, 3% had cholangiocarcinoma, and 18% had liver metastases. One patient was excluded for poor image registration. 27 patients had underlying cirrhosis (81% HBV/HCV, 30% alcohol-related). 29 and 5 patients were Child-Pugh A and B, respectively. Most treatments (76%) were performed via lobar artery infusions with average delivered activity of 3.1GBq. No liver failure, abscess, biloma, or death occurred within 90 days. 15 patients had Grade ≤1 toxicity. 12 patients had Grade 2, 7 had Grade 3, and none had Grade 4 or higher toxicity. The median dose delivered to the normal liver in the treated lobe was 49Gy [range 5–133]. Patients with a Grade ≥2 change in albumin, bilirubin, and AST had a significantly higher parenchymal dose than those with Grade ≤1 (62±34Gy vs 39±21Gy, p=0.01). Multivariate models of each toxicity index showed that parenchymal dose is the most common factor associated with Grade ≥2 toxicity.

CONCLUSION

90Y delivered dose to normal liver parenchyma can be measured by internal pair-production PET after radioembolization and predicts post-treatment liver toxicity.

CLINICAL RELEVANCE/APPLICATION

90Y-PET tumor dosimetry permits immediate assessment of the dose received by normal liver after radioembolization and may predict treatment-related liver toxicity.

VSIO21-09 Panel Discussion: Management of Intermediate-Advanced HCC

Monday, Nov. 28 3:30PM - 3:45PM Room: S406B

Participants

VSIO21-10 Identification of Novel Angiogenesis Biomarkers Showing Transient and Sustained Changes in Circulating Levels after Hepatic Arterial Embolization for Hepatocellular Carcinoma

Monday, Nov. 28 3:45PM - 3:55PM Room: S406B

Awards
Student Travel Stipend Award

Participants
James S. Ronald, MD, PhD, Durham, NC (*Presenter*) Nothing to Disclose
Gemini L. Janas, RT, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Willa Chen, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Paul V. Suhocki, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Waleska M. Pabon-Ramos, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
David R. Sopko, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Andrew Nixon, PhD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Charles Y. Kim, MD, Durham, NC (*Abstract Co-Author*) Consultant, Halyard Health, Inc; Consultant, Cryolife, Inc; Consultant, Merit Medical Systems, Inc

PURPOSE

Prior studies of angiogenesis biomarker response after hepatic embolotherapy for hepatocellular carcinoma (HCC) in humans have been restricted to chemoembolization and radioembolization, which may confound biomarker response to ischemia. Furthermore, while many studies have focused on a limited number of biomarkers, numerous molecular pathways are implicated in angiogenesis. The purpose of this study was to characterize serum biomarker responses related to ischemia after bland transarterial embolization (TAE) of HCC using a robust and modern panel of circulating angiogenesis and associated biomarkers.

METHOD AND MATERIALS

This prospective study enrolled 25 patients with untreated HCC (LI-RADS 5 or biopsy proven) undergoing TAE as the sole method of oncologic treatment. A panel of 19 angiogenesis biomarkers were measured immediately prior to treatment and at 1 day, 2 weeks, and 4 weeks after treatment using multiplex enzyme-linked immunosorbent assays. Paired Wilcoxon rank sum tests were used to identify changes in biomarker levels compared with pre-TAE levels. Multiple testing corrections were performed.

RESULTS

Ten of 19 biomarkers showed statistically significant transient changes on the day following TAE, 10 biomarkers showed significant elevations at 2 weeks, and 2 biomarkers remained elevated as late as 4 weeks following TAE. IL-6 expression was initially increased but quickly returned to baseline levels. PDGF-AA, and PDGF-BB were transiently downregulated on the day following TAE. TGFß-2 was initially downregulated followed later by an increase in TGFß-1. TSP-2 also showed delayed upregulation at 2 weeks. Interestingly VEGF-D was upregulated for at least 2 weeks following TAE whereas VEGF-A showed only transient change. TIMP-1, ICAM-1, PlGF, and VEGFR-2 and 3 showed early and sustained upregulation persisting at least 2 weeks following TAE whereas VEGFR-1 showed little change. OPN and VCAM-1 showed the most sustained upregulation, extending at least 4 weeks following TAE.

CONCLUSION

Using a current panel of angiogenesis biomarkers, multiple biomarkers demonstrated significant changes after TAE, including several novel factors demonstrating sustained upregulation.

CLINICAL RELEVANCE/APPLICATION

Identification of specific pro-angiogenesis pathways after TAE may guide therapeutic targets for blocking the angiogenic response, which has been implicated in residual/recurrent tumorigenesis.

VSIO21-11 Characterizing Alterations in BCAA Metabolism in HCC in Vitro under TAE-like Ischemia Using Carbon-13 NMRS

Monday, Nov. 28 3:55PM - 4:05PM Room: S406B

Awards
Student Travel Stipend Award

Participants
Mike Sheng, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Santiago Pulido, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Michael Noji, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Gregory J. Nadolski II, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Stephen J. Hunt, MD,PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Terence P. Gade, MD, PhD, New York, NY (*Abstract Co-Author*) Research Grant, Guerbet SA

PURPOSE

Transarterial embolization (TAE) is the gold standard treatment for unresectable hepatocellular carcinoma (HCC). Under TAE ischemic environments, HCC cells undergo metabolic reprogramming that enables survival by facilitating reduction oxidation chemistry (redox) homeostasis. Specifically, we have focused on the redox regulation of protein function through the role of branched chain aminotransferase (BCAT1 and BCAT2), enzymes that are epigenetically re-expressed in HCC and play a central role in the metabolism of branched-chain amino acids (BCAAs), especially leucine and its α-keto acid (α-ketoisocaproic acid [KIC]) precursor. Utilizing carbon-13 NMR spectroscopy, we characterize alterations of BCAA metabolism in HCC cells surviving severe, TAE-like ischemia.

METHOD AND MATERIALS

13C-NMR spectroscopy of [1-13C] KIC and [1-13C] leucine metabolism was performed on previously established diethylnitrosamine (DEN)-induced rat HCC cell lines to assess alterations in BCAA metabolism *in vitro* under TAE-like ischemia compared to standard conditions. Western blot and qPCR was applied to elucidate changes in BCAT1/BCAT2 protein and RNA under stressed conditions.

RESULTS

HCC cells incubated with [1-13C] KIC under ischemia demonstrated metabolism of [1-13C] KIC to [1-13C] CO2 and nearly absent metabolism to [1-13C] leucine, in keeping with reductive stress induced inactivation of BCAT and activation of branched chain ketoacid dehydrogenase (BCKDH). These findings were corroborated by Western blot analysis which showed decreased BCAT1/BCAT2 and increased BCKDH protein expression under ischemic conditions.

CONCLUSION

HCC cells in TAE-like ischemic conditions undergo inactivation of BCAT and increased expression of BCKDH, leading to increased BCAA catabolism.

CLINICAL RELEVANCE/APPLICATION

Characterization of alterations in protein metabolism in HCC cells under TAE-like ischemic conditions could provide an effective biomarker of surviving cancer cells.

VSIO21-12 Radiofrequency Hyperthermia-Enhanced Direct Intratumoral Chemotherapy of Hepatocellular Carcinoma via an Interventional Molecular Imaging-Guided Approach

Monday, Nov. 28 4:05PM - 4:15PM Room: S406B

Participants
Jun Gao, MD, PhD, Seattle, WA (*Presenter*) Nothing to Disclose
Feng Zhang, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Yin Jin, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose

Yaoping Shi, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Jianfeng Wang, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Xiaoming Yang, MD, PhD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Recurrence often occurs in the margin of radiofrequency (RF) ablated hepatocellular carcinoma (HCC), due to residual tumor cells in the peritumoral zone. One potential strategy to overcome this clinical problem is combining RF ablation with adjuvant treatments. In this study, we investigated the opportunity of using RFH to enhance interventional molecular imaging-guided, direct intratumoral chemotherapy of HCC.

METHOD AND MATERIALS

For both in-vitro confirmation and in-vivo validation, different groups of Luciferase/mCherry-labeled human HCC cells (Lu/mC-HepG2) and mice with subcutaneous Lu/mC-HepG2 xenografts were treated by: (i) combination therapy with liposomal doxorubicin plus RFH at 42 **I**; (ii) liposomal doxorubicin alone; (iii) RFH alone; and (iv) saline. For in-vitro confirmation, MTS assay, confocal microscopy and flow cytometry were used to compare cell viabilities and apoptosis among different treatment groups. For in vivo validation, liposomal doxorubicin was directly injected into the tumor under ultrasound imaging guidance, followed by intratumoral RFH for 30 min. Changes on bioluminescent signals and sizes of tumors were followed up by quantitative molecular optical and ultrasound imaging overtime, which were correlated with subsequent histology confirmation.

RESULTS

Of in vitro experiments, MTS assay demonstrated the lowest cell proliferation in combination therapy compared with other three treatments (25.0±5.6% vs 49.7±5.2% vs 94.2±3.9% vs 100%, $p<0.001$). Flow cytometry showed the highest apoptotic index in combination therapy compared to other treatments (37.9±3.2% vs 32.2±1.7% vs 2.9±1.7% vs 1.8±0.7%, $p<0.001$). Of in vivo experiments, optical imaging demonstrated a significant decrease of bioluminescence intensities in combination therapy compared with other treatments (0.53±0.10 vs 1.4±0.5 vs 2.8±0.8 vs 3.0±0.3, $p<0.05$). Ultrasound images further showed the smallest tumor volume for combination therapy compared to other treatments (0.7±0.1 vs 1.8±0.4 vs 3.0±0.8 vs 3.3±0.3, $p<0.05$). Both imaging findings were confirmed by histologic correlation.

CONCLUSION

We have successfully validated the feasibility of using RFH to enhance direct intratumoral liposomal doxorubicin therapy of HCC.

CLINICAL RELEVANCE/APPLICATION

This concept may open new avenues for effective management of HCCs by combining RF technology with interventional molecular imaging-guided direct intratumoral chemotherapy.

VSIO21-13 Making Sense of Alabtion Technologies for Liver Cancer

Monday, Nov. 28 4:15PM - 4:35PM Room: S406B

Participants
Govindarajan Narayanan, MD, Miami, FL (*Presenter*) Consultant, BTG International Ltd; Consultant, AngioDynamics, Inc; Consultant, Medtronic plc; Consultant, Guerbet SA

VSIO21-14 Transcatheter Arterial Chemoembolization (TACE) followed by Immediate Radiofrequency Ablation (RFA) versus TACE alone in Treatment of Solitary Huge Hepatocellular Carcinoma (HCC>=10cm)

Monday, Nov. 28 4:35PM - 4:45PM Room: S406B

Participants
Zhijun Wang Sr, MD, PhD, Beijing, China (*Presenter*) Nothing to Disclose

PURPOSE

To compare the long-term clinical benefit of conventional TACE followed by immediate CBCT(C-arm Cone Bean CT) guided RFA and TACE alone in treatment of solitary huge HCC (≥10cm).

METHOD AND MATERIALS

This is a retrospective study involving 75 patients with unresectable solitary huge HCC (10.0 cm in diameter or larger) admitted to Chinese PLA General Hospital (Beijing, China) between January 2010 and March 2013. The median follow-up time was 33 months (range, 6–72 months). Of these patients, 44 patients received TACE alone and 31 patients received TACE immediately followed by CBCT guided RFA. For TACE with synchronous RFA group, all of patents received one to three cycles of TACE before combined therapy. The tumor response rate, treatment sessions were compared between the two modalities and overall survival (OS) were hierarchically analyzed using log–rank tests.

RESULTS

All patients successfully underwent TACE alone or TACE followed by immediate RFA with no serious complications. The median survival time was 19 months (range, 4–52 months) for TACE alone and 38 months (range, 6–70 months) for TACE with synchronous RFA group. Comparing to TACE alone, the combined therapeutic modality showed higher rates of complete response (87.1%) with fewer sessions ($P<0.001$). The 1-year, 2-year, and 3-year OS rates we were 66.7%, 31.8%, and 18.2% in TACE alone group, respectively. In contrast, for TACE with synchronous RFA group, the 1-year, 2-year, and 3-year OS rates were 90.3%, 64.5%, and 48.4%, respectively. This difference was statistically significant between the two groups ($P<0.001$).

CONCLUSION

TACE combined with synchronous RFA had advantages in prolonging OS, higher tumor response rate and decreasing therapeutic sessions in patients with unresectable solitary huge HCC when compared to TACE alone. The promising results suggest that the further prospective studies are required to confirm the findings of this study.

CLINICAL RELEVANCE/APPLICATION

The combined therapeutic modalities have the clinical benefit to improve the long-term outcome in treatment of solitary huge HCC.

VSIO21-15 Interventional Oncology Treatment of Cholangiocarcinoma

Monday, Nov. 28 4:45PM - 5:05PM Room: S406B

Participants
William S. Rilling, MD, Milwaukee, WI (*Presenter*) Research support, B. Braun Melsungen AG; Research support, Sirtex Medical Ltd; Research support, Siemens AG; Consultant, B. Braun Melsungen AG; Consultant, Cook Group Incorporated ; Consultant, Terumo Corporation; Advisory Board, Terumo Corporation

LEARNING OBJECTIVES

VSIO21-16 Treatment of Recurrent, Unresectable Intrahepatic Cholangiocarcinoma using Multi-Agent DSM TACE (Triple-TACE)

Monday, Nov. 28 5:05PM - 5:15PM Room: S406B

Participants
Fabian Goerg, Aachen, Germany (*Presenter*) Nothing to Disclose
Philipp Bruners, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Christiane K. Kuhl, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of the study was to evaluate the efficacy of transarterial multi-agent chemoembolization used in combination with degradable starch microspheres in patients with recurrent, unresectable cholangiocarcinoma (ICC)

METHOD AND MATERIALS

Single-center study on 18 patients (mean age 63y) with unresectable ICC, of whom 7 had undergone hemihepatectomy or trisectorectomy, and another 4 had undergone segmentectomy, and who were secondary-progressive under systemic chemotherapy, were treated by multi-agent DSM-TACE according to a standardized protocol. A total 45 sessions of TACE were performed in 4 week intervals with a mean of 2.5 sessions per patient. The cytotoxic agents were Cisplatin, Mitomycin C and Doxorubicin ("Triple-TACE"). Degradable starch microspheres with a mean diameter of 50 µm were mixed with mitomycin and doxorubicine. After thorough angiography of the celiac trunc and hepatic vessels, a microcatheter was placed in the respective hepatic artery. Cisplatin was injected via perfusor set at 1 ml/min. The mitomycin/doxorubicine/DSM mixture was hand injected under permanent fluoroscopic control of antegrade flow. Local tumor response was evaluated by MRI and CT. In patients with bilio-enteric anastomses, aggressive preventive antibiotic treatment was applied.

RESULTS

Local tumor response according to RECIST 1.1 was as follows: One patient was lost to follow-up; another patient with whole-liver ICC underwent liver transplantation. For the remaining 16 patients for whom follow-up is available, complete response was observed in 2 patients (12.5%), one of whom has remained without intrahepatic disease for over 28 months; partial response in 8 patients (50%), stable disease in 6 patients (43.8%). Beyond RECIST, based on multiparametric hepatic MRI, the reduction of hepatic vital tumor load was categorized as follows: None of the patients had progressive intrahepatic disease; 2/16 (12.5%) had unchanged tumor load; 8/16 (50%) had a substantial reduction of vital tumor load; 4/16 (25%) had an almost complete reduction of tumor load, and 2/16 (12.5%) complete reduction with no vital tumor left.

CONCLUSION

Response assessment based on Recist 1.1 and multiparametric MRI showed excellent local tumor control in patients with ICC after Triple-TACE with degradable starch microspheres.

CLINICAL RELEVANCE/APPLICATION

Triple-TACE with degradable starch microspheres is effective for treatment of otherwise therapy-refractory intrahepatic ICC.

VSIO21-17 Clinical Value of Multimodality 3D Imaging in Interventional Oncology

Monday, Nov. 28 5:15PM - 5:35PM Room: S406B

Participants
Julius Chapiro, MD, New Haven, CT, (julius.chapiro@yale.edu) (*Presenter*) Research Grant, Koninklijke Philips NV

LEARNING OBJECTIVES

1) Understand the challenges in assessing tumor response after interventional oncology procedures. 2) Become acquainted with the more recently introduced solutions for this problem such as computer-assisted tumor segmentation and image analysis. 3) Learn about the previously available tumor response criteria as well as the more recently introduced three-dimensional software-assisted approaches such as the quantitative European Association for the Study of the Liver (qEASL) criteria.

ABSTRACT

Assessing the tumor response of liver cancer lesions after intraarterial therapies is of major clinical interest. Over the last two decades, tumor response criteria have come a long way from purely size-based, anatomic methods such as the Response Evaluation Criteria in Solid Tumors towards more functional, enhancement- and diffusion-based parameters with a strong emphasis on MRI as the ultimate imaging modality. However, the relatively low reproducibility of those one- and two-dimenstional techniques (modified Response Evaluation Criteria in Solid Tumors and the European Association for the Study of the Liver criteria) provided the rationale for the development of new, three-dimensional (3D) quantitative assessment techniques. This talk will summarize and compare the existing methodologies used for 3D quantitative tumor analysis and provide an overview of the published clinical evidence for the benefits of 3D quantitative tumor response assessment techniques.

VSIO21-18 Use of Enhancing Tumor Burden on MRI for Response Assessment and Prediction of the Survival after 90Yttrium Radioembolization in Hepatocellular Carcinoma

Monday, Nov. 28 5:35PM - 5:45PM Room: S406B

Participants
Duc Do Minh, BSc, Berlin, Germany (*Presenter*) Nothing to Disclose
Julius Chapiro, MD, New Haven, CT (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV
Ming De Lin, PhD, Cambridge, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Mansur Ghani, BS, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Qiang Huang, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Cuihong Liu, Jinan, China (*Abstract Co-Author*) Nothing to Disclose
Bruno R. Tegel, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
David Wainstejn, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Bernhard Gebauer, MD, Berlin, Germany (*Abstract Co-Author*) Research Consultant, C. R. Bard, Inc ; Research Consultant, Sirtex Medical Ltd; Research Grant, C. R. Bard, Inc; Research Consultant, PAREXEL International Corporation; Travel support, AngioDynamics , Inc
Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC

PURPOSE

Assessing tumor response after 90Yttrium radioembolization (Y90) has proven difficult when using traditional guidelines for image assessment (i.e. RECIST, mRECIST, WHO and EASL). Thus, novel methodologies for an early assessment of treatment response in patients with relatively short overall survival are needed. This study investigates the concept of enhancing tumor burden [ETB] and uses a whole-liver quantification of tumor enhancement as an early imaging biomarker for tumor response in patients with hepatocellular carcinoma (HCC) after the initial Y90.

METHOD AND MATERIALS

This retrospective single-center study included 35 HCC patients who underwent Y90 between 2000 and 2015. A semi-automated 3D quantification of the ETB as seen on baseline and follow-up contrast enhanced MR imaging was performed (qEASL prototype, Philips Healthcare). Several cutoffs were tested to define response (≥25%, 30%, 50% or 65% volumetric decrease in ETB). The paired student t-test was used to compare pre-and post-therapy ETB. Survival analysis included Kaplan-Meier curves with the log-rank test and Cox-proportional hazards modeling (uni- and multivariate). The predictive value of the various response cutoffs was evaluated via the Akaike information criterion (AIC).

RESULTS

Mean patient age was 62.0 years, 73.3% of patients were males. Only minimal decrease of mean ETB was measured after Y90 (156.4 cm3 to 150.1 cm3; p=0.78). Regarding the cutoff values of ≥25%, 30% and 50%, ETB response was associated with longer survival (HR:0.26; 0.22; 0.09, retrospectively, for p 50%, ETB response with the 50% cutoff remained significant in the multi-variate analysis (HR: 0.09, 95%CI: 0.02-0.41, p<0.01).

CONCLUSION

Volumetric changes in the ETB can be used as an imaging biomarker for tumor response and early survival prediction in patients with HCC after the initial lobar.

CLINICAL RELEVANCE/APPLICATION

Early response assessment after Y90 can be achieve using the ETB concept applied to contrast-enhanced MR imaging as early as 4-8 weeks after the initial therapy session, thus allowing for early therapeutic decisions. The implications of these results warrant further analysis in larger patient cohorts.

VSIO21-19 Tumor Board

Monday, Nov. 28 5:45PM - 6:00PM Room: S406B

Participants

SSE25

Vascular Interventional (Non-vascular Interventions)

Monday, Nov. 28 3:00PM - 4:00PM Room: N226

CT IR US

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

FDA Discussions may include off-label uses.

Participants
Juan C. Camacho, MD, Atlanta, GA (*Moderator*) Nothing to Disclose
Thomas-Evangelos G. Vrachliotis, MD, PhD, Athens, Greece (*Moderator*) Nothing to Disclose

Sub-Events

SSE25-01 CT-Guided Transgluteal Biopsy for Systematic Sampling of the Prostate in Patients without Rectal Access: A 13-Year Single-Center Experience

Monday, Nov. 28 3:00PM - 3:10PM Room: N226

Participants
Michael Olson, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Thomas D. Atwell, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Lance A. Mynderse, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Bernard F. King Jr, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Timothy Welch, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Ajit H. Goenka, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Complexities of prostate sampling in patients without rectal access may delay a referral for biopsy, resulting in delayed diagnosis of prostate cancer (CaP). Our purpose was to review safety and efficacy of CT-guided transgluteal systematic prostate biopsy in this patient population.

METHOD AND MATERIALS

Retrospective review identified 73 CT-guided transgluteal prostate biopsies in 65 men (mean age 64 years; range 40-87) without rectal access (2002-2015). Mean PSA was 7.8 ng/mL (range 0.37-31.5). Biopsies were performed to obtain tissue samples from both sides of the prostate base and apex. Technical success was defined as placement of biopsy device into prostate yielding diagnostic tissue specimens. Electronic medical records were reviewed for procedural details and peri-procedure complications. Mean PSA and number of cores in malignant and benign cohorts were compared with Student's t-test.

RESULTS

97.2% (71/73) biopsies were technically successful (mean cores 8.5, range 3-28). Only complication was an asymptomatic hematoma (1/73; 1.4%). Mean effective radiation dose was 18.5 mSv (median 15.0, range 4.4-86.2) (n=46).43.6% (31/71) biopsies yielded malignancy (mean Gleason score 7, range 6-10) and 56.3% (40/71) yielded benign tissue. In 14 patients who underwent surgery, Gleason scores were concordant in 71.4% (10/14) and discordant in 28.6% (4/14; Gleason 6 on biopsy but Gleason 7 on surgical specimen).25% (10/40) patients from benign cohort had no subsequent followup at our institution. Mean follow-up in others was 3.5 years (range: 2 months-10 years). 13% (4/30) patients had rising PSA and were subsequently diagnosed with malignancy: two on follow-up CT-guided biopsies 6 months and 2 years later, one on prostate MRI, and fourth on biopsy of an enlarging bone lesion. There was no significant difference in mean PSA (p=0.06) or number of cores (p=0.38) between malignant and benign cohorts.

CONCLUSION

CT-guided transgluteal biopsy is a safe and reliable technique for prostate sampling and detection of clinically significant CaP in men without rectal access. In patients with initial negative biopsy, repeat CT-guided biopsy or MRI should be considered if there is a persistent PSA rise.

CLINICAL RELEVANCE/APPLICATION

CT-guided transgluteal biopsy is safe and reliable for prostate sampling and detection of clinically significant CaP in the growing population of patients without rectal access.

SSE25-02 CT-guided Intramuscular Injection of Botulinum Toxin a for Treatment of Myofascial Pelvic Pain: Single Center Evaluation of Safety and Early Efficacy

Monday, Nov. 28 3:10PM - 3:20PM Room: N226

Awards
Student Travel Stipend Award

Participants
Anna Moreland, MD, Baltimore, MD (*Presenter*) Consultant, NeuWave Medical, Inc
Greg Minwell, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Alexander J. Kieger, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Douglas B. Yim, MD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Kelvin K. Hong, MD, Baltimore, MD (*Abstract Co-Author*) Scientific Advisory Board, Boston Scientific Corporation

PURPOSE

Myofascial pelvic pain and spasm are a significant source of morbidity among affected patients, and may be treated with botulinum toxin A (Botox) injection into pelvic floor muscles. Conventional injections are performed by a gynecologist using physical exam landmarks without imaging guidance. CT-guidance of injections may offer benefits due to ability for definitive localization of injections to target. The present study aims to evaluate the safety and efficacy of CT-guided intramuscular injection of Botox for treatment of myofascial pelvic pain.

METHOD AND MATERIALS

Between 07/2013 and 03/2016, n = 57 patients with myofascial pelvic pain and spasm were treated with CT-guided pelvic floor muscle Botox injections in 76 treatment sessions. Referrals were made by gynecologists specializing in chronic pelvic pain, who requested injection of specific pelvic floor muscles in each patient according to point tenderness on pelvic exam. Following scout CT, A 22 gauge needle was placed into each target muscle under CT fluoroscopic guidance. Botox suspended in saline was injected into the piriformis, obturator internus, and/or levator ani (n = 53, 6, and 12 treatments, respectively). Visual analog scale pain scores (on a 10-point scale) were compared immediately pre- and post-procedure, and at follow-up clinic appointments.

RESULTS

Successful injection of the full dose of Botox to the target muscle was accomplished in all cases, conferring a technical success rate of 100%. There were no major or minor complications by SIR criteria as assessed immediately post procedure or at follow up clinic appointments, including no patient report of urinary or fecal incontinence in any case. Lower visual analog pain scores were reported post procedure following 68% of treatments, with the difference in scores demonstrating statistical significance (p = 0.03).

CONCLUSION

CT-guided Botox injection of pelvic floor muscles is a technically feasible, safe, and frequently efficacious option for treatment of myofascial pelvic pain. Further evaluation of the durability of response, predictors of efficacy to guide patient selection, and comparison to conventional injections without CT guidance may be warranted.

CLINICAL RELEVANCE/APPLICATION

CT-guided percutaneous injection of Botox into pelvic floor muscles for treatment of myofascial pelvic pain demonstrates similar efficacy and lower complication rates as compared to those published for non-CT-guided injections.

SSE25-03 Portable Ultrasound-Guided High Intensity Focused Ultrasound with 3D Electronic Steering and Targeting Forecast Function: Prospective Clinical Trial for Uterine Fibroids

Monday, Nov. 28 3:20PM - 3:30PM Room: N226

Participants
Jae Young Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hyun Hoon Chung, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Soo Yeon Kang, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Dong Hyuk Park, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kook Jin Kang, Seoul, Korea, Republic Of (*Abstract Co-Author*) Employee, Alpinion Medical Systems Co, Ltd
Keonho Son, Seoul, Korea, Republic Of (*Abstract Co-Author*) Employee, Alpinion Medical Systems Co, Ltd
Joon Koo Han, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate efficacy and safety of a new portable ultrasound-guided high intensity focused ultrasound (HIFU) with advanced targeting technology for the treatment of uterine fibroids

METHOD AND MATERIALS

This prospective study was approved by institutional review board and informed consent was obtained in all participants. Fifty-nine uterine fibroids of 36 patients (mean age, 44.9 ± 4.1 years) were enrolled. All patients were treated with HIFU with 3D electronic steering. MR imaging studies were performed before HIFU, immediately after HIFU, 1 month, 3 (or 5) months and 1 year after HIFU treatment. Non-perfused volume ratio (NPVR), fibroid volume shrinkage rate (FVSR), symptom improvement, quantified life quality assessment and safety were analyzed.

RESULTS

The volume of treated uterine fibroids ranged from 7.5 cm3 to 274.4 cm3 (mean, 69.8 cm3; SD, 64.3 cm3). Mean NPVR on immediate post-HIFU MR imaging was 74.8 ± 25.2%. Mean FVSR was 17.3 % at 1-month; 33.3 % at 3 months; 44.8% at 5 months; and 43.7% at 1 year after HIFU treatment. Mean time taken to treat was 44.6 ± 28.2 minutes per fibroid and 72.9 ± 31.4 minutes per patient. Uterine fibroid-related symptoms and life quality showed statistically significant improvement after HIFU treatment. For safety issue, no significant symptom or complication occurred.

CONCLUSION

This clinical trial showed that ultrasound-guided HIFU with advanced function may be effective, time-saving and safe for the treatment of uterine fibroids.

CLINICAL RELEVANCE/APPLICATION

1. A portable ultrasound-guided HIFU device provides 3D electronic steering and targeting forecast function, which is helpful to reduce treatment time and to increase safety.
2. A portable ultrasound-guided HIFU device can effectively and safely treat uterine fibroid in a noninvasive manner
3. Significant number of patients who were treated showed significant volume reduction of treated uterine fibroids and significant symptom improvement.

SSE25-04 Fibroid Treated by MRgFUS: MR-Texture Parameters are Associated with Ablathermy Efficacy

Monday, Nov. 28 3:30PM - 3:40PM Room: N226

Participants
Arnaud Hocquelet, Pessac, France (*Presenter*) Nothing to Disclose
Bauoduin d. Senneville, Talence, France (*Abstract Co-Author*) Nothing to Disclose
Nora Frulio, Bordeaux, France (*Abstract Co-Author*) Nothing to Disclose
Cecile Salut, Bordeaux, France (*Abstract Co-Author*) Nothing to Disclose
Mounir Bouzgarrou, MD, Merignac, France (*Abstract Co-Author*) Nothing to Disclose
Herve Trillaud, MD, Bordeaux, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

to assess the potential association between texture parameter analysis, derived from T2 weighted images and treatment efficacy using the Magnetic resonance guided focused ultrasound(MRgFUS) Sonalleve system to treat uterine fibroids.

METHOD AND MATERIALS

The study protocol was approved by the institution's human research committee. Informed consent was not necessary for this retrospective study. 55 women with 55 fibroids treated by MRgFUS Sonalleve system were included. Texture parameters calculated with Mazda software from 3D T2 weighted images, fibroids/muscular T2 ratio, Funaki type, and fibroid depth were correlated using uni- and multivariate linear regression with treatment efficacy defined as ratio of non-perfused volume on post-treatment contrast-enhanced MRI by total volume of treatment-cells sizes used.

RESULTS

Among the 15 texture parameters, 6 were significantly correlated with NPV ratio: fibroid/muscular T2 ratio; mean signal intensity; skewness; kurtosis; sum of square; sum of entropy. In multivariate linear regression, fibroid/muscular T2 ratio and Mean Sum of entropy were associated with NPV ratio. The formula of the multivariate model was: Y= 15.744 + -8.012*MeanSumEntropy + -0.128*T2ratio (Total R2=0.2).

CONCLUSION

Fibroids texture parameters provide complementary information to T2 ratio, predicting MRgFUS efficacy. Sum of Entropy and T2Wratio were both retained in multivariate model significantly associated with treatment efficacy while Funaki type was not.

CLINICAL RELEVANCE/APPLICATION

Heterogeneity of fibroid texture is negatively correlated with MRgFUS efficacy

SSE25-05 Comparison of Laser Ablation with Radiofrequency Ablation for Treatment of Benign Thyroid Nodules: A Retrospective Multicentric Analysis

Monday, Nov. 28 3:40PM - 3:50PM Room: N226

Participants
Giovanni Mauri, MD, Milan, Italy (*Presenter*) Consultant, Esaote SpA
Claudio M. Pacella, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Roberto Cesareo, Latina, Italy (*Abstract Co-Author*) Nothing to Disclose
Valerio Pasqualini, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Roberto Cianni, Latina, Italy (*Abstract Co-Author*) Nothing to Disclose
Pasquale De Feo, Naples, Italy (*Abstract Co-Author*) Nothing to Disclose
G Gambelunghe, Latina, Italy (*Abstract Co-Author*) Nothing to Disclose
Bruno Raggiunti, Perugia, Italy (*Abstract Co-Author*) Nothing to Disclose
Tina Doris, Perugia, Italy (*Abstract Co-Author*) Nothing to Disclose
Maurilio Deandrea, Atri, Italy (*Abstract Co-Author*) Nothing to Disclose
Paolo Limone, Torino, Italy (*Abstract Co-Author*) Nothing to Disclose
Alberto Mormile, Torino, Italy (*Abstract Co-Author*) Nothing to Disclose
Massimo Giusti, Genova, Italy (*Abstract Co-Author*) Nothing to Disclose
Silvia Oddo, Turin, Italy (*Abstract Co-Author*) Nothing to Disclose
G Achille, Genova, Italy (*Abstract Co-Author*) Nothing to Disclose
Enrico Di Stasio, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Irene Misischi, Albano Laziale, Italy (*Abstract Co-Author*) Nothing to Disclose
Enrico Papini, MD, Albano Laziale, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To retrospectively compare laser ablation (LA) and radiofrequency ablation (RFA) in the treatment of benign thyroid.

METHOD AND MATERIALS

Six hundred one symptomatic thyroid benign nodules in 601 euthyroid patients were ablated in eight centers between 2009 and 2015. 441 (mean age 57±14) have undergone LA while 152 (mean age, 57±14) RFA. LA was performed with a fixed-power protocol (3W) while number of applicators and illumination times were different according to target size. RFA was performed in a single session based on the "moving-shot" technique. During the manoeuvre the output power ranged from 40 to 80W. Patients of each group were matched by applying one-to-one propensity score matching.

RESULTS

The mean basal volume of nodules treated with LA and RFA was 21.5±16.5 ml and 24.6±17.9 mL (P= .065) respectively. At 12 months mean nodule volume decreased to 8.0±7.2mL (P< .001) in LA patients and to 9.9±9.5mL (P< .001) in RFA patients. The nodules with basal volume >30 mL have had a percentage volume reduction (PVR) at 12th month significantly higher in LA patients than in RFA patients (-64±16% vs -56±21%, respectively; P= .033). The total energy delivered was significantly higher in RFA patients than in LA ones (64.6±58 vs 5.8±2.7 KJ; P= .001).A total of 138 patients from each group were matched. After this adjustment, mean nodule reduction at 6th and 12th month was -67%±19% vs -57%±21% (P< .001) and -70%±19% vs 62%±22%

(P= .001) in LA and RFA group, respectively. A a lower release of energy in the LA group was confirmed (6.1±2.7 vs 61.6±51.4 KJ, respectively; P = .001). No changes in thyroid function were observed.

CONCLUSION

RFA and LA seems to provide similar results in the small and medium nodules while LA appear more effective in treating larger nodules, RFA requiring more energy to achieve the ablation.

CLINICAL RELEVANCE/APPLICATION

Both LA and RFA are able to achieve similar significant volume reduction of symptomatic benign thyroid nodules.

SSE25-06 Vertebroplasty and Kyphoplasty Outcomes in Spinal Metastatic Osseous Lesions: A Systematic Review and Meta-Analysis

Monday, Nov. 28 3:50PM - 4:00PM Room: N226

Awards
Student Travel Stipend Award

Participants
Karan N. Patel, MD, Detroit, MI (*Presenter*) Nothing to Disclose
Haiying Yu, MD,PhD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Mark Le, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Aravind N. Mohandas, MD, Bangalore, India (*Abstract Co-Author*) Nothing to Disclose
Hiren Rangunwala, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Monte L. Harvill, MD, Franklin, MI (*Abstract Co-Author*) Nothing to Disclose
Jeffrey J. Critchfield, MD, Royal Oak, MI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Vertebroplasty (VP) and kyphoplasty (KP) are widely utilized percutaneous techniques used to relieve pain and restore stability in metastatic spinal disease with pathologic vertebral compression fractures. The purpose of this systematic review is to compare outcomes between VP and KP in terms of safety and efficacy in providing pain relief and improving patient's functional status.

METHOD AND MATERIALS

A PRISMA compliant systematic review was performed utilizing the electronic database Pubmed from conception to 2016. Levels of evidence and grades of recommendation were established based on the Oxford Centre for Evidence-Based Medicine guidelines. MedCalc (16.2.1) was used for data entry and analysis. Comparison between the groups (VP & KP) in terms of cement leakage and complications were calculated using a chi-square test. Pain level was assessed using the visual analog scale (VAS) and the groups were compared using t-test. P value <0.05 was considered as statistical significant.

RESULTS

10 published studies on KP and 3 published studies on VP for metastatic spine lesions met the inclusion criteria, representing 342 patients undergoing VP and KP at various levels of the spine with most common treated level being the thoracic spine. No significant difference in the cement leaks (p=0.35) and incidence of perioperative complication (p=0.77) was noted between the KP and VP groups. KP group showed significant reduction in the VAS by postoperative day 1-3 (p=0.0002) and by posoperative month 0.5-3 (p<0.0001). Within the KP group, significant decrease in Oswestry Disability Index from baseline was observed by postoperative day 1-3 and by postoperative month 0.5-3.

CONCLUSION

Our systematic review shows KP is more effective in reducing pain as early as postoperative day 1-3. Furthermore, patients who underwent KP had significant improvement in their functional status from baseline by as early as posoperative day 1-3 with continued improved functional status lasting up to a year. Meanwhile, no difference in cement leaks or perioperative complication rate was observed between the KP and VP groups.

CLINICAL RELEVANCE/APPLICATION

KP is more effective in providing pain relief as early as postoperative day 1-3, improving patient's functional status for up to a year postoperatively without an increase in cement leaks/perioperative complications in comparison to VP.

SPSI25

Special Interest Session: Quality, Clinical Care and Effectiveness in Image-Guided Therapy: Do It Right, First Time, Every Time

Monday, Nov. 28 4:30PM - 6:00PM Room: S404AB

IR SQ

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

Participants

LEARNING OBJECTIVES

1) To understand the importance of interventional oncologists assuming primary clinical responsibility for their patients, and of their appropriate participation in multidisciplinary care. 2) To learn the concept of scope of quality assurance in procedural disciplines (such as interventional oncology and radiation oncology. 3) To appreciate the importance of patient-reported outcomes in oncology. To understand how safety checklists reduce morbidity and mortality in procedural discipline.

LEARNING OBJECTIVES

1) To understand the importance of interventional oncologists assuming primary clinical responsibility for their patients, and of their appropriate participation in multidisciplinary care. 2) To learn the concept and scope of quality assurance in procedural disciplines (such as interventional oncology and radiation oncology) and outline the first global framework of quality assurance in interventional oncology. 3) To appreciate the importance of patient-reported outcomes in oncology. To understand how safety checklists reduce morbidity and mortality in procedural disciplines.

Sub-Events

SPSI25A Clinical Practice and Patient Pathways in Interventional Oncology: Care for the Patient, Not Just the Tumor

Participants
Andreas Adam, MD, London, United Kingdom, (andy.adam@kcl.ac.uk) (*Presenter*) Institutional research support, Boston Scientific Corporation; Institutional research support, Siemens AG; Institutional research support, Medtronic, Inc

LEARNING OBJECTIVES

1) To understand the importance of interventional oncologists assuming primary clinical responsibility for their patients, and of their appropriate participation in multidisciplinary care. 2) To learn the concept and scope of quality assurance in procedural disciplines (such as interventional oncology and radiation oncology) and to outline the first global framework of quality assurance in interventional oncology. 3) To appreciate the importance of patient-reported outcomes in oncology. To understand how safety checklists reduce morbidity and mortality in procedural disciplines.

ABSTRACT

Multidisciplinary teams are the standard of care in oncology, and interventional radiologists need to be an integral part of these teams. Decisions about patient management, and patient pathways, are often considered at multidisciplinary meetings. Oncologists, surgeons, gastroenterologists and other specialists are present at multidisciplinary meetings. Radiologists are usually involved in the presentation of images but interventional radiologist are often not included, and do not take an active part in the decision-making process. This needs to change.Cancers are getting smaller. Modern imaging can demonstrate tumours 5 mm in size and soon even smaller lesions will be detectable. Small-volume, paucilesional, solid organ disease will fall increasingly within the remit of image-guided therapy. Randomised studies in interventional radiology face significant challenges, including changing chemotherapy regiments, cross over between treatment arms, and difficulties with randomisation.Professor Michael Rawlings, who was the chairman of the National Institute for Clinical Excellence in 2008 said in his Harveian Oration. Randomised controlled trials are not always appropriate. Randomised comparisons between surgery and thermal ablation in patients with colorectal liver metastasis have been tried and been abandoned because of lack of recruitment. Perhaps it is time to accept that such studies will never be carried out and that, if they ever are performed, they may not be valid comparisons.Large-scale, good-quality registries will help us in our decision-making. We should make sure that interventional radiologists are represented in multidisciplinary teams in their capacity is interventionists and not as imagers. And when they are there, they should take an active part in decision-making, taking into consideration pathways suggested by consensus panels of experts.Specialists from various disciplines should discuss each case in detail and decisions should be based on the available expertise. This may be intellectually less satisfying and a cause of frustration to those unfamiliar with the complexities and difficulties of the practical disciplines such as interventional oncology but are more likely to serve the best interests of patients. The Quality Assurance system for interventional oncology developed by CIRSE will make a significant contribution this area by ensuring that all aspects of care and delivered to a high standard.Evolving technologies are a fact of life interventional oncology. There are no smart pathways that can be used in every case. There are only smart doctors, and smart patients who are appropriately advised by them.

URL

SPSI25B Quality Assurance in Interventional Oncology: It's Not Just About the Kit

Participants
Lizbeth Kenny, MD, FRANZCR, Herston, Australia (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

In acknowledgement of the overwhelming importance of standards of practice and their ultimate incorporation into a quality assurance program, CIRSE has developed a set of practice standards for Interventional Oncology. The Standards follow the entire care pathway for patients undergoing interventional cancer procedures. They will support safe quality care for patients and will also act as a basis on which interventional oncologists can work with facilities to improve the infrastructure and processes required for their teams to practice effectively. There are 14 Standards, broadly divided into three areas. and each follows a standard format:
1. Facility management (7 standards)
2. Treatment planning and delivery (3 standards)
3. Safety and quality management (4 standards)
There is a consistent format for each Standard includes:
i Description of the Standards that refer to a corresponding goal or outcome.
ii Criteria that describe the key processes required to attain that goal.
iii A commentary provides information to give background to how a criterion applies in everyday practice.
iv The required evidence that documents the records the facility needs to be able to provide to demonstrate compliance with the Standards. These draft Standards will be available on the CIRSE website and will be piloted in a number of interventional oncology practices within Europe during the second half of 2016.

SPSI25C Patient Reported Outcomes: Living Longer Is Not the Only Yardstick

Participants
Anthony L. Zietman, MD, Boston, MA, (azietman@partners.org) (*Presenter*) Editor, Reed Elsevier

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

ED007-TU

Interventional Radiology Tuesday Case of the Day

Tuesday, Nov. 29 7:00AM - 11:59PM Room: Case of Day, Learning Center

IR

AMA PRA Category 1 Credit ™: .50

Participants

Anne M. Covey, MD, New York, NY (*Presenter*) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose
Bradley B. Pua, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
John A. Kaufman, MD, Portland, OR (*Abstract Co-Author*) Advisory Board, Bio2 Technologies, Inc; Consultant, Cook Group Incorporated; Consultant, Guerbet SA; Stockholder, Hatch Medical LLC; Stockholder, VuMedi, Inc; Stockholder, Veniti, Inc; Royalties, Reed Elsevier; Advisory Board, Delcath Systems, Inc; Researcher, W. L. Gore & Associates, Inc; Researcher, EKOS Corporation; Stockholder, EndoShape, Inc; Advisory Board, AV Medical Technologies Ltd; Advisory Board, Javelin Medical

TEACHING POINTS

1) The objective of the Interventional Radiology Case of the Day at RSNA 2016 is to provide participants the opportunity to review challenging cases and synthesize cogent a differential diagnosis based on limited history and images.

RC314

Interventional Series: Dialysis Interventions

Tuesday, Nov. 29 8:30AM - 12:00PM Room: E353A

IR

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

FDA Discussions may include off-label uses.

Participants
Charles E. Ray JR, MD, PhD, Chicago, IL (*Moderator*) Advisory Board, Novate Medical Ltd; Editor, Thieme Medical Publishers, Inc; Consultant, W. L. Gore & Associates, Inc; Consultant, Medtronic plc; ; ; ; ;
Ziv J. Haskal, MD, Baltimore, MD (*Moderator*) Advisory Board, W. L. Gore & Associates Research Consultant, W. L. Gore & Associates Advisory Board, IC Sciences Corporation Royalties, Cook Group Incorporated Research Support, C. R. Bard, Inc Research Consultant, C. R. Bard, Inc Advisory Board, NovaShunt AG Advisory Board, Endoshape, Inc

Sub-Events

RC314-01 Advanced Stent Grafting

Tuesday, Nov. 29 8:30AM - 8:45AM Room: E353A

Participants
Ziv J. Haskal, MD, Baltimore, MD (*Presenter*) Advisory Board, W. L. Gore & Associates Research Consultant, W. L. Gore & Associates Advisory Board, IC Sciences Corporation Royalties, Cook Group Incorporated Research Support, C. R. Bard, Inc Research Consultant, C. R. Bard, Inc Advisory Board, NovaShunt AG Advisory Board, Endoshape, Inc

RC314-02 Debate - Early Stenting?

Tuesday, Nov. 29 8:45AM - 9:00AM Room: E353A

Participants
Charles E. Ray JR, MD, PhD, Chicago, IL (*Presenter*) Advisory Board, Novate Medical Ltd; Editor, Thieme Medical Publishers, Inc; Consultant, W. L. Gore & Associates, Inc; Consultant, Medtronic plc; ; ; ; ;
James T. Bui, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss outcomes of angioplasty for treatment of failing HD access circuits. 2) Critique role of stenting in failing HD access circuits. 3) Debate merits of angioplasty versus stenting in HD access circuits. 4) Apply personalized management of HD access circuits.

ABSTRACT

RC314-03 Currently Available Stent Grafts

Tuesday, Nov. 29 9:00AM - 9:15AM Room: E353A

Participants
Charles E. Ray JR, MD, PhD, Chicago, IL (*Presenter*) Advisory Board, Novate Medical Ltd; Editor, Thieme Medical Publishers, Inc; Consultant, W. L. Gore & Associates, Inc; Consultant, Medtronic plc; ; ; ; ;

RC314-04 Hemodialysis Reliable Outflow (HeRO) Opportunities and Challenges

Tuesday, Nov. 29 9:15AM - 9:30AM Room: E353A

Participants
James T. Bui, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe applications for use of Hemodialysis Reliable Outflow (HeRO). 2) List potential challenges or complications for HeRO placement and maintence. 3) Examine options to overcome challenges during use. 4) Identify device and the varying locations on radiographs.

ABSTRACT

RC314-05 Near Infrared Fluorescence Imaging of Matrix Metalloprotease Activity as a Biomarker of Vascular Remodeling in Hemodialysis Access

Tuesday, Nov. 29 9:30AM - 9:40AM Room: E353A

Awards
Student Travel Stipend Award

Participants
Charles N. Weber, MD, Boston, MA (*Presenter*) Nothing to Disclose
Stephen J. Hunt, MD,PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Terence P. Gade, MD, PhD, New York, NY (*Abstract Co-Author*) Research Grant, Guerbet SA
Gregory J. Nadolski II, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Fistulography images the late morphologic changes of vascular remodeling. To better prevent and treat stenosis, imaging of the biological process preceding these late structural changes must be developed. The purpose of this study is to establish the capability of near-infrared fluorescence (NIRF) imaging of MMP activity to be a biomarker of vascular remodeling within an in vivo animal model of hemodialysis access stenosis.

METHOD AND MATERIALS

Arteriovenous fistulae (AVF) were made in 12wk old Sprague Dawley rats (n=10) using an end-to-side anastomosis between the right common femoral artery and vein with interrupted 10-0 suture. Sham operations were performed on the contralateral femoral vessels in all animals. Four weeks after creation, fistulography was performed via a left common carotid artery approach using a 1.5F catheter that was positioned at the aortic bifurcation. At the time of fistulography, 2 nmol of MMP activated NIRF probe (MMPSense 750) was injected from catheter immediately above the aortic bifurcation. NIRF imaging was performed on explanted AVFs and control vessels after 24hrs using Spectrum IVUS (excitation 750nm, detection 780nm). NIRF signal normalized to background was calculated in AVF and control vessels and compared using paired student's t-test. The AVF and control explants were stained with alpha SMA, MMP2, DAPI, and CD31 for immunohistochemical analysis.

RESULTS

AVFs were successfully created in all animals. Fistulography confirmed AVF with >50% peri-anastomotic stenosis in 8 animals 4-weeks post-AVF creation. In the remaining two animals, AVFs were thrombosed. The mean normalized MMP activated NIRF signal was 45.5 in AVFs compared to 16.2 in the contralateral control vessels. The mean increase in total radiant efficiency of AVFs over the control vessels was 2.6-fold (SD = 0.98, p=0.012). Increased NIRF signal correlated with neointimal hyperplasia containing increased alpha-SMA and MMP2 expression.

CONCLUSION

NIRF optical imaging can detect increased MMP activity in stenotic AVFs compared to contralateral normal vessels, which correlated with MMP expression and neointimal hyperplasia on immunohistochemistry. These findings suggest NIRF imaging of MMP may be used as a biomarker for the vascular remodeling underlying stenosis.

CLINICAL RELEVANCE/APPLICATION

Advancement of this technology may provide a mechanism for earlier detection and treatment of vascular remodeling that leads to stenosis in AVF.

RC314-06 Visualization and Quantification of 4D-flow MRI in the Native Radiocephalic Fistula for Hemodialysis

Tuesday, Nov. 29 9:40AM - 9:50AM Room: E353A

Awards
Student Travel Stipend Award

Participants
Yigang Pei, MD, Changsha, China (*Presenter*) Nothing to Disclose
Wenzheng Li, MD,PhD, Changsha, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the feasibility of 4D-flow MRI for visualizing and quantifying the hemodynamics of the native radiocephalic fistula(RCF) in hemodialysis patients.

METHOD AND MATERIALS

This prospective study was approved by the institutional review board. Written informed consent was obtained from all participants prior to examination. ECG gated flow-sensitive 4D MRIs with velocity 200cm/s, 400cm/s and 600cm/s were performed respectively on a 3 Tesla scanner (Ingenia, Philips Medical Systems) in 24 consecutive dialysis patients by native RCF for at least 6months. A 4D-flow MRI with mostly distinctly presented native RCF from them for each subject was choose to achieve the visualization of blood flow's streamline bundles and to evaluate the hemodynamics for the native RCF. The regional peak and mean velocities were quantitative analyzed at the 3 points of the RCF (the vascular anastomosis , artery and vein proximate segments at 1cm from the anastomosis), which were compared to the referenced standard Doppler ultrasound (DUS).

RESULTS

22out of 24 subjects were undergone successfully 4D-flow MRI, including 8 native RCF with stenosis and 5 with turbulent blood flow. 3D blood flow's streamline bundles of native RCF were obtained on 4D-flow MRI from dialysis patients' wrist, which was more excellent and extended than DUS. At the anastomosis point, there was no significant difference and had good agreement for peak velocities ($p>0.05$, $r=0.69$) and for mean velocities ($p>0.05$, $r = 0.64$) between 4D-flow MR and DUS. At arterial proximate segment, there was no significant difference and had excellent agreement for peak velocities ($p>0.05$, $r=0.82$) and good agreement for mean velocities ($p>0.05$, $r = 0.78$). At vein position, there was no significant difference and good agreement for peak velocities ($p>0.05$, $r=0.65$) and for mean velocities ($p>0.05$, $r = 0.58$) .

CONCLUSION

4D-flow MRI is a promising , non-invasive and safe method for a good visualization of native RCF, and for providing a detailed blood flow's hemodynamics in those hemodialysis patients, which can help to guide the interventional therapy of native RCF relative complications.

CLINICAL RELEVANCE/APPLICATION

4D-flow MRI is a promising, non- invasive and safe method for visualizing and quantifying the hemodynamics of the native RCF in those hemodialysis patients, which can help to guide the interventional treatment of RCF relative complications.

RC314-07 MSCT Vascular Mapping of AV Fistula Related Vascular Complications in Hemodialysis Patients;

Adjuvant Role in Correlation with CDUS

Tuesday, Nov. 29 9:50AM - 10:00AM Room: E353A

Participants
Hazem Soliman, MD, Cairo, Egypt (*Presenter*) Nothing to Disclose
rami sulaiman, Bridgeport, CT (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the role and usefulness of Multislice CT angiography (CTA) and color Doppler US (CDUS) in assessment of vascular tree of AVFs and comprehensive evaluation of possible shunt complications in ESRD patients on hemodialysis.

METHOD AND MATERIALS

Prospective analysis of vascular access related data was obtained from 30 patients (10 Male, 20 Female and age range 18–80 years) referred from hemodialysis unit via CTA and CDUS examination of the upper limbs. All patients were examined to identify the different types of fistula shunt related complications utilizing Doppler indices (PSV, EDV and RI) and different CTA 2D image reconstruction and 3D volume rendering techniques followed by surgical procedures as a gold standard within 2–7 days.

RESULTS

The study showed 15 patients with shunt related complications; aneurysm 33.3% (10 patients) followed by venous thrombosis 23.3% (7 patients), and arterial steal syndrome 13.3% (4 patients), and finally venous hypertension 6.6% (2 patients). Considering surgery as a gold standard the sensitivity and specificity of CDUS and CTA, in detecting aneurysms and stenosis was 100% and 100% respectively. The detection of subclavian occlusion sensitivity and specificity by CDUS was 70% and 85% respectively on the other hand CTA sensitivity and specificity was 100% and 100% respectively.

CONCLUSION

The adjuvant diagnostic value of CTA with CDUS maximizes the evaluation of AV fistula related vascular complications approaching that of surgery.

CLINICAL RELEVANCE/APPLICATION

The MDCT angiography has facilitated non invasive imaging of the vascular system. CT angiography (CTA) demonstrates vessel abnormalities such as stenosis, thrombosis, aneurysms, pseudoaneurysms, calcifications, intimal thickening, stent ingrowth and perivascular complications

RC314-08 Endovascular Hemodialysis AVF Creation

Tuesday, Nov. 29 10:00AM - 10:15AM Room: E353A

Participants
Dheeraj K. Rajan, MD, Toronto, ON (*Presenter*) Consultant, TVA Medical, Inc; Shareholder, TVA Medical, Inc;

LEARNING OBJECTIVES

1) Discuss currrent surgical outcomes for AVF creation. 2) Describe the potential advantages of endovascular creation of an AVF. 3) Describe current published outcomes with this new procedure.

ABSTRACT

RC314-09 Competitive Outflow Vein Embolization

Tuesday, Nov. 29 10:30AM - 10:45AM Room: E353A

Participants
John E. Aruny, MD, New Haven, CT (*Presenter*) Speakers Bureau, W. L. Gore & Associates, Inc

RC314-10 Clinical and Imaging Assessment of the Failing Dialysis Access

Tuesday, Nov. 29 10:45AM - 11:00AM Room: E353A

Participants
Paul J. Rochon, MD, Denver, CO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Clinically evaluate a patient with a failing arteriovenous fistula.

RC314-11 In Vivo Endothelial Cell Gene Expression Analysis of Venous Outflow Stenoses in Hemodialysis Arteriovenous Fistulas Utilizing a Novel Endovascular Sampling Technique

Tuesday, Nov. 29 11:00AM - 11:10AM Room: E353A

Awards
Trainee Research Prize - Fellow

Participants
Hugh C. McGregor, MD, San Francisco, CA (*Presenter*) Research Grant, HealthTronics, Inc
Zhengda Sun, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Miles B. Conrad, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Mark W. Wilson, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Daniel L. Cooke, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To elucidate the mechanisms underlying venous outflow stenosis by evaluating endothelial cell (EC) dysfunction on a molecular level using a novel endovascular sampling technique.

METHOD AND MATERIALS

Informed consent was obtained for this IRB approved proof of concept study. A venous outflow stenosis of a radiocephalic arteriovenous fistula was identified angiographically and with intravascular ultrasound. A Rosen guidewire was advanced into the stenosis and retracted at 1 cm intervals 20 times. Identical sampling technique was used in a morphologically normal outflow vein (control). ECs were identified by immunofluorescence staining with endothelial specific CD31 and sorted by single cell flourescence activated cell sorting. Gene expression analysis was performed by single-cell quantitative polymerase chain reaction (PCR) using the Fluidigm BioMark HD system. Fluidigm Real-Time PCR Analysis software and SINGuLAR Analysis Toolset 2.1 were used for single-cell quantitative PCR data processing and statistical analysis. Violin plots were used to identify the distribution of expression for each gene between stenosis and control sites.

RESULTS

Immunofluorescence staining for endothelial specific CD31 demonstrated viable ECs. Seventy-five ECs were sorted from the stenosis and 40 from the control vein. Twenty-four ECs from each group were then selected for microfluidic single cell quantitative PCR analysis. Statistically significant differential expression of TIMP metallopeptidase inhibitor 1 (TIMP1) and angiotensin 1 converting enzyme (ACE) between control ECs and ECs sampled from the outflow stenosis were identified. Elevated transcriptional levels of TIMP1 were present in control ECs and elevated transcriptional levels of ACE were present in ECs from the region of stenosis.

CONCLUSION

Endovascular sampling and single cell gene expression analysis of ECs is feasible and may help elucidate the molecular mechanisms underlying venous outflow stenoses in dialysis arteriovenous fistulas. Preliminary data suggests genes involved inhibition of tissue metalloproteinases may be underexpressed and genes involved in vasoconstriction overexpressed in ECs from stenotic regions when compared to morphologically normal controls.

CLINICAL RELEVANCE/APPLICATION

Understanding the molecular mechanisms underlying vascular stenoses in dialysis arteriovenous fistulas will enable identification of specific drug targets to prolong fistula patency.

RC314-12 Vector Flow Imaging in Arteriovenous Fistulas: New Tool to Evaluate Complex Flow

Tuesday, Nov. 29 11:10AM - 11:20AM Room: E353A

Participants
Ilaria Fiorina, Pavia, Italy (*Presenter*) Travel support, Shenzhen Mindray Bio-Medical Electronics Co, Ltd; Consultant, Esaote SpA; Consultant, Shenzhen Mindray Bio-Medical Electronics Co, Ltd; Consultant, SuperSonic Imagine; Consultant, Hitachi, Ltd; Consultant, Toshiba Corporation
Maria Vittoria Raciti, MD, Pavia, Italy (*Abstract Co-Author*) Nothing to Disclose
Alfredo Goddi, MD, Varese, Italy (*Abstract Co-Author*) Nothing to Disclose
Fabrizio Calliada, MD, Pavia, Italy (*Abstract Co-Author*) Research Grant, Toshiba Corporation; Speakers Bureau Member, Hitachi, Ltd; Speakers Bureau Member, Shenzhen Mindray Bio-Medical Electronics Co, Ltd

PURPOSE

Color Doppler (CD) and Spectral Doppler are the first-line of non invasive imaging techniques to evaluate the flow in hemodialytic fistulas. We assessed a new ultrasound technique: Vector Flow Imaging (VFI).

METHOD AND MATERIALS

We prospectively examined 14 patients (2 females and 12 males), age ranging from 32 to 86 years (mean age 59 years), with functioning upper arm arteriovenous fistulas. We realized the examinations with Resona 7 (Mindray, Shenzhen, China), through high frequency linear array transducer (L11-U3). The scans were performed just before the hemodialytic session, through CD, Spectral Doppler and Vector Flow Imaging.

RESULTS

Vector Flow Imaging (VFI) shows the blood flow direction and velocity, through multiple coloured arrows real-time within a color box. This technique doesn't necessitate of adequate insonation angle and, for that reason, is less prone to operator-related mistakes. In 2 patients the flow in the arteriovenous fistula showed the same features through CD and VFI. Eleven patients demonstrated complex flow, not adequately valuable with conventional color, characterized by orthogonal components (8/11), inverted flow (5/11) and vortices (4/11). Instead in one case, in correspondence of a stenotic tract evidenced through CD, where the velocities were faster, we didn’t obtain any signal with VFI.

CONCLUSION

VFI is an intuitive method to study the complex flow in the vascular accesses, that provides additional information despite of conventional CD examination. Furthermore, VFI allows to identify the components of a complex flow, such as vortices and inverted flow.

CLINICAL RELEVANCE/APPLICATION

Vector Flow Imaging can demonstrate singular components of the flow in the arteriovenous fistulas in hemodialysis patients and should be useful for the surveillance of the vascular access.

RC314-13 Comparison of Standard and Extended Lyse- and- Wait Technique for Acute Thrombosed Hemodialysis Fistulas

Tuesday, Nov. 29 11:20AM - 11:30AM Room: E353A

Participants
Susanne Regus, Erlangen, Germany (*Presenter*) Nothing to Disclose
Werner Lang, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Marco Heinz, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Axel Schmid, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Local thrombolysis with an exposure time of recombinant- tissue plasminogen activator (rtPA) for about 15 to 150 minutes is commonly used to declot acutely thrombosed hemodialysis fistulas. There is still an ongoing discussion about short or long time thrombolysis for restoration of arteriovenous blood flow. Catheters in case of sudden failure of fistulas or grafts should be avoided, if possible 1 The aim of this study was to compare long (3 hours and more) (LTT) to short (less than 3 hours) (STT) thrombolysis treatment at our institution.

METHOD AND MATERIALS

We retrospectively analyzed 86 interventional declotting procedures (28 STT and 58 LTT) for thrombosed hemodialysis fistulas. Special interest was focused on the intervention time (IT) from first fistulography to the end of angioplasty maneuvers and the risk for temporary catheter placement (TCP).

RESULTS

The IT was reduced after LTT (63.3 ± 9.3 minutes) in contrast to STT (106.7 ± 24.7) ($p < 0.001$), whereas there was no difference in success rate (85.7 % STT, 89.7% LTT; $p = 0.722$). Despite the extended procedure, the need for TCP was not increased after LTT (10.7%) compared to STT (12.1%) ($p = 0.982$), while the major complication rate was reduced (3.4% after LTT and 28.6% after STT; $p = 0.004$).

CONCLUSION

LTT results in shorter and less complicated percutaneous stenosis treatment. Despite the long time interval up to 25 hours until access was punctable for dialysis, there was no increased risk for TCP or major adverse events as bleeding and access rupture after LTT.

CLINICAL RELEVANCE/APPLICATION

we demonstrate our results comparing lyse-and -wait thrombolysis for acute thrombosed hemodialysis access using rtPA with prolonged local reaction time

RC314-14 What the Surgeon Needs to Know

Tuesday, Nov. 29 11:30AM - 11:45AM Room: E353A

Participants
Thomas M. Vesely, MD, Saint Louis, MO (*Presenter*) Research Consultant, W.L. Gore & Associates; Research Consultant, Phase One Medical; Medical Advisory Board, Elcam Medical; Research Consultant, Lutonix

LEARNING OBJECTIVES

Following this course the participant will:1. Learn the advantages of surgerical intervention for hemodialysis access.2.Understand the limitations of endovascular interventions.3. Improve patient referral patterns.

RC314-15 Debate: Cephalic Arch: Advanced Interventions vs. Repeat PTA

Tuesday, Nov. 29 11:45AM - 12:00PM Room: E353A

Participants
Ziv J. Haskal, MD, Baltimore, MD (*Presenter*) Advisory Board, W. L. Gore & Associates Research Consultant, W. L. Gore & Associates Advisory Board, IC Sciences Corporation Royalties, Cook Group Incorporated Research Support, C. R. Bard, Inc Research Consultant, C. R. Bard, Inc Advisory Board, NovaShunt AG Advisory Board, Endoshape, Inc
Thomas M. Vesely, MD, Saint Louis, MO (*Presenter*) Research Consultant, W.L. Gore & Associates; Research Consultant, Phase One Medical; Medical Advisory Board, Elcam Medical; Research Consultant, Lutonix

LEARNING OBJECTIVES

After completing this course the participant will:1. Understand the etiology(s) of cephalic arch stenosis.2. Recognize typical and atypical patterns of cephalic arch stenosis.3. Know appropriate indications for treatment of cephalic arch stenosis.

ABSTRACT

RC331

Tumor Ablation beyond the Liver: Practical Techniques for Success

Tuesday, Nov. 29 8:30AM - 10:00AM Room: S104A

GI IR

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

Participants

Debra A. Gervais, MD, Boston, MA (*Presenter*) Nothing to Disclose
Terrance T. Healey, MD, Providence, RI (*Presenter*) Nothing to Disclose
Anil N. Kurup, MD, Rochester, MN, (kurup.anil@mayo.edu) (*Presenter*) Research Grant, Galil Medical Ltd; Royalties, UpToDate, Inc
Muneeb Ahmed, MD, Wellesley, MA, (mahmed@bidmc.harvard.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe indications for tumor ablation in extrahepatic sites. 2) Describe approaches and techniques to help prevent and manage organ specific complications. 3) Review results of tumor ablation in the lung, kidney, and bone.

ABSTRACT

Pulmonary malignancies, and specifically lung cancer, are a leading cause of death worldwide. Utilization of best current therapies results in an overall five-year relative survival rate for all stages combined to be only 15%, necessitating the use of alternative therapies. Image-guided ablation of lung malignancies is a revolutionary concept whose clinical applications are just beginning to be developed. It has some advantages over traditional radiotherapy and chemotherapy. Its safety profile is similar to percutaneous image guided lung biopsy. Almost all image-guided ablative procedures can be performed in an outpatient setting, mostly with conscious sedation. Multiple applications can be performed without any additional risks. Contraindications are few and include uncontrollable bleeding diathesis and recent use of anticoagulants.Image-guided ablation of lung malignancies is performed with two basic rationales. In the first group it is used with an intention of achieving definitive therapy. These are patients who are not candidates for surgery because of co-morbid medical contraindications to surgery, like poor cardiopulmonary reserve or patients refusing to undergo operation. This cohort could potentially derive significant benefit form a minimally invasive alternative therapy. In the second group it is used as a palliative measure as follows: (a) to achieve tumor reduction before chemotherapy (b) to palliate local symptoms related to aggressive tumor growth, such as chest pain, chest wall pain or dyspnea (c) hematogenous painful bony metastatic disease (d) tumor recurrence in patients who are not suitable for repeat radiation therapy or surgery Image-guided ablation is expanding treatment options for the local control of non-small cell lung cancer and metastatic disease.

Honored Educators

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

Debra A. Gervais, MD - 2012 Honored Educator

SSG16

Vascular Interventional (Percutaneous Ablation: Basic Science)

Tuesday, Nov. 29 10:30AM - 12:00PM Room: E351

CT IR PH

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

FDA Discussions may include off-label uses.

Participants
Gordon McLennan, MD, Chagrin Falls, OH (*Moderator*) Research Grant, Sirtex Medical Ltd; Research Grant, C. R. Bard, Inc; Consultant, Medtronic plc; Advisory Board, Siemens AG; Advisory Board, Surefire Medical, Inc; Stock Holder, Surefire Medical, Inc; Advisory Board, Medtronic plc; Advisory Board, Stealth Medical; Advisory Board, Rene Medical;
Himanshu Shah, MD, Zionsville, IN (*Moderator*) Consultant, IMARC Research Inc

Sub-Events

SSG16-01 Performance Evaluation of a Robotic Assistance Device Compared to Manual Fluoroscopy Procedure in Computed Tomography Guided Minimally Invasive Ablation Procedures and Diagnostic Punctures

Tuesday, Nov. 29 10:30AM - 10:40AM Room: E351

Participants
Arman Smakic, MD, Mannheim, Germany (*Presenter*) Nothing to Disclose
Nils Rathmann, MD, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Kostrzewa, MD, Mannheim, Germany (*Abstract Co-Author*) Institutional research agreement, Siemens AG
Stefan O. Schoenberg, MD, PhD, Mannheim , Germany (*Abstract Co-Author*) Institutional research agreement, Siemens AG
Steffen J. Diehl, MD, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate a novel commercially available robotic assistance device for computed tomography guided interventions compared to standard manually performed CT-scan guided interventions in terms of precision, radiation exposure and intervention time.

METHOD AND MATERIALS

Within 16 months 55 patients were treated using robotic assistance (group A) and compared to a control group of 102 patients previously treated with a standard CT-scan guided, manually performed, approach (group B). Evaluated parameters were precision (deviation from planned target and number of needle replacements), radiation exposure and intervention time. Evaluations were performed with regard to complexity (in plane vs. out of plane interventions) and anesthesia type (general vs. local anesthesia).

RESULTS

Parameters related to precision were in general significantly better in the robotic assistance group ($p<0.01$) with a mean deviation of only 1.2mm (±1.6 mm) compared to 2.6mm (±1.1 mm) in the control group. Regarding the sub-groups, differences in deviation in both groups were smaller in procedures performed under general anesthesia compared to local anesthesia (Group A: 0.5mm (±0.9mm) vs. 2.1mm (±1,9mm) group B: 1.9mm (±1.3 mm) vs. 3.4mm (±1.1 mm) (both $p<0.001$). Mean number of needle replacements necessary to reach the target was 0.3 (±0.4) in the robotic assistance group compared to 1.8 (±0.7) in the comparison group ($p<0.001$). Compared to standard procedure mean intervention time was 15 minutes (± 5.4min) shorter in complex out of plane punctures in the robotic group. There was no increase of radiation exposure to the patient while radiation exposure for the physician was reduced to zero when the navigation system was used.

CONCLUSION

Compared to manual placement the use of a robotic assistance device in complex out of plane CT guided interventions under general anesthesia allows probe placement with high precision, reduces intervention time with no increase of exposure to radiation to the patient and zero radiation for the physician. In less complex in plane punctures no advantages concerning intervention time and radiation dose were seen while precision analysis showed small advantages.

CLINICAL RELEVANCE/APPLICATION

Use of a robotic navigation system can improve the workflow of complex CT guided minimally invasive ablation procedures and diagnostic punctures in terms of precision, intervention time and eliminates radiation to the performing physician.

SSG16-02 Effect of Concentration of Perfusate and Power-Setting on Coagulated Size of Hydrochloric Acid-Infused Radiofrequency Ablation

Tuesday, Nov. 29 10:40AM - 10:50AM Room: E351

Awards
Trainee Research Prize - Resident

Participants
Tianqi Zhang, Guangzhou, China (*Presenter*) Nothing to Disclose
Kaiwen Huang, Taipei City, Taiwan (R.O.C.), Taiwan (*Abstract Co-Author*) Nothing to Disclose
Leyi Xu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yangkui Gu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Rongqian Yang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Ruhai Zou, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jinhua Huang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the optimal concentration of hydrochloric acid (HCl) applied in HCl-infused radiofrequency ablation (H-RFA) by investigating the H-RFA lesion sizes and the conductivities in different concentrations of HCl under different ablation powers.

METHOD AND MATERIALS

H-RFA procedure was conducted in 60 ex vivo porcine livers at 103oC within 30 minutes. To test four different concentrations of HCl (5%, 10%, 15%, 20%) as experimental groups and two control groups including distilled water and normal saline under two setting ablative powers (30 w, 60w), 12 subgroups were created, each with five specimens. For each ablation procedure, the power output was recorded every 2.5 minutes, the longitudinal and transverse diameters were measured, and ablation volumes were calculated. The average impedance, actual power output, longitudinal and transverse diameters, and volumes of the lesions in all eight groups were compared with analysis of variance. Alpha was set at 0.05.

RESULTS

The ablation zones of H-RFA were significantly larger than controls ($P<0.001$). The largest mean lesion volume of H-RFA was 179.22 ± 24.79 cm3, with 10% HCl concentration at 60 w; the smallest was 93.97 ± 15.09 cm3, with 5% HCl at 30 w. The average power outputs at concentrations of 5% and 10% were significantly greater than those at 15% and 20% in the 30 w and 60 w groups, respectively ($P<0.05$). In the 60 w groups, the longitudinal and transverse diameters and volume at 10% were significantly greater than those of the other three concentration groups ($P<0.05$). Although the average power output of the 15% and 20% groups was smaller than that at 5% ($P>0.05$), the lesion sizes were similar in 60 watt groups than those of the 5% group and were even larger in 30 watt groups.

CONCLUSION

An HCl concentration of 10% produced the largest lesion and is thus the optimal concentration for HRFA under the conditions tested.

CLINICAL RELEVANCE/APPLICATION

An HCl concentration of 10% is evaluated as the optimal concentration for hydrochloric acid infused radiofrequency ablation (HRFA). By applied 10% HCl, it could create large ablation zone by HRFA.

SSG16-03 Single Exponential Decay Voltage Profile for Non-thermal Tissue Ablation

Tuesday, Nov. 29 10:50AM - 11:00AM Room: E351

Participants
Michael K. Stehling, MD, PhD, Offenbach, Germany (*Presenter*) Investor, InterScience GmbH
Enric Guenther, Dipl Phys, Frankfurt, Germany (*Abstract Co-Author*) Investor, InterScience GmbH
Paul Mikus, DPhil, Coto De Caza, CA (*Abstract Co-Author*) Consultant, Interscience
Nina Klein, MSc, Offenbach am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Boris Rubinsky, PhD, Berkeley, CA (*Abstract Co-Author*) Consultant, InterScience GmbH

PURPOSE

Non-thermal irreversible electroporation (NTIRE) protocols are designed to maximize tissue ablation by irreversible electroporation while minimizing Joule heating; to spare vital structures such as blood vessels in the treated lesion. Due to muscle contractions, muscle relaxants are necessary. We designed a new technology for non-thermal tissue ablation, which employs a synergistic combination of electroporation and electrolysis (SEE) inducing electrical parameters. The voltage profile, delivered as a millisecond long exponential decay, generates products of electrolysis, which ablate cells by penetrating the interior of electroporation permeabilized cells.

METHOD AND MATERIALS

The liver of three pigs was exposed and treated with two custom-made, electrolysis promoting Ti based electrodes under ultrasound monitoring. We utilized a generator designed to simultaneously deliver electrolysis and electroporation. The initial voltage, the time constants of the exponential voltage profile and the number of pulses delivered were parameters of this study. Animals were sacrificed at 24 hours. For microscopic analysis, the liver samples were fixed in a 10% formalin solution, processed to wax blocks and stained with Masson's trichromatic stain for histologic examination.

RESULTS

Single SEE electric fields which decayed exponentially within milliseconds from field strengths of 750 and 1000 V/cm produced continuous ablation between electrodes with comparable ablation dimensions to that achieved with 70 typical NTIRE pulses, without the necessity of muscle relaxants. Animals tolerated the procedure without significant adverse events.

CONCLUSION

The SEE technology can reliably ablate liver tissue on a cellular level with single exponential decay voltage profiles. At the same time it reduces the muscle contraction to the extent that no muscle relaxants are needed. While other shapes of voltage potentials for SEE exist, an advantage of the exponential decay voltage shape is its technological simplicity. This non-thermal technology is therefore faster than comparable ablation modalities, with lower toxicity and lower requirements for anesthesia and muscle relaxation.

CLINICAL RELEVANCE/APPLICATION

SEE is a novel technology for non-thermal tissue ablation, which utilizes a synergistic combination of electroporation and electrolysis parameters, delivered as a single exponential decay voltage.

SSG16-04 Evaluation of A Novel Thermal Accelerant Agent to Augment Tissue Heating During Image-Guided Microwave Ablation

Tuesday, Nov. 29 11:00AM - 11:10AM Room: E351

Awards

Student Travel Stipend Award

Participants
William C. Park, PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Damian E. Dupuy, MD, Providence, RI (*Presenter*) Research Grant, NeuWave Medical Inc Board of Directors, BSD Medical Corporation Stockholder, BSD Medical Corporation Speaker, Educational Symposia
Aaron W. Maxwell, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Shaolei Lu, MD,PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Grayson L. Baird, PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Edward G. Walsh, PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Victoria Frank, Fall River, MA (*Abstract Co-Author*) Nothing to Disclose
Michael P. Primmer, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Kara A. Lombardo, BS, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Scott Collins, RT, Providence, RI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The effectiveness of thermal ablation in solid tumors decreases with distance from the applicator tip (thermal diffusion) and with increased adjacent blood flow ("heat sink" effect). In this study, we describe our initial experience with a novel thermal accelerant (TA) agent designed to mitigate these factors and augment ablation zone volume.

METHOD AND MATERIALS

TA performance was evaluated with a commercially available microwave ablation system using *in vitro* agarose phantom, *ex vivo* bovine liver, and *in vivo* porcine liver, kidney, and muscle models. Microwave power, TA dose, and TA-to-tip distance were varied, and temperature readings compared with and without TA. Gross pathologic analysis was performed on *in vivo* specimens using triphenyl tetrazolium chloride (TTC) staining to calculate ablation zone volumes. Imaging characteristics were determined using ultrasound and CT.

RESULTS

Using the *in vitro* model, both the rate and magnitude of increase in ablation zone temperature were significantly greater with TA under all tested conditions ($p<0.0001$). *Ex vivo*, the intrahepatic ablation zone temperature increase was directly proportional to dose, with 60°C reached in 180 second using 250 mg/mL at 60W. *In vivo*, liver, muscle, and kidney ablation zone volumes as determined by TTC staining were significantly increased with TA use ($p<0.01$ for all). The compound exhibited biphasic gel properties, existing as a clear liquid at 25°C and an opaque gel at 37°C. On ultrasound imaging, the TA appeared hypoechoic when liquid and mildly echogenic as gel. On CT, TA density was proportional to dose, with average values ranging from 329 HU to 3071 HU at 10 mg/mL and 1,000mg/mL, respectively.

CONCLUSION

Our novel TA agent improved the performance of a commercially-available microwave ablation system and increased ablation zone volume in multiple tissue types. The agent is readily visible under both CT and ultrasound, and can be reliably placed within biologic tissues owing to its biphasic gel properties. Future studies evaluating optimal TA-to-target geometry and other organ-specific parameters are planned.

CLINICAL RELEVANCE/APPLICATION

Ablation volume is significantly augmented through the use of a novel thermal accelerant agent designed to mitigate thermal diffusion and heat sink effects.

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/

Damian E. Dupuy, MD - 2012 Honored Educator

SSG16-05 Imaging-guided Spinal Radiofrequency, Microwave, and Cryoablation in a Sheep Model

Tuesday, Nov. 29 11:10AM - 11:20AM Room: E351

Participants
Adam N. Wallace, MD, Saint Louis, MO (*Presenter*) In-kind support, DFINE, Inc ; In-kind support, Galil Medical Ltd; In-kind support, Medtronic plc
Travis J. Hillen, MD, Saint Louis, MO (*Abstract Co-Author*) Consultant, Biomedical Systems; Instructor, DFine, Inc
Michael V. Friedman, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Zohny S. Zohny, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Bradley H. Stephens, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Suellen C. Greco, DVM, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Michael R. Talcott, DVM, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Jack W. Jennings, MD, Saint Louis, MO (*Abstract Co-Author*) Speakers Bureau, DFINE, Inc Consultant, DFINE, Inc

PURPOSE

In this study, in vivo RFA, cryoablation, and MWA of healthy sheep vertebrae were performed to accomplish three objectives. First, the technical parameters of each modality were correlated with the diameter of the necrotic ablation zone on gross pathology. Second, ablations were performed that exceeded the dimensions of the vertebral bodies to determine whether the posterior vertebral body cortex acts as a protective barrier for the spinal cord. Third, post-ablation MRI and histologic findings were evaluated and correlated.

METHOD AND MATERIALS

Ten healthy sheep vertebrae were treated with radiofrequency ablation (n = 3), cryoablation (n = 4), or microwave ablation (n =

3).. In the first sheep, the parameters of each ablation were chosen to produce an ablation volume with a 20-mm diameter orthogonal to the ablation probe based on preclinical data provided by the manufacturers. MRI was performed 48 hours (sheep 1) or 7 days (sheep 2, 3) after the ablation procedure. The vertebral bodies were then harvested for gross pathologic and histologic evaluation.

RESULTS

Radiofrequency ablation zones on gross pathology were 5.9±0.7 mm smaller than those expected based on previously derived correlations with technical parameters. Cryoablation and microwave ablation zones were within 2 and 1 mm, respectively, of those expected. Cryoablation and microwave ablation zones larger than the target vertebral bodies caused histologically confirmed spinal cord injury, but this was not observed with radiofrequency ablation. On MRI, all ablation modalities produced a non-enhancing ablation zone delineated by a thin rim of enhancement, which corresponded histologically to marrow necrosis and hemorrhagic congestion, respectively. Gross pathology ablation zones were larger than those measured on MRI by 0.6±0.2 mm for radiofrequency ablation, 0.9±0.3 mm for cryoablation, and 1.4±0.8 mm for microwave ablation.

CONCLUSION

Estimations of ablation zone dimensions and the risk of ablation-induced spinal cord injury vary among modalities. Ablation zones are slightly larger on pathology than on MRI.

CLINICAL RELEVANCE/APPLICATION

Accurate estimation of spinal ablation zone dimensions derived from an in vivo sheep model, coupled with the knowledge of whether the cortex protects against ablation-induced spinal cord injury, will facilitate the adequate and safe ablation of spinal tumors.

SSG16-06 Use of CT Densitometry to Differentiate between Recurrence and Ablation Scar

Tuesday, Nov. 29 11:20AM - 11:30AM Room: E351

Awards
Student Travel Stipend Award

Participants
Lillian Xiong, MD, Providence, RI (*Presenter*) Nothing to Disclose
Erica S. Alexander, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Grayson L. Baird, PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Damian E. Dupuy, MD, Providence, RI (*Abstract Co-Author*) Research Grant, NeuWave Medical Inc Board of Directors, BSD Medical Corporation Stockholder, BSD Medical Corporation Speaker, Educational Symposia

PURPOSE

This study evaluates CT densitometry's ability to differentiate tumor from scar after radiofrequency ablation.

METHOD AND MATERIALS

Data used from a prospective, multicenter group trial approved by each institutional review board. 54 patients from 16 US sites were enrolled, of these, 50 patients (23 Men, 27 Women; mean age 75.3±7.5 years) met eligibility requirements. Data from patients' pretreatment and multiple post treatment follow up multiphase CT scans (CT densitometry) at 3, 6, 9, and 12 months to evaluate recurrent tumor and scar enhancement at 0, 45, 90, 180, and 300 seconds.

RESULTS

Evaluation of the CT densitometry at times of recurrence showed kinetics that mimic the pretreatment densitometry. The average change in Housfield units (HU) from 0 to 45 seconds at time of recurrence was 48 HU CI 95% (29-67) and pretreatment, biopsy proven tumor, has an average change of 56 HU CI 95% (40-72) with a near identical slopes. After this initial increased uptake, the recurrences and biopsy proven tumor curves show plateau to slight washout of contrast. Conversely, the CT densitometry without recurrence showed kinetics that mimic the 3 month ablation scar densitometry curve with near identical slope. The average change in HU from 0 to 45 seconds with no recurrence was 13 HU CI 95% (1.2-24) and 28 HU CI 95% (14-41) in the 3 month ablation scar. At the 90 and 180 time points, these both show persistent uptake of contrast, consistent with the imaging findings of scar and fibrosis.

CONCLUSION

CT densitometry shows different kinetic curves in recurrent and primary tumor compared to scar. This may be a useful imaging biomarker of neovascularity in patients undergoing ablative therapies.

CLINICAL RELEVANCE/APPLICATION

Similar to the kinetic curves used in breast MRI to evaluate lesion physiology, CT densitometry's ability to differentiate tumor from scar makes it a viable alternative imaging method or adjunct method to evaluate post ablation patients.

Honored Educators

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

Damian E. Dupuy, MD - 2012 Honored Educator

SSG16-07 Novel Needle-Attached Orientation Sensor to Correct for Respiratory Motion during Percutaneous Interventions: Accuracy of Lesion Position Estimation in the Liver

Tuesday, Nov. 29 11:30AM - 11:40AM Room: E351

Participants
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Takahisa Kato, Boston, MA (*Abstract Co-Author*) Employee, Canon Inc
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Nobuhiko Hata, PhD, Boston, MA (*Presenter*) Research Grant, Canon USA Inc; Research Grant, Koh Young Technology Inc; Research Consultant, AZE, Ltd ; Research Consultant, Harmonus, Ltd ; Stockholder, Harmonus, Ltd

PURPOSE

Respiratory motion is the single-most important obstacle in targeting small lesions in the lung, liver and kidney. We assessed if the motion of an initially placed 'reference' needle coupled with an attached sensor could be used to accurately estimate the position of a simulated liver lesion motion in real-time at different proximities of the needle to the lesion.

METHOD AND MATERIALS

An experimental platform was developed to mimic liver motion during breathing using a 2-degrees-of-freedom (DOF) motorized stage. The motorized stage simulated the lesion motion; 10mm in the superior-inferior and 6mm in the anterior-posterior directions; during shallow breathing that includes inhalation (2s), exhalation (2s) and then a pause (2s). A custom made 9DOF inertial measurement unit (IMU) was attached to the hub of an 18-gauge standard 'reference' biopsy needle. Following 21 needle placements into the phantom, IMU collected the surrogate signals including 3D orientation, linear acceleration and angular velocity of the needle during synthetic motions of the phantom. A supervised learning algorithm based on Random k-Labelsets method was trained to create a correspondence model that correlated the surrogate signals to the lesion position over 20 seconds. The actual lesion position was measured using an electro-magnetic (EM) sensor at the lesion site and used as a gold standard. The IMU and EM sensor data were synchronized and split; 66% of the data was used for training and 34% was used for testing. The needle was placed with varying proximity to the lesion.

RESULTS

The errors to estimate lesion motion were 0.0, 1.0 and 0.0 mm in median value, and 0.63±0.87, 0.74±0.79, and 0.53±0.81 mm in average value (p=0.003 by Kruskal-Wallis), for needle-to-lesion proximity range of 0-1cm, 1-2cm and 2-3cm respectively. The processing time for training and testing was 4-12 ms, which is sufficient for real-time lesion motion estimation using the proposed surrogate signal.

CONCLUSION

Motion of an initially placed 'reference' needle can be used as a surrogate signal to accurately estimate a lesion's position in real-time during percutaneous interventions. The needle proximity to lesion significantly affected the lesion position estimation error.

CLINICAL RELEVANCE/APPLICATION

As initially placed 'reference' needle with an attached sensor can be used to compensate for respiratory motion and improve targeting of small tumors in organs that move with respiration.

SSG16-08 In Vitro Artifact Assessment of a New MR-compatible Microwave Antenna Device for Tumor Ablation with Near-Realtime Fluoroscopic MRI-Sequences

Tuesday, Nov. 29 11:40AM - 11:50AM Room: E351

Participants
David-Emanuel Kessler, Tubingen, Germany (*Presenter*) Nothing to Disclose
Jakob Weis, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
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Konstantin Nikolaou, MD, Tuebingen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG; Speakers Bureau, Bracco Group; Speakers Bureau, Bayer AG
Rudiger Hoffmann, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate artifact configuration and diameters of a new magnetic resonance (MR) compatible microwave (MW) applicator for percutaneous tumor ablation using two different near-realtime MR fluoroscopic sequences.

METHOD AND MATERIALS

Two new MW applicators (14 and 16 Gauge) were tested in a phantom study at 1.5T with two dedicated sequences optimized for MR fluoroscopic imaging: T1 weighted spoiled Gradient Echo (GRE) sequence and T1/T2 weighted Steady State Free Precession (SSFP) sequence. Applicator orientation to main magnetic field (B0), slice orientation and phase encoding direction (PED) were varied in a systematic fashion. Needle tip location error (TLE) was assessed and artifact diameters were calculated for each needle, sequence, and position. Influence of imaging parameters on artifacts were assessed with ANOVA and post hoc testing.

RESULTS

The artifact was homogenous along the whole length of both antennas with all tested parameters. The tip artifact measured 7.7+/-1.2mm for the 14 G antenna and 6.9 +/-1.0mm for the 16 G antenna, respectively. The shaft artifact diameter measured 9.6+/-1.5 mm and 8.6+/-1.2mm, respectively. TLE was -1.6+/-1.2mm and -1.5+/-1.2mm, respectively. Orientation to B0 had no statistically significant influence on the tip artifact diameter (p=0.07 and p=0.55, respectively) or the TLE (p=0.26 and p=0.93, respectively). GRE sequence produced statistically significant greater TLE (p<0.0001). Slice orientation had no statistically significant influence on the size of the tip artifact (p=0.31 and p=0.93, respectively) and on the TLE (p=0.97 and p=0.35, respectively). PED had no statistically significant influence on the TLE (p=0.15 and p=0.68, respectively)

CONCLUSION

The new MR-compatible MW applicator's artifact is adequately small and TLE seems small enough for safe applicator positioning during near-realtime fluoroscopic MR-guidance for percutaneous ablation procedures.

CLINICAL RELEVANCE/APPLICATION

The results of this study may help implementing MR-guided microwave ablation in clinical practice.

SSG16-09 Cardiac Safety of Irreversible Electroporation Evaluated by Biomarkers and Electrocardiographic Monitoring

Tuesday, Nov. 29 11:50AM - 12:00PM Room: E351

Participants
Michael Kostrzewa, MD, Mannheim, Germany (*Presenter*) Institutional research agreement, Siemens AG
Erol Tueluemen, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Volker Liebe, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Nils Rathmann, MD, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas Henzler, MD, Mannheim, Germany (*Abstract Co-Author*) Research support, Siemens AG; Speaker, Siemens AG
Stefan O. Schoenberg, MD, PhD, Mannheim , Germany (*Abstract Co-Author*) Institutional research agreement, Siemens AG
Martin Borggrefe, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose
Steffen J. Diehl, MD, Mannheim, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To systematically evaluate the safety of irreversible electroporation (IRE) in respect to cardiac safety, using cardiac biomarkers and electrocardiographic (ECG) monitoring.

METHOD AND MATERIALS

Computed tomography (CT) guided IRE ablation was conducted with intention to treat. All patients underwent 12-lead ECG and 24h Holter ECG recording on the day of the IRE procedure to detect procedure related conduction disturbances/arrhythmias. Venous blood samples (BNP, high sensitive Troponin I) were obtained before the procedure as baseline, and 4h and 16h after the procedure to detect cardiac injury. Findings were divided into normal, procedure related minor, procedure related major, procedure unrelated minor and procedure unrelated major.

RESULTS

In 25 patients (10 female, 15 male, mean age 63 years) IRE ablation was conducted in order to treat different malignancies at varying locations (liver: 9, kidney: 8, lung: 4, adrenal gland: 3, soft tissue: 1). A standard ablation protocol was used applying voltages from 2000 to 3000 Volts and currents from 20 to 30 Amperes. After ablation Troponin I elevation was found in 9 (36%), BNP elevation in 19 patients (76%). All patients except one with an elevation in Troponin I, also had a BNP elevation. The ECG and Holter results showed normal findings in 9 (36%) patients, procedure unrelated minor abnormalities in 5 (20%), procedure related minor abnormalities in 9 (36%) and procedure related major abnormalities in 2 (8%) patients (3rd grade AV block and non-sustained ventricular tachycardias). On follow up after three months patients had no residual arrhythmias, or signs of cardiac damage.

CONCLUSION

Our findings suggest that IRE might result in temporary cardiac injury. Thus we strongly recommend the implementation of a cardiac safety protocol consisting of ECG, biomarkers and cardiologic surveillance.

CLINICAL RELEVANCE/APPLICATION

Treatment of patients with IRE requires close collaboration between cardiology and radiology in order to assure patient’s safety.

VIS-TUA

Vascular Interventional Tuesday Poster Discussions

Tuesday, Nov. 29 12:15PM - 12:45PM Room: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
Kenneth J. Kolbeck, MD, PhD, Portland, OR (*Moderator*) Nothing to Disclose

Sub-Events

VI242-SD-TUA1 CT Guided Cryoablation of Primary and Metastatic Lung Tumors: Low Recurrence and Complication Rates

Station #1

Participants
Hussein D. Aoun, MD, Dearborn, MI (*Abstract Co-Author*) Nothing to Disclose
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
Hamza M. Beano, MD, Detroit, MI (*Presenter*) Nothing to Disclose
Mohamed M. Jaber, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Barbara A. Adam, MSN, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Matthew Prus, BS, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Mark J. Krycia, BS, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess technical feasibility, efficacy and complication rates of CT guided cryoablation of lung tumors in multiple locations.

METHOD AND MATERIALS

CT fluoroscopic-guided percutaneous cryoablation was performed in 277 procedures on 375 tumors (106 primary, 269 metastatic tumors) in 158 patients. Tumor and ablation volumes, location, abutting vessels >3mm, recurrences, and PFT's were reviewed for all patients. Complications were graded by the National Institutes of Health, Common Terminology of Complications and Adverse Events 4.0 (CTCAE).

RESULTS

All procedures were performed with conscious sedation. Mean FEV1 and DLCO2 were 80.2 (32-145) and 69.5 (27-110), respectively. Overall tumor and ablation median size was 2.4 cm (0.5 – 12.3 cm) and 4.6 cm (1.7-12.8 cm), respectively. Total major complication rates were only 4.3% (12/277), however major complication rates were significantly lower in tumors ≤3 cm as opposed to ≥3cm, 1.0% (2/194) vs. 12.0% (10/83) ($p<0.001$) No statistical significance was noted for major complications with central tumors or major vessel proximity. Recurrence rates of 8.3% (31/375) were not significantly affected by tumor size (<3cm or >3cm). Recurrence rates increased for central tumors near major vessels 13.5% (19/141) compared with peripheral tumors 5.1% (12/234) ($p< 0.005$).

CONCLUSION

CT guided percutaneous cryoablation in the lung provides a low morbidity alternative with superb efficacy. Complication rates are significantly lower for tumors <3cm and total complications were low.

CLINICAL RELEVANCE/APPLICATION

Appropriately delivered thoracic cryoablation is affected by vessel location yet still produces low recurrence and complication rates.

VI243-SD-TUA2 Advantages of the Reduced Expansion Technique of Cisplatin-loaded Superabsorbent Polymer Microspheres for Chemoembolization in Rabbit VX2 Liver Tumors

Station #2

Participants
Takeshi Sato, Kashihara, Japan (*Presenter*) Nothing to Disclose
Toshihiro Tanaka, MD, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
Hideyuki Nishiofuku, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
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Kimihiko Kichikawa, MD, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose
Shota Tatsumoto, Kashihara, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Previously, it was revealed that superabsorbent polymer (SAP) microspheres could absorb and elute cisplatin. Cisplatin-loaded SAP microspheres mixed with nonionic contrast medium expand approximately 4 times larger than those original sizes in the dry stage. However, theoretically, smaller size of microspheres could be ideal for tumors with fine feeding arteries. Recently, it has been newly developed that adding 10 % NaCl could reduce the expansion of SAP by half. The purpose of this study is to evaluate the pharmacological and histological advantages of cisplatin-loaded SAP with the reduced expansion technique in a rabbit VX2 tumor model.

METHOD AND MATERIALS

Eighteen rabbits with VX2 liver tumors were treated with cisplatin-loaded SAP. In the normal expansion group, 25 mg/vial

Eighteen rabbits with VX2 liver tumors were treated with cisplatin-loaded SAP. In the normal expansion group, 25 mg/vial Hepashpere was preloaded with 25 mg cisplatin dissolved in 5 mL of nonionic contrast medium. In the reduced expansion group, 4 mL of nonionic contrast medium and 1 mL of 10 % NaCl. In both groups, cisplatin-loaded SAP suspension was injected into the left hepatic artery until stasis of hepatic arterial flow was achieved. All rabbits were sacrificed at 1 (n=3), 24 (n=3), and 72 (n=3) hours after administration of cisplatin. The concentrations of platinum in the tumor tissue and the histopathological findings were analyzed.

RESULTS

The mean diameters of cisplatin-loaded SAP with the normal technique and the reduced expansion technique were 377 and 200 µm, respectively. The mean platinum concentrations in VX2 tumor at 1, 24 and 72 hours were 1.57, 3.76 and 0.73 µg/g, respectively, in the normal expansion group; and 10.76, 4.85 and 2.79 µg/g, respectively, in the reduced expansion group. The tumor platinum concentrations of the reduced expansion group at 1 hour was significantly higher than the concentrations of the normal expansion group (P = .044). Histopathological findings revealed that the microspheres in the reduced expansion group were more frequently observed inside the liver tumors and peripheral liver parenchyma compared with those in the normal expansion group.

CONCLUSION

Chemoembolization using cisplatin-loaded SAP with the reduced expansion technique has an advantage of achieving a better distribution of microspheres and a higher drug concentration of cisplatin in tumors.

CLINICAL RELEVANCE/APPLICATION

The newly developed reduced expansion technique could be useful for tumors with fine feeding arteries in chemoembolization using cisplatin-loaded SAP.

VI244-SD-TUA3 MRI Study of Probucol Therapy on Atherosclerotic Plaque in Watanabe Heritable Hyperlipidemic Rabbits

Station #3

Participants
Chiaki Kaneko, Shiga, Japan (*Abstract Co-Author*) Nothing to Disclose
Norihisa Nitta, MD, Kyoto, Japan (*Presenter*) Nothing to Disclose
Keiko Tsuchiya, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose
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Ayumi Seko, MD, Otsu, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study was to evaluate the effect of a Probucol on atherosclerotic regression by MRI studies and histopathological studies.

METHOD AND MATERIALS

We divided 14 Watanabe heritable hyperlipidemic (WHHL) rabbits into 2 equal groups (6-7 months). One group was fed on mixed of Probucol, and the other group received normal chow without active drug as control.Five times of MRI (a baseline, 2,4,6,10,months after) and lastly MRI of USPIO were performed. The last MRI study was followed by histologic examination.The black blood sequence, cardiac-gated 2D fast spin echo sequence was used with triple inversion recovery pulses to suppress fat and blood signals was used. The vessel wall area was measured in the wall of the lower thoracic aorta on axial images. Specimens from the same level of the aorta were subjected to RAM-11 immunostaining ,and used for histopathological study. For statistical analysis of the MRI and histopathological findings we used t-test.

RESULTS

The vessel wall area with Probucol group were larger than compared with control ($p < 0.05$) in the serial MRI (2,4,6,10,months after.) The significant difference was not seen by the vessel wall area in the first pre MRI.Pathologically, in RAM-11 staining, the positive area of the macrophage was decreasing siginificantly in the group with probucol ($p < 0.05$).

CONCLUSION

In the evaluation of the aorta of WHHL by MRI, the vessel wall thickness was controlled by probucol. Pathologically, reduction of the macrophage in the atherosclerotic plaque was seen.

CLINICAL RELEVANCE/APPLICATION

The evaluation of the atherosclerosis in a rabbit by the MRI can apply to carotid artery plaque diagnosis of the human, and it is useful to evaluation of medical treatment.

VI245-SD-TUA4 Local Pulse Wave Velocity Profile in the Murine Abdominal Aorta at 17.6 T MRI

Station #4

Participants
Stefan M. Herz, MD, Wuerzburg, Germany (*Presenter*) Nothing to Disclose
Volker Herold, Wurzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Patrick Winter, Wurzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Julian Kunz, MD, Wurzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Tobias Gassenmaier, MD, Wurzburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Thorsten A. Bley, MD, Hamburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Wolfgang R. Bauer, MD, PHD, Wuerzburg, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of our study was to determine the local pulse wave velocity profile of the murine abdominal aorta in a multi-local setting

The aim of our study was to determine the local pulse wave velocity profile of the murine abdominal aorta in a multi-local setting and its potential to predict atherosclerotic plaque formation. Inflammation in atherosclerosis impairs the vessel wall function and reduces the wall elasticity which can be assessed by measuring the pulse wave velocity (PWV).

METHOD AND MATERIALS

ECG- and respiratory-gated MRI at 17.6 T was used to determine the local PWV profile (10x accelerated K-T BLAST QA method) and to visualize atherosclerotic plaques (multi-slice-multi-spin-echo sequence). 7 ApoE(-/-) and 7 C57Bl/6 wild type (WT) mice were imaged at the age of 19 and 30 weeks. Local PWV was calculated from the change in volume flow and cross sectional area of the abdominal aorta in early systole. Morphological plaque imaging was conducted in early systole to realize a „black blood" effect. Hematoxylin and Eosin staining were used for histological analysis.

RESULTS

Due to a 10 fold accelerated K-T BLAST method we were able to determine the local PWV profile along 8 subsequent slices. At the age of both 19 and 30 weeks ApoE(-/-) mice showed a significantly elevated local PWV compared to WT controls. In contrast at 30 weeks the maximum wall thickness of ApoE(-/-) mice was significantly elevated indicating the presence of atherosclerotic plaques while at the age of 19 weeks no elevated wall thickness was found. Statistical analysis indicates a positive correlation between local PWV and wall thickness at the age of 30 weeks. In contrast, no significant correlation was found for local PWV of ApoE(-/-) mice at 19 weeks and the corresponding wall thickness at 30 weeks. Results were supported by histological findings.

CONCLUSION

These results indicate a significant correlation of local PWV and wall thickness when atherosclerotic plaques are present. They support previous studies indicating that an elevated local PWV in early atherosclerosis precedes later plaque development. However, local PWV was not able to predict the exact location of the subsequent plaque formation.

CLINICAL RELEVANCE/APPLICATION

Elevated local PWV precedes subsequent plaque development in murine atherosclerosis and might have the potential as indicator of cardiovascular risk.

VI246-SD-TUA5 Do Immunohistochemistry Features of Thrombus Affect Outcome of Catheter-directed Thrombolysis in Patients with Deep Venous Thrombus?

Station #5

Participants
Eiji Furukoji, Miyazaki-shi, Japan (*Abstract Co-Author*) Nothing to Disclose
Masatsugu Kawano, Miyazaki, Japan (*Presenter*) Nothing to Disclose
Yoshihito Kadota, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Norihiro Shinkawa, MD, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Tatefumi Sakae, MD, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Toshinori Hirai, MD, PhD, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

If the mechanism of thrombus organization is more clearly understood, the efficacy of catheter-directed thrombolysis (CDT) for venous thromboembolism may increase. We aimed to evaluate the relationship of patient characteristics, treatment effects of CDT, and immunohistochemistry features of thrombus.

METHOD AND MATERIALS

This study included consecutive 19 patients (11 males, 8 females; age range 20-78 years; mean age 54.6 years) treated with CDT for venous thromboembolism. Venous thrombus developed on the left leg in 14 cases and the right in 5; 10 cases also had pulmonary embolism. The patients had trauma (n = 4), prolonged immobility (n = 3), postoperative state (n = 2) and cancer (n = 2); the remaining 8 patients were idiopathic. The risk factors of the thrombotic diathesis included high homocysteinemia, AT III deficiency, protein C deficiency. After placement of an 8Fr guiding catheter at the popliteal vein, CDT using urokinase and aspiration of venous thrombus were performed in all patients. Experienced pathologists assessed the aspirated thrombi on histology and immunohistochemistry. The patients were followed at least 3 months. We evaluated the relationship between patient characteristics, treatment effects of CDT, and immunohistochemistry features of aspirated venous thrombus. We used the Pearson correlation coefficient to assess the associations.

RESULTS

Time from symptom onset to treatment was 5-60 days (mean, 19.3 days). The venous thrombus disappeared in the follow up completely in 3 and partially in 13 cases, and recurred after thrombus reduction in 3 cases. In the histologic examination of aspirated thrombus, the degree of thrombus organization varied according to the period from symptom onset to CDT, and a significant correlation was found between the time from symptom onset and the expression of alpha–smooth muscle actin (myofibroblast and smooth-muscle cells) in thrombus ($p < 0.05$). The relationship between the expression of alpha–smooth muscle actin and the effect of treatment was not found.

CONCLUSION

In patients with deep venous thrombus, the time from symptom onset affects the expression of alpha–smooth muscle actin in thrombus. However, it is not determined whether the immunohistochemistry features of thrombus affect treatment outcome.

CLINICAL RELEVANCE/APPLICATION

Although the mechanism of thrombus organization is complex, catheter-directed thrombolysis is useful for treating deep venous thrombus.

VI247-SD-TUA6 Microwave-Ablation in the Proximity of Surgical Clips: Does it Influence the Ablation Zone?

Station #6

Awards

Student Travel Stipend Award

Participants
Martin Liebl, MD, Aachen, Germany (*Presenter*) Nothing to Disclose
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Philipp Bruners, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
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Peter Isfort, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Microwave ablation (MWA) is an established treatment option for patients suffering from hepatic malignancies.If materials with good electric conductivity, like surgical clips, are placed near the microwave antenna, unwanted heating effects may occur due to the induced electric current.We evaluated the possible influences of surgical clips within the ablation zone on the temperature and shape of the ablation volume during MWA .

METHOD AND MATERIALS

18 microwave ablations were performed in bovine liver tissue with an AMICA-microwave device (Mermaid Medical) using an ablation protocol with application of 60 Watts for 3 minutes. A titanium surgical clip was placed 7,5 mm distant from the microwave probe. Temperature was measured every second at 4 points of interest (POI): at the site of the clip and 7,5 mm distal from the clip, and at the same distances (7,5 and 15 mm) on the opposite side of the probe (without clip). We calculated the mean temperature curve at the 4 POI during the energy application. After the MWA, the liver was dissected to measure the ablation zone and evaluate the shape of the ablation.

RESULTS

MWA could be successfully performed in all 18 liver specimens.No significant changes of the size and shape of the ablation zone were ascertained.The Temperature at the position of the clip was significantly higher compared to the same distance on the opposite position of the probe without clip at all times during ablation with a maximum difference of 17 degrees at the end of the energy deposition. (p=0,009).

CONCLUSION

Surgical clips within the target volume result in an significant increase in local temperature but do not lead to changes in shape and volume of the ablation zone.

CLINICAL RELEVANCE/APPLICATION

Heating of surgical clips during MWA is likely to happen, but damage to surrounding structures such as biliodigestive anastomosis or the stomach wall would need direct contact to the clip, as the ablation volume is not influenced by the clip.

VI248-SD-TUA7 Extravascular Incidental Malignant Findings in Follow-up CT Angiograms in Patients Post Endovascular Aneurysm Repair

Station #7

Awards
Student Travel Stipend Award

Participants
Permesh S. Dhillon, MBBS, Derby, United Kingdom (*Presenter*) Nothing to Disclose
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Peter D. Thurley, MBBS, Nottingham, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Mario De Nunzio, Derby, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Graham Pollock, Derby, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Peter Bungay, FRCR, MBChB, Derby, United Kingdom (*Abstract Co-Author*) Consultant, Terumo Corporation Speaker, Terumo Corporation
Christopher A. Squirrell, FRCR, Derby, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
James E. Kirk, MBChB, MRCP, Nottingham, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the incidence and clinical relevance of extravascular incidental findings (EVIF), particularly malignancies, in follow-up CT angiograms (CTA) of the abdominal aorta in patients who underwent endovascular aneurysm repair (EVAR) of abdominal aortic aneurysm.

METHOD AND MATERIALS

Retrospective study of 2199 planning and follow-up CTAs of 418 patients who underwent EVAR in a single tertiary centre between 2006 – 2015. CTA reports were scrutinized for EVIFs, which were classified according to clinical relevance, into (I) immediate, (II) potential and (III) no clinical relevance. Clinical follow-up and management were reviewed for significant findings. Follow-up CTAs of patients with incidental malignancies were re-reviewed by 2 consultant radiologists and early missed malignant findings on previous CTAs were identified.

RESULTS

In total, 934 EVIFs were noted in 418 patients [31 females (7.4%), 387 males (92.6%); age range 63-93, mean age 78.5 years]. The number of patients with findings in each category were; Category I (114), Category II (166), Category III (304).Incidental malignant findings were reported in 51 patients (12.2%), of which 25 were noted on the initial CTA (6.0%) and 26 on follow-up CTAs (6.2%). Of the 26 patients, 15 had early malignant findings missed or misinterpreted on previous CTAs, while 11 had no significant abnormality even on retrospective review.

CONCLUSION

A high number of significant EVIFs, particularly incidental malignancies, can be identified in follow-up CTAs of patients who undergo EVAR. Hence, it is prudent to be vigilant in evaluation of abdominal CTAs and necessary clinical follow-up arranged.

CLINICAL RELEVANCE/APPLICATION

Specific 'review areas' when reporting surveillance CTAs can be recommended on the basis of the findings of our study.

VI280-SD-TUA8 Palliative Treatment of Painful Bone Metastases with MR Imaging-guided Focused Ultrasound Surgery: A Two-centre Study

Station #8

Participants
Alessandro Napoli, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Andrea Leonardi, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Fabrizio Andrani, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Vincenzo Noce, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Alberto Bazzocchi, MD, Bologna, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the efficacy of non-invasive high intensity MR guided focused Ultrasound Surgery (MRgFUS) for pain palliation of bone metastasis in patients over a large population.

METHOD AND MATERIALS

This prospective, single arm, two-centre study received IRB approval. 102 patients (female: 38, male: 64, mean age: 62,3) with painful bone metastases were enrolled. 121 non-spinal lesions underwent MRgFUS treatment using ExAblate 2100 system (InSightec). European Organization for Research and Treatment of Cancer QLQ- BM22 was used for clinical assessment additionally to Visual Analog Scale (VAS), at baseline and 1, 3 and 6 months after treatment. All patients underwent CT and MRI before treatment and 3-6 months afterward.

RESULTS

No treatment-related adverse events were recorded. 48/102 (47%) patients reported complete response to treatment and discontinued medications. 39/102 (38,2%) experienced a pain score reduction >2 points, consistent with partial response. Remaining 15 (14,7%) patients had recurrence after treatment. Statistically significant differences between baseline (6, 95%CI 5-8) and follow-up (2, 95%CI 0-3) VAS values and medication intake were observed ($p<0.05$). Similarly a significant difference was found for QLQ- BM22 between baseline and follow-up ($p<0.05$).

CONCLUSION

MRgFUS can be safely and effectively be adopted for treatment of painful bone metastases.

CLINICAL RELEVANCE/APPLICATION

MRgFUS can be safely and effectively used as totally noninvasive treatment for pain palliation of acoustically accessible bone metastasis

VIS-TUB

Vascular Interventional Tuesday Poster Discussions

Tuesday, Nov. 29 12:45PM - 1:15PM Room: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
Kenneth J. Kolbeck, MD, PhD, Portland, OR (*Moderator*) Nothing to Disclose

Sub-Events

VI249-SD-TUB1 Non-Invasive Treatment for Osteoid Osteoma by MR-Guided Focused Ultrasound (MRgFUS) Ablation: Clinical Outcomes in Five-year Experience

Station #1

Participants
Carola Palla, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Fabrizio Andrani, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Michele Anzidei, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Roberto Scipione, Terracina, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Alessandro Napoli, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determinate long-term clinical response and safety of MRgFUS ablative procedure for symptomatic non-vertebral osteoid osteomas

METHOD AND MATERIALS

In this prospective observational study we enrolled patients with clinical and imaging evidence of Osteoid Osteoma, excluding vertebral lesions as considered inaccessible; recurrences after RFA or surgery were included. MrgFUS was performed towards osteoma nidus using InSightec ExAblate system. Primary endpoints for treatment efficacy were pain relief (assessed by visual analogue pain questionnaires, VAS) and reduction of Non-steroidal drugs (NSAISs) intake. As secondary endpoints we considered bone remineralization after treatment assessed by CT imaging and nidus enhancement decrease (performed through Dynamic contrast-enhanced Imaging MR). Imaging follow-up (MR and CT) was established at 1 and 12 months after treatment; VAS evaluation was scheduled at 1 month after MRgFUS, then yearly.

RESULTS

We recruited 42 patients for MRgFUS ablation (female 9; male, 33; mean age 25,7 ± 1,3); no intra-procedural or peri-procedural adverse events were observed. A mean number of 5 ± 1,3 sonications was necessary to complete the treatment (average administered energy 985 ± 423 J). Three patients underwent treatment as rescue therapy (2 post-RFA, 1 post surgery). At 1-month follow-up 39/42 patients (92,8%) experienced a complete clinical response (VAS score 0 and NSAIDs therapy interruption), with statistically significant difference (p=0.001) between baseline VAS score (7 ± 2) and follow-up (0 ± 2). 3/42 patients were classified as partial responders. 38 out of 39 complete responders maintained their status over 1-year and 2-year follow-up, while one subject reported pain recurrence requiring RFA.

CONCLUSION

In our 5-year experience, MRgFUS demonstrated as effective non-invasive treatment for osteoid osteoma, with excellent rate of complete response over time

CLINICAL RELEVANCE/APPLICATION

MRgFUS is feasible and safe for osteoid osteoma ablation, guaranteeing immediate and enduring pain relief

VI250-SD-TUB2 Single-step versus Stepwise Chemoembolization for Unresectable Giant Hepatocellular Carcinoma: Is Single-step Chemoembolization Harmful?

Station #2

Participants
Yohei Ikebe, Nagasaki, Japan (*Presenter*) Nothing to Disclose
Hideki Ishimaru, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazunori Mitarai, Omura, Japan (*Abstract Co-Author*) Nothing to Disclose
Satomi Mine, Omura, Japan (*Abstract Co-Author*) Nothing to Disclose
Saori Akashi, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Hideyuki Hayashi, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Eijun Sueyoshi, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Ichiro Sakamoto, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuto Ashizawa, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Masataka Uetani, MD, Nagasaki, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Some authors claim that stepwise manner should be chosen in chemoembolization of giant hepatocellular carcinoma (HCC) to avoid complications; however, it has not been confirmed. We aimed to compare the periprocedural toxicity and outcome of single-step and stepwise chemoembolization for unresectable giant HCC.

METHOD AND MATERIALS

Between 2009 and 2015, 27 patients (22 men, 5 women; median age, 72 years; age range, 56-96 years) who underwent single-step (n=16) or stepwise (n=11) chemoembolization for unresectable HCC more than 8cm in diameter were included. In single-step therapy, detailed evaluation of tumor feeding arteries was performed using rotational DSA, and each feeding artery was embolized tightly and ultraselectively using anticancer-in-oil emulsion followed by gelatin sponge particle. In stepwise therapy one third to half of feeding arteries were embolized in a session. Periprocedural toxicity was graded according to the common terminology criteria for adverse events (CTCAE ver. 4.0). Patient survival from the first TACE session was calculated with Kaplan-Meier analysis.

RESULTS

Between the two groups, there were no significant differences in Child-Pugh grade or tumor stage. Chemoembolization did not cause acute tumor lysis syndrome in either group. Grade 3 or 4 toxicity after single-step and stepwise therapy, included abdominal pain (0 and 9%, respectively), elevated aspartate aminotransferase (75 and 73%, respectively) and alanine aminotransferase (44 and 27%, respectively). Stepwise chemoembolization was completed in only 3/11 (27%). The cumulative survival rates of single-step and stepwise therapy were 80 and 60% at 1 year, 67 and 45% at 2 years, and 50 and 0% at 3 years, respectively (log-rank test P=0.32).

CONCLUSION

This study's results showed non-inferiority of single-step chemoembolization compared with stepwise chemoembolization in periprocedural toxicity and survival. Single step chemoembolization for giant HCCs, in a manner which embolize all feeders tightly and ultraselectively, is not harmful and should not be discouraged.

CLINICAL RELEVANCE/APPLICATION

Single-step chemoembolization, which induces larger tumor necrosis and prevents early progression, is challenging but preferable option for unresectable giant HCC.

VI251-SD-TUB3 Bedside IVC Filters Placed with Digital Radiograph Guidance: A Single Institution's Initial Experience

Station #3

Awards
Student Travel Stipend Award

Participants
John A. Walker, MD, San Antonio, TX (*Presenter*) Nothing to Disclose
Jorge E. Lopera, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Ryan M. Hegg, MD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Girish Kumar, MD, Stickney, IL (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Acute pulmonary embolism is associated with high mortality, and prophylaxis among high risk patients is the standard of care. Critically ill patients are often among those at highest risk and frequently require mechanical prophylaxis with an IVC filter. Transporting these critically ill patients however can be a logistical challenge and sometime carries significant risk. Therefore bedside filter placement should be considered. Here we review bedside IVC filter placement in the intensive care unit (ICU) using digital radiography (DR).

METHOD AND MATERIALS

Bedside IVC filters placed in ICU patients as part of a quality improvement project implemented in July 2015 were retrospectively reviewed. Indication for filter placement followed SIR guidelines. The majority of patients had prior CT imaging available for procedure planning. CT images were used to assess cava anatomy and define the lowest renal vein and IVC bifurcation with respect to the spine. Filters were then placed at bedside with DR guidance. In the absence of a prior CT scan, intravascular ultrasound (IVUS) was utilized with DR. DR was used to visualize wire placement, adjust position of the delivery sheath and confirm final deployed filter position.

RESULTS

A total of 29 IVC filters were placed at beside with DR guidance, two with the aid of IVUS. Seventeen were placed for trauma prophylaxis and 14 for documented deep vein thrombosis and/or pulmonary embolism. Twenty were placed from a right common femoral access and 9 from the left. Average recorded procedural time was 18.6 minutes, ranging from 13-25 minutes. Median number of abdominal radiographs used was 5, ranging from 4-6. 18 Denali, 9 Option and 2 Celect filters were used. All 29 filters were positioned as planned. Two filters were considered significantly tilted, 3 mildly tilted and 24 centered. Eleven patients have received CT since placement with all filters adequately positioned in the infra-renal IVC. Three of the bedside placed filters have been removed to date, all without difficulty.

CONCLUSION

Bedside IVC filter placement with DR guidance after pre-planning from prior CT imaging is safe and effective while reducing complicated patient transfers.

CLINICAL RELEVANCE/APPLICATION

Digital radiography provides convenient rapid bedside imaging and when used in conjuction with pre-planning CT provides a platform for delivering bedside IVC filters effectively and safely.

VI252-SD-TUB4 Predictive Factors for Hypertrophy of the Future Liver Remnant after Portal Vein Embolization with Absolute Ethanol

Station #4

Participants

Keitaro Sofue, MD, Kobe, Japan (*Presenter*) Nothing to Disclose
Yoshito Takeuchi, MD, Kyoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Masakatsu Tsurusaki, MD, PhD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Masato Yamaguchi, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Koji Sugimoto, MD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuro Sugimura, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, Eisai Co, Ltd Research Grant, DAIICHI SANKYO Group
Yasuaki Arai, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To identify predictive factors associated with hypertrophy of the future liver remnant (FLR) after portal vein embolization (PVE) and to clarify the value of PVE with absolute ethanol in patients with negative predictive factors for liver regeneration.

METHOD AND MATERIALS

A total of 102 patients (68 men and 34 women) who underwent PVE were evaluated. PVE via ipsilateral approach was performed to increase insufficient FLR before major hepatic resection. Outcome of PVE and hepatic resection were evaluated. Changes in FLR and FLR/TFLV ratio were calculated by CT volumetry. Patient demographics including chronic liver disease, diabetes mellitus, and cholestasis, laboratory tests, PVE procedure, and volumetric parameters of the liver before PVE were assessed to identify predictive factors associated with hypertrophy of the FLR using a multiple linear regression analysis with stepwise backward elimination method. Prespecified analysis in the presence/absence of the identified predictive factor was also performed to compare the outcome of PVE and postoperative complication.

RESULTS

PVE was successful in all patients and complications occurred in seven (6.9%). The mean FLR and FLR/total functional liver volume (TFLV) ratio significantly increased after PVE (P<.0001). FLR and FLR/TFLV ratio before PVE were inversely correlated (P<.0001) to hypertrophy of the FLR, and extent of embolized segments was also a significant factor (P<.02). The change in FLR and FLR/TFLV ratio were significantly smaller in patients who underwent left and right anterior PVE than those underwent right PVE (P<.01). Successful major hepatic resection was achieved in 85 (83.3%) patients. Postoperative complications occurred in 27 (31.8%) and developed more frequently in patients who underwent left trisegmentectomy (61.5%) than in patients who underwent right major hepatectomy (26.4%) (P=.021).

CONCLUSION

FLR and FLR/TFLV ratio before PVE with absolute ethanol were associated with hypertrophy of the FLR after PVE, and negative predictive factors for liver regeneration did not affect hypertrophy of the FLR. PVE before left trisegmentectomy confined insufficient FLR hypertrophy and resulted in higher rate of postoperative complications.

CLINICAL RELEVANCE/APPLICATION

Chronic liver disease, diabetes mellitus, and cholestasis do not affect hypertrophy of FLR after PVE, and therapeutic strategy for liver trisegmentectomy is needed to achieve better clinical outcome.

VI253-SD-TUB5 Hemorrhagic Pulmonary Sheath Accompanying Acute Stanford A Aortic Dissection: Prevalence, CT Appearance and Consequences

Station #5

Participants
Qiuxia Xie, Guangzhou, China (*Presenter*) Nothing to Disclose
Xuhui Zhou, MD, PhD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Ling Lin, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jifei Wang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To retrospectively investigate the prevalence , computed tomography (CT) appearance and consequences of hemorrhagic pulmonary sheath(HPS) in Stanford A aortic dissection(AD) patients.

METHOD AND MATERIALS

Institutional review board approval and informed consent were not required. One hundred eighty eight consecutive acute Stanford A aortic dissection patients (mean age,59 years; range29-78years; 136 male, 52 female) underwent CT aortic angiography were reviewed. CT images were interpreted by two independent radiologists. Clinical charts were reviewed for outcomes of patients up to 30-days after the initial CT scan. By using Chi-square tests, Fisher exact tests, Wilcoxon rank sum test , CT findings were compared with patient outcome—survival or death.

RESULTS

Eighteen (9.6%) of the 188 patients had HPS. HPS involved right pulmonary artery in 50% (9 of 18) patients, left pulmonary artery in 11.1% (2 of 18) and both in38.9% (7 of 18) respectively. HPS extending bronchovascular sheaths were indentified in 44.4% (8 of 18) patients, and 6 (75%) of 8 patients with HPS had alveolar opacity around the thickened bronchovascular sheath. During 30days of follow-up in 18 patients with HPS, 61.1% (11 of 18) patients died and 38.9% (7 of 18) patients showed HPS absorption. HPS extending bronchovascular sheaths was more frequent in death group (6 of 11, 54.5%) than survival (2 of 7, 28.6%), but not significantly(ρ=0.3665). Patients in death group were more likely to have involved abdominal visceral arteries by AD (7 of 11, 63.6%) than patients in survival group (0 of 7, 0%)(ρ=0.0103). There were no significant differences in their age, ascending aorta maximum diameter, pleural effusion and hemopericardium.

CONCLUSION

HPS is not a rare complication in patients with Stanford A aortic dissection, and patients with abdominal visceral arteries involvement by AD have a poor short-term outcome. The impact of HPS extending bronchovascular sheaths on prognosis of patients need further research to confirmed.

CLINICAL RELEVANCE/APPLICATION

CT appearance of hemorrhagic pulmonary sheath has been reported in several cases of Stanford A aortic dissection.There are no published data about the prevalence and consequences of this complication.

VI254-SD-TUB6 The Safety and Efficacy of Radiofrequency Ablation with Hydrochloric Acid Infusion in Rabbit Liver Model

Station #6

Participants
Jinhua Huang, Guangzhou, China (*Presenter*) Nothing to Disclose
Senmiao Huang, GuangZhou, China (*Abstract Co-Author*) Nothing to Disclose
Tianqi Zhang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Ruhai Zou, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yangkui Gu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the safety and efficacy of radiofrequency ablation with hydrochloric acid (HCl) infusion using monopolar perfusion electrode in rabbit liver model.

METHOD AND MATERIALS

Thirty rabbits were randomly divided into five groups and received corresponding infusion for RFA: normal saline infused RFA (NS-RFA) group (n=6); four different concentration (5%, 10%, 15% and 20%) of HCl infused RFA (HCl-RFA) groups, each group contains 6 rabbits (n = 24). Hepatic and renal toxicity, and electrolytes were evaluated by means of blood biochemical analysis for all animals before and 2, 7, 14 days after ablation. Magnetic Resonance Imaging (MRI) and histopathologic examinations were proceeded to evaluate the ablation zone.

RESULTS

All animals tolerated the ablation without any deaths. Blood biochemical analysis indicating hepatic and renal toxicity and electrolytes did not differ among the five groups before or after ablation ($P > 0.05$). MRI showed all RFA lesions were irregular or ellipsoid, and limited in the liver. Longitudinal diameters of the ablation zones were from 2.20± 0.15 cm to 2.69± 0.17 cm in HCl-RFA groups, larger than 1.68± 0.14 cm in NS-RFA group ($P<0.05$), while transverse diameters were from 1.92± 0.2 cm to 2.29± 0.11 cm in HCl-RFA groups, larger than 1.47± 0.19 cm in NS-RFA group ($P<0.05$). Histopathologic examinations showed HCl-RFA create more serious necrosis compared with NS-RFA.

CONCLUSION

HCl-RFA could enlarge the ablation zone obviously compared to NS-RFA with reversible liver function damage without renal toxicity. HCl infusion may be a feasible and safe method to enhance the efficacy of RFA.

CLINICAL RELEVANCE/APPLICATION

HCl infusion may be a safe method to enhance the efficacy of RFA, so it is predictively feasible to treat large Hepatocellular Carcinoma.

VI159-ED-TUB7 Vascular Closure Devices from Wrist to Groin: A 2016 Update

Station #7

Participants
Diane Szaflarski, MD, Mineola, NY (*Presenter*) Nothing to Disclose
Sameer Mittal, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Ahmed Fadl, MD, Mineola, NY (*Abstract Co-Author*) Nothing to Disclose
Achal Shah, Richmond Hill, NY (*Abstract Co-Author*) Nothing to Disclose
Nicholas A. Georgiou, MD, Westbury, NY (*Abstract Co-Author*) Nothing to Disclose
Jason C. Hoffmann, MD, Mineola, NY (*Abstract Co-Author*) Consultant, Merit Medical Systems, Inc; Speakers Bureau, Merit Medical Systems, Inc
Osama Hussaini, Old Westbury, NY (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

1. An understanding of the various types of vascular closure devices (VCDs) is essential for the interventional radiologist to utilize the most appropriate device(s) in various clinical settings to optimize patient outcomes and hemostasis.2. Three general categories of VCDs exist: active approximation devices, passive approximation devices, and external compressive devices.

TABLE OF CONTENTS/OUTLINE

-Review the history of vascular closure device (VCD) development and use in Interventional Radiology-Detail the economic costs and benefits of VCD use, and review the relevant literature (including SIR practice guidelines) regarding their use-Thoroughly discuss the three types of device classes; active approximation, passive approximation, and external hemostatic devices-Discuss the differences of each class of device, including thorough review of the most common devices in each class, their cost, how to use, complications, indications, success rates, and strengths and weaknesses-This will include review of femoral and radial devices-Highlight current trends and possible future products that may further improve safety and efficacy of VCDs

Image Guided Interventional Radiology Procedures Using a Combined Angiography CT System: Supported by Toshiba America Medical Systems

Tuesday, Nov. 29 1:30PM - 3:00PM Room: S105D

Participants

PARTICIPANTS

Farah Gillan Irani, MD, Senior Consultant, SHHQ-SGH, Singapore; David Hays, MD, Interventional Oncology, CARTI Cancer Center, Little Rock, AR

PROGRAM INFORMATION

CME Credit is available through a third party provider.

VSIO31

Interventional Oncology Series: Lung and Musculoskeletal

Tuesday, Nov. 29 1:30PM - 6:00PM Room: S405AB

CH MK IR

AMA PRA Category 1 Credits ™: 4.50
ARRT Category A+ Credits: 5.00

FDA Discussions may include off-label uses.

Participants
Matthew R. Callstrom, MD, PhD, Rochester, MN, (Callstrom.matthew@mayo.edu) (*Moderator*) Research Grant, Thermedical, Inc
Research Grant, General Electric Company Research Grant, Siemens AG Research Grant, Galil Medical Ltd
Sean M. Tutton, MD, Milwaukee, WI (*Moderator*) Consultant, Benvenue Medical, Inc

LEARNING OBJECTIVES

1) Describe patients that are appropriate for ablation for lung and MSK tumors. 2) Describe the relative role of ablation with other treatments for lung and MSK tumors. 3) Describe outcome of the use of ablation for the treatment of lung and MSK tumors.

ABSTRACT

Sub-Events

VSIO31-01 Ablation Should Be First Option for Limited Metastatic Disease

Tuesday, Nov. 29 1:30PM - 1:50PM Room: S405AB

Participants
Stephen B. Solomon, MD, New York, NY (*Presenter*) Research Grant, General Electric Company

VSIO31-02 Possibility of Pathological and Genetic Analysis of Percutaneous Needle Biopsy Performed Immediately after Lung Radiofrequency Ablation

Tuesday, Nov. 29 1:50PM - 2:00PM Room: S405AB

Participants
Takaaki Hasegawa, Nagoya, Japan (*Presenter*) Nothing to Disclose
Chiaki Kondo, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose
Yozo Sato, MD, PhD, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshitaka Inaba, MD, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose
Hidekazu Yamaura I, MD, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose
Mina Kato, MD, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose
Shinichi Murata, MD, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose
Yui Onoda, MD, Shinagawa-ku, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasushi Yatabe, MD, Nagoya, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the possibility of pathological diagnosis and genetic mutation analysis for the specimen of percutaneous needle biopsy obtained immediately after lung radiofrequency ablation (RFA).

METHOD AND MATERIALS

During May 2013 to February 2016, 19 patients (8 male and 11 female; median age, 68 years; range, 52–88 years) underwent percutaneous needle biopsy immediately after RFA for 19 lung tumors of 0.5–2.6 cm (mean, 1.6±0.5 cm). Thirteen tumors were solid and 6 were consisted dominantly of ground-glass opacity (GGO). All specimens were pathologically classified using standard hematoxylin and eosin (H&E) staining and adding immunostaining as necessary. Genetic mutation of EGFR and KRAS was examined for the specimens containing tumor cells. The safety and technical success of the procedure and the possibility of pathological diagnosis and genetic mutation analysis were evaluated. Safety of the whole procedure was evaluated by using complication grading system of the Society of Interventional Radiology.

RESULTS

Nineteen patients were completed with both lung RFA and needle biopsy. Major complications occurred in 2 patients (11%, 2/19) (grade-D aseptic pleuritis (n=1) and grade-C pneumothorax with tube placement (n=1)) and minor complications occurred in 9 patients (47%, 9/19) (grade-B pneumothorax without tube placement (n=8) and self-limiting hemoptysis (n=1)). Tumor seeding was not seen during the median follow up of 9 months (range, 1-28 months). Tumor tissue was obtained in 16 patients, so technical success rate was 84% (16/19). Only normal pulmonary epithelium was obtained in 3 patients (16%, 3/19) with GGO dominant tumors. Pathological diagnosis was achieved in 14 patients, so pathological diagnosability rate was 74% (14/19). Although atypical cell was obtained, pathological diagnosis was not able to determine in 2 patients. Among 16 specimens containing tumor cell, both EGFR and KRAS mutation was able to analyze in 13 specimens (68%, 13/19). EGFR mutation could not be evaluated in 1 patient and KRAS mutation could not be in 2 patients, due to insufficient tumor cells.

CONCLUSION

Pathological diagnosis and genetic analysis were possible even for specimen obtained immediately after RFA for lung tumor.

CLINICAL RELEVANCE/APPLICATION

Percutaneous needle biopsy was feasibly performed immediately after lung RFA and the obtained specimen could be evaluated pathologically or genetically.

VSIO31-03 Outcomes with SBRT in the Treatment of Metastatic Lung Tumors

Tuesday, Nov. 29 2:00PM - 2:20PM Room: S405AB

Participants
Kenneth R. Olivier, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the technique and delivery of Lung SBRT. 2) Discuss the role of Lung SBRT in treatment of Oligometastatic Disease. 3) Compare SBRT to other modalities used in this context.

ABSTRACT

VSIO31-04 VATS Resection with Radionucleotide Localization - Effective Treatment for Small Lung Nodules

Tuesday, Nov. 29 2:20PM - 2:40PM Room: S405AB

Participants
Robert K. Shen, MD, Rochester, MN, (shen.krobert@mayo.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Develop an understanding of the technique using CT-guided placement of radionucleotide to localize small indeterminate lung nodules to facilitate thoracoscopic resection. At the conclusion of the presentation the learner should have an undertanding of the rationale for such an approach, the technical details of performing this technique, the indications for the technique and the outcomes of surgery performed using this technique.

ABSTRACT

VATS Resection with Radionucleotide Localization-Effective Treatment for Small Indeterminate Lung NodulesK. Robert Shen, M.D.Mayo ClinicDivision of General Thoracic Surgery The increased use of chest computed tomography (CT) in lung cancer screening programs and for various clinical applications has led to identification of significant numbers of indeterminate lung nodules. Improved CT technology allows diagnosis of not only more nodules, but also increasingly smaller nodules. Thoracic surgeons are now being called on to evaluate these lesions for the possibility of malignancy, often in the setting of high-risk patients with significant smoking histories. Although short-term follow-up imaging may often suggest either benignity or malignancy, caution should be exercised in accepting a benign diagnosis without tissue confirmation. Additionally, given evidence that tumor size directly impacts survival even within subgroups of stage IA tumors, it makes intuitive sense to attempt to treat potential cancers as early as possible.1 We and others have found that small lung nodules, particularly subcentimeter nodules, cannot be reliably biopsied percutaneously. Often, the most expedient and direct path to definitive management of a suspicious indeterminate small pulmonary nodule is to proceed with surgical excisional biopsy. Thoracoscopic surgery carries less morbidity than diagnostic procedures performed through thoracotomy, but is limited by the frequent inability to see or palpate (digitally or instrumentally) small subpleural lesions. To overcome this limitation, several different thoracoscopic nodule localization techniques have been developed and have been reported to improve the ease and accuracy of thoracoscopic biopsy. These include the use of visual markers, such as methylene blue and hook wires, fluoroscopic localization using various radiopaque markers, radiotracer localization techniques, and more recently, thoracic endosonography. All of these techniques have their own advantages and disadvantages, as well as significant learning curves. Several years ago, we modified a technique utilizing CT-guided radiotracer injection followed by intraoperative thoracoscopic radioprobe localization as the preferred method for finding nodules that we anticipate preoperatively will be difficult to see or palpate. In this presentation, I will review our experience using this technique. ReferencesStiles BM, Altes TA, Jones DR, Shen KR, Ailawadi G, Gay SB, Olazagasti J, Rehm PK, Daniel TM.Clinical experience with radiotracer-guided thoracoscopic biopsy of small, indeterminate lung nodules.Ann Thorac Surg 2006; 82:1191. Grogan EL, Jones DR, Kozower BD, Simons WD, Daniel TM.Identification of small nodules: technique of radio-tracer guided thoracoscopic biopsy.Ann Thorac Surg 2008; Feb 85(2): S772-7.

VSIO31-05 Palliative Treatment of Painful Bone Metastases with MR Imaging-guided Focused Ultrasound Surgery: A Two-centre Study

Tuesday, Nov. 29 2:40PM - 2:50PM Room: S405AB

Participants
Alessandro Napoli, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Andrea Leonardi, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Fabrizio Andrani, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Vincenzo Noce, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Alberto Bazzocchi, MD, Bologna, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the efficacy of non-invasive high intensity MR guided focused Ultrasound Surgery (MRgFUS) for pain palliation of bone metastasis in patients over a large population.

METHOD AND MATERIALS

This prospective, single arm, two-centre study received IRB approval. 102 patients (female: 38, male: 64, mean age: 62,3) with painful bone metastases were enrolled. 121 non-spinal lesions underwent MRgFUS treatment using ExAblate 2100 system (InSightec). European Organization for Research and Treatment of Cancer QLQ- BM22 was used for clinical assessment additionally to Visual Analog Scale (VAS), at baseline and 1, 3 and 6 months after treatment. All patients underwent CT and MRI before treatment and 3-6 months afterward.

RESULTS

No treatment-related adverse events were recorded. 48/102 (47%) patients reported complete response to treatment and discontinued medications. 39/102 (38,2%) experienced a pain score reduction >2 points, consistent with partial response. Remaining 15 (14,7%) patients had recurrence after treatment. Statistically significant differences between baseline (6, 95%CI 5-

8) and follow-up (2, 95%CI 0-3) VAS values and medication intake were observed (p<0.05). Similarly a significant difference was found for QLQ- BM22 between baseline and follow-up (p<0.05).

CONCLUSION

MRgFUS can be safely and effectively be adopted for treatment of painful bone metastases.

CLINICAL RELEVANCE/APPLICATION

MRgFUS can be safely and effectively used as totally noninvasive treatment for pain palliation of acoustically accessible bone metastasis

VSIO31-06 Cryoablation is the Best Option for Ablation of Pulmonary Metastases

Tuesday, Nov. 29 2:50PM - 3:10PM Room: S405AB

Participants
Thierry Debaere, Villejuif, France (*Presenter*) Consultant, Terumo Corporation; Speaker, Terumo Corporation; Proctor, Galil Medical Ltd; Data Safety Monitoring Board, Medtronic plc

LEARNING OBJECTIVES

1) Select best candidate for lung cryoabalation. 2) Apply adequate treatment algorythm for cryoabalation in the lungs. 3) Understand pattern of imaging follow-up after lung cryoablation.

VSIO31-07 MW not RF Ablation is the Best Option for Ablation of Pulmonary Metastases

Tuesday, Nov. 29 3:10PM - 3:30PM Room: S405AB

Participants
Damian E. Dupuy, MD, Providence, RI (*Presenter*) Research Grant, NeuWave Medical Inc Board of Directors, BSD Medical Corporation Stockholder, BSD Medical Corporation Speaker, Educational Symposia

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/

Damian E. Dupuy, MD - 2012 Honored Educator

VSIO31-08 Mid-Term Ablation Zone Evolution Following Microwave Ablation of Normal Swine Lung

Tuesday, Nov. 29 3:30PM - 3:40PM Room: S405AB

Participants
Hiroshi Kodama, MD, New York, NY (*Presenter*) Nothing to Disclose
Song Gao, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Eisuke Ueshima, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Kreg Howk, Mansfield, MA (*Abstract Co-Author*) Nothing to Disclose
Stephen B. Solomon, MD, New York, NY (*Abstract Co-Author*) Research Grant, General Electric Company
Govindarajan Srimathveeravalli, PhD, New York, NY (*Abstract Co-Author*) Support, Medtronic plc

PURPOSE

To compare CT images of microwave ablation (MWA) of lung in a porcine model with gross ablation zone measurements to understand evolution of treatment zone dimensions over 28 days.

METHOD AND MATERIALS

Twenty-two percutaneous microwave (Emprint™, Covidien) unilateral lung ablations were performed in 8 swine (2-3 ablations/animal). All sites were ablated at 100W for either 2 minutes (low; 14 ablations) or 10 minutes (high; 8 ablations, at least one/animal). Animals were sacrificed at 2 days (n=4) or 28 days (n=4) after the procedure. Non-contrast and dual-phase (30s and 90s) CECT imaging was performed post-treatment and prior to sacrifice in all animals. Animals sacrificed at 28 days were also imaged on days 7 and 14. Lungs and trachea were removed en-bloc after euthanasia, perfusion fixed with formalin, step sectioned at 3-5mm thickness and photographed at high resolution. CT and anatomical measurements were aggregated as mean ± standard deviation, differences in measurements were evaluated with T-test, p<0.05 was considered statistically significant.

RESULTS

In both treatment groups, ablation volume measured on CT was maximum at 7 days (high: 23.1±11.1 cm3; low: 9.2±5.2 cm3) and significantly larger compared to immediate post-ablation volume (high: 9.0±3.5 cm3; low: 3.5±1.8 cm3), P=0.004. Two-axis measurements performed on the largest ablation cross section on CT corresponded well with gross ablation measurements for both high (CT: 3.5±0.5x2.4±0.4 cm vs. Gross: 3.3±0.6x2.1±0.2 cm at 2days, CT: 2.7±1.0x1.9±1.0 cm vs. Gross: 2.7±0.9x1.9±0.8 cm at 28 days; no statistical difference) and low (CT: 2.3±0.5x1.5±0.3 cm vs. Gross: 1.9±0.5x1.3±0.3 cm at 2 days, CT: 1.4±0.5x1.0±0.4 cm vs. Gross: 1.2±0.5x0.9±0.3 cm; no statistical difference) dose ablations.

CONCLUSION

CT imaging correlates with the gross pathology size at 2 and 28 days following microwave ablation of normal swine lung. Volume of treatment zone can vary substantially, achieving largest size 7 days post-treatment.

CLINICAL RELEVANCE/APPLICATION

Follow-up imaging in patients must be performed within 2 or after 28 days after ablation to ensure accuracy.

VSIO31-09 Lung Tumor Board

Tuesday, Nov. 29 3:40PM - 3:55PM Room: S405AB

Participants
Matthew R. Callstrom, MD, PhD, Rochester, MN, (Callstrom.matthew@mayo.edu) (*Moderator*) Research Grant, Thermedical, Inc Research Grant, General Electric Company Research Grant, Siemens AG Research Grant, Galil Medical Ltd

LEARNING OBJECTIVES

1) Describe patients that are appropriate for ablation for lung tumors. 2) Describe the relative role of ablation with other treatments for lung tumors. 3) Describe outcome of the use of ablation for the treatment of lung tumors.

VSIO31-10 Technical Approaches to Treatment of Metastatic Disease in the Pelvis

Tuesday, Nov. 29 3:55PM - 4:15PM Room: S405AB

Participants
Sean M. Tutton, MD, Milwaukee, WI (*Presenter*) Consultant, Benvenue Medical, Inc

VSIO31-11 Skeletal Metastases Treated by MR-guided Focused Ultrasound: Dynamic Contrast-Enhanced MRI (DCE-MRI) for Treatment Response Evaluation

Tuesday, Nov. 29 4:15PM - 4:25PM Room: S405AB

Participants
Vincenzo Noce, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Carola Palla, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Susan Dababou, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Cristina Marrocchio, rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Alessandro Napoli, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare DCE-MRI findings in skeletal metastases treated with MR-guided Focused Ultrasound (MRgFUS) with clinical outcome assessed by visual analogue scale (VAS)

METHOD AND MATERIALS

Eighteen patients, enrolled for MRgFUS treatment for symptomatic skeletal metastases, underwent Dynamic Contrast-Enhanced MR exam (3T Discovery 750 scanner, GE; Gd-BOPTA, Bracco) before and 3 months after the ablative procedure. Perfusional parameters comprehended DCE transfer rate (Ktrans) and extravascular volume fraction (ve), calculated by dedicated analysis software. Every subject was monitored over the following three months to define clinical outcome in terms of pain relief

RESULTS

Fourteen of eighteen treated subjects demonstrated a clinical complete response (CR), with a VAS score mean reduction of 4,3 (47,8%. p<0,001), whereas four patients showed a partial clinical response (PR) with incomplete relief according to VAS scale. Perfusional analysis demonstrated in CR population significant decrease of Gadolinium extraction (mean Ktrans reduction 2,14/min, ΔKt=52,65%. p<0,01) and ve increase (5,6%. p>0,01). Partial Responders showed no substantial modification in Ktrans value (ΔKt=+0,042/min, +11,39%. p<0,01) or increase in extravascular volume. Spearman test revealed a significant relationship between Ktrans quantitative parameters and symptoms decrease evaluated by VAS scale (p<0,001) in both CR and PR patients

CONCLUSION

Ktrans negative modifications (-ΔKt) may reflect effectiveness of ultrasound ablation procedure, as direct expression of decreased tumoral cells' metabolism, and positively correlate to clinical response

CLINICAL RELEVANCE/APPLICATION

DCE-MRI reflects clinical outcome in MRgFUS treated bone metastases. Perfusional data may be routinely included in imaging protocols for MRgFUS planning and follow-up

VSIO31-12 Surgical Management Using Cryoblation in MSK Tumors

Tuesday, Nov. 29 4:25PM - 4:45PM Room: S405AB

Participants
Bennie Lindeque, MD, PhD, Aurora, CO (*Presenter*) Research Grant, Endocare, Inc

VSIO31-13 Preoperative Transcatheter Arterial Embolization of Bone Tumors

Tuesday, Nov. 29 4:45PM - 4:55PM Room: S405AB

Awards
Student Travel Stipend Award

Participants
Ashley Altman, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Mikin V. Patel, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Steven M. Zangan, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Brian S. Funaki, MD, Riverside, IL (*Abstract Co-Author*) Data Safety Monitoring Board, Novate Medical Ltd

PURPOSE

To evaluate pre-operative embolization for surgical resection of primary and metastatic bone tumors.

To evaluate pre-operative embolization for surgical resection of primary and metastatic bone tumors.

METHOD AND MATERIALS

We retrospectively evaluated 58 patients (31 men, 19 women, 4 boys, 4 girls median age 56.5 years, age range 12-80 years) who underwent 52 preoperative transcatheter arterial embolizations between 2004 and 2015. Surgery was performed within 48 hours in 96.6% (57/59) of cases undergoing preoperative angiogram. Bone tumors included renal cell carcinoma (n=26), plasma cell (n=8), aneurysmal bone cyst (n=4), thyroid metastasis (n=2), giant cell tumor (n=2), chondroblastoma (n=2), melanoma metastasis (n=2), osteosarcoma (n=1), NSCLC (n=1), liposarcoma (n=1), malignant fibrous histiocytoma (n=1). Pathologic fractures were present in 32.7% (n=17) and impending in 38.5% (n=20) of patients. The majority of lesions (63.5%, n=33) were metastatic.

RESULTS

Technical success, on an intent-to-embolize basis, defined as complete or near-complete stasis on post-embolization angiogram, was achieved in 88% of patients (51/58). Seven patients (4 men, 3 women, median age 17, age range 11-70) had preoperative angiograms but embolization was not attempted due to lack of a suitable embolic target. One patient underwent embolization on two separate occasions for different bone tumors. Embolic agents included tris-acryl microspheres (Embospheres) (n=26), PVA (n=20), coils (n=8), and gelfoam (n=10). Surgeries included resection, curettage, ORIF, and spinal decompression. Average estimated blood loss for all surgeries was 774.5 cc. Twelve patients required blood transfusion following surgery during hospitalization, with mean overall transfusion 0.5 units per patient. Three minor complications were attributed to angiography: groin hematoma, suspected contrast induced nephropathy, and arterial branch dissection/thrombosis.

CONCLUSION

Preoperative transarterial embolization is safe and effective in a wide variety of bone tumors prior to resection, ORIF, curettage, biopsy, and spinal decompression. A small minority of patients with bone lesions that appear hypervascular on cross-sectional imaging have vascular anatomy that is not amenable to embolization.

CLINICAL RELEVANCE/APPLICATION

Preoperative embolization of primary and metastatic bone tumors is feasible in most patients and safe. Here we report the largest retrospective case series in existing literature.

VSIO31-14 Role of Ablation is MSK Oligometastatic Disease

Tuesday, Nov. 29 4:55PM - 5:15PM Room: S405AB

Participants
Anil N. Kurup, MD, Rochester, MN, (kurup.anil@mayo.edu) (*Presenter*) Research Grant, Galil Medical Ltd; Royalties, UpToDate, Inc

LEARNING OBJECTIVES

1) Identify indications and contraindications for ablation of MSK tumors in the setting of oligometastatic disease. 2) Triage patients to ablation and particular ablation modalities based on tumor characteristics. 3) Recognize lesions that require adjunctive techniques, such as cementoplasty.

VSIO31-15 Developing an Electroporation and Nanoparticle-based Therapeutic Platform for Bone Metastases

Tuesday, Nov. 29 5:15PM - 5:25PM Room: S405AB

Participants
Alda L. Tam, MD, Houston, TX (*Presenter*) Medical Monitor, Galil Medical Ltd; Research Grant, AngioDynamics, Inc
Marites P. Melancon, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Tomas Appleton Figueira, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Li Tian, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Joe Ensor, Houston, TX (*Abstract Co-Author*) Consultant, Aetna, Inc
Kiersten Maldonado, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Katherine Dixon, RT, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Amanda McWatters, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Mark McArthur, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Sanjay Gupta, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To demonstrate the intratumoral uptake and antitumor effect of doxorubicin loaded superparamagnetic iron oxide nanoparticles (SPIO-DOX) when combined with irreversible electroporation (IRE).

METHOD AND MATERIALS

Fourteen rabbits with tibial VX2 tumors underwent one of three treatments: control (n=5); IRE (n=3); or injection of SPIO-DOX followed by IRE (SPIO-DOX+IRE) (n=6). Dynamic T2* weighted 4.7T MR images were obtained at t=0, 2 h, and 5 days after treatment to monitor the treatment effects mediated by SPIO-DOX. Elemental analysis was used to quantify iron concentration. Antitumor effect was expressed as a tumor growth ratio from T2* MR images and histological percent necrosis. A generalized linear model was used to analyze the data.

RESULTS

SPIO-DOX was clearly seen as a signal reduction in T2*-weighted images within the tumor up to 5 days after injection. Change in T2* measurements show that there was a significant decrease in the signal intensity due to the presence of iron: 2.3 ms (control), 2.13 ms (IRE), and -8.94 ms (SPIO-DOX+IRE), $p < 0.0001$. Similarly, elemental analysis showed increased iron concentration in the tumor after SPIO-DOX: 30.8 ppm (control), 71.2 ppm (IRE), and 124 ppm (SPIO-DOX+IRE). Average volume of tumor prior to treatment was 157.3 + 46.5 mm3 and not significantly different between groups ($p=0.29$). Average tumor growth ratios were calculated: control (194.6 + 58%), IRE (135.9 + 13.7%), and SPIO-DOX+IRE (36.2 + 13.3%). While the difference between the average tumor growth ratio between the control and IRE groups was not significant ($p=0.15$), the group treated with SPIO-DOX+IRE shows a significant antitumor effect when compared to control ($p<0.0001$). Changes in tumor volume mirrored the histological calculation of percent necrosis: 59 + 20.4% (control), 65% (IRE), and 79.2 + 11.1% (SPIO-DOX+IRE). Percent necrosis was significantly different between the IRE and SPIO-DOX+IRE groups ($p=0.04$).

CONCLUSION

The intratumoral localization of SPIO-DOX can be successfully identified on MR imaging. Tibial VX2 tumors treated with combination therapy demonstrate enhanced antitumor effect when compared to control.

CLINICAL RELEVANCE/APPLICATION

Exploiting the synergy between electroporation and nanoparticle therapy is a viable strategy to surmounting the issue of incomplete tumor ablation in bone metastases.

VSIO31-16 Avoiding Complications with Ablation in the Spine

Tuesday, Nov. 29 5:25PM - 5:45PM Room: S405AB

Participants
Afshin Gangi, MD, PhD, Strasbourg, France, (gangi@unistra.fr) (*Presenter*) Proctor, Galil Medical Ltd

LEARNING OBJECTIVES

1/Describe the complications which could occur during spinal tumor ablation 2/ Describe how to avoid these complications and reduce the risks 3/ Describe the limits of thermal ablation of spine

VSIO31-17 Bone Metastases Tumor Board

Tuesday, Nov. 29 5:45PM - 6:00PM Room: S405AB

Participants
Sean M. Tutton, MD, Milwaukee, WI (*Moderator*) Consultant, Benvenue Medical, Inc

SSJ11

Genitourinary (Intervention of the Genitourinary Tract: Non-Prostate)

Tuesday, Nov. 29 3:00PM - 4:00PM Room: E353B

GU IR MR US

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

Participants
David D. Childs, MD, Clemmons, NC (*Moderator*) Nothing to Disclose
Steven S. Raman, MD, Santa Monica, CA (*Moderator*) Nothing to Disclose

Sub-Events

SSJ11-01 Disposition after Percutaneous Thermal Ablation of localized RCC: Risk Factors Associated with Need for Hospitalization

Tuesday, Nov. 29 3:00PM - 3:10PM Room: E353B

Participants
Shane A. Wells, MD, Madison, WI (*Presenter*) Nothing to Disclose
J. Louis Hinshaw, MD, Middleton, WI (*Abstract Co-Author*) Stockholder, NeuWave Medical Inc; Stockholder, Cellectar Biosciences, Inc
Timothy J. Ziemlewicz, MD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Sarah Best, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Fred T. Lee Jr, MD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Jason Abel, Madison, WI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To identify patient and tumor characteristics predictive of early procedure related complications in patients undergoing thermal ablation of localized renal cell carcinoma.

METHOD AND MATERIALS

Retrospective review of 235 consecutive patients who underwent percutaneous thermal ablation for localized RCC from 2001-2015. Patient demographics, comorbidities, pathology, tumor size, RENAL score, procedure and hospital course details, and 30 day complications were recorded. We used an inclusive retrospective assessment to determine which patients benefited from overnight hospitalization. This included patients experiencing a complication, those who stayed >24 hours and those readmitted within 72 hours from discharge. Fischer's exact, Wilcoxon rank sum, and univariate logistic regression tests were used as appropriate.

RESULTS

High-grade complications (3.4%) were rare. Six patients (2.5%) had a bleeding complication. These patients had a higher BMI (39.4 vs 31.3, p=0.047), larger tumors (median 4.0 vs 2.6cm, p=0.04), higher RENAL score (9 vs 7, p=0.056) and were more likely to have a hematoma on immediate post-procedure CT (67% vs 12%, p=0.004). Patients with a hematoma were 14.3x more likely to have a bleeding complication (p=0.0028). The use of ≥3 ablation applicators was associated with an 18.9x risk of bleeding (p=0.008). In retrospect, 14 patients (6%) were judged to benefit from hospital admission. Factors associated with this include tumor ≥3cm (OR 4.4, p=0.152), RENAL score >8 (OR 7.2, p=0.0012), post-procedure hematoma (OR 5.6, p=0.0029), and using ≥3 ablation applicators (OR 7.2, p=0.0007).

CONCLUSION

High-grade complications, including significant bleeding, are rare following thermal ablation of localized RCC. Larger tumors, higher tumor complexity, post-procedure hematoma, and higher BMI increase the risk for complications. These patients may benefit from overnight hospital admission.

CLINICAL RELEVANCE/APPLICATION

The majority of patients who undergo percutaneous thermal ablation of renal cell carcinoma can be safely discharged on the day of the procedure and avoid the cost and inconvenience of hospitalization.

Honored Educators

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

Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator

SSJ11-02 Single Institutional Review of 15 Years of Renal Mass Biopsy

Tuesday, Nov. 29 3:10PM - 3:20PM Room: E353B

Participants
Rosaleen B. Parsons, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
David B. Cahn, DO, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Alexander Kutikov, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
David Y. Chen, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

Richard E. Greenberg, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Rosalie Viterbo, MD, philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Marc Smaldone, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Robert Uzzo, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study was to review our 15 yr institutional experience with renal mass biopsy

METHOD AND MATERIALS

Using our prospectively maintained database we identified patients who underwent renal mass biopsy and reviewed our institutional experience and assessed pathologic and histologic features and concordance rates.

RESULTS

A total of 374 renal biopsies were performed from 1999-2015. Core(+/- FNA) was performed in 65.2% of the cases and 41% underwent surgical resection. Core was nondiagnostic in 9% of surgical cases and subsequently diagnosed with RCC. 11% of biopsies were benign and no surgery was performed.Of the benign lesions 69% were oncocytoma and 2.$% angiomyolilpoma. RCC diagnosed on core sampling that underwent resection demonstrated histological/grade concordance of 94.3% /62.5%. All discordant grades were upgraded at surgery. FNA was performed on 22.7% of cases and at final pathology histologic concordance was 72.5% and 5% were upgraded from benign to malignant .

CONCLUSION

Renal lesion biopsy is effective in the evaluation of renal masses and our data is consistent with previously published data.This underscores that although biopsy harbors clinical uncertainaites diagnostic accuracy may assist in clinical managment. Pathways incorporating renal biopsy may decrease over treatment but may also risk under treatment based on poor grade concordance.

CLINICAL RELEVANCE/APPLICATION

Renal mas biopsy is becoing incresingly important in the patient managment and as radiologists we should anticpate that requests for biopsy of renal masses will continue

SSJ11-03 Evaluation of Complications from Ultrasound-Guided Percutaneous Transplant Kidney Biopsies

Tuesday, Nov. 29 3:20PM - 3:30PM Room: E353B

Awards
Student Travel Stipend Award

Participants
Neema J. Patel, MD, Jacksonville, FL (*Presenter*) Nothing to Disclose
Jacob Lewis, MD, Jacksonville, FL (*Abstract Co-Author*) Nothing to Disclose
Andrew Bowman, MD, PhD, Jacksonville, FL (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the prevalence and type of complications that occur during ultrasound-guided transplant kidney biopsies in order to discern whether routine pre-procedure intravenous (IV) access is necessary for potential resuscitation efforts.

METHOD AND MATERIALS

A retrospective review of medical records was performed in patients who underwent an ultrasound-guided kidney biopsy performed between 7/2/2013 and 6/30/2015. Procedures performed on inpatients, native kidneys, renal lesions, and those performed by services other than Radiology were excluded. Biopsy information was recorded and analyzed, including the following: any intervention or treatment (other than pain control), unexpected complications, and hospital admissions or return visits to the emergency department (ED) within 7 days of the biopsy.

RESULTS

After exclusion criteria were applied, there were 1318 transplant kidney biopsies in 601 patients. There were five (0.38%) serious complications/unexpected adverse events requiring treatment. These complications included bleeding/hematuria, hypotension, hypertensive urgency, syncope, and pain. Only 1 (0.07%) of the cases was taken to angiography to evaluate for active bleeding, which did not occur until several hours after the biopsy, and no bleeding was found thus no intervention was performed. There were 8 (0.62%) minor complications requiring hospital admission for observation and/or a return visit to the ED for additional evaluation. These included perinephric hematoma (0.38%), hematuria (0.15%), and pain (0.07%).

CONCLUSION

The prevalence of renal transplant biopsy complications at our institution is low (1.0%), with only 0.38% of biopsies requiring IV access for treatment, which suggests that IV access is not routinely required prior to renal transplant biopsy.

CLINICAL RELEVANCE/APPLICATION

Routine pre-procedure IV placement may be safely discontinued without negatively affecting patient outcomes, and this should improve both departmental efficiency and patient satisfaction.

SSJ11-04 MRgFUS as Mininvasive Alternative Therapy in the Treatment of Submucosal Fibroids: Effectiveness and Safety

Tuesday, Nov. 29 3:30PM - 3:40PM Room: E353B

Participants
Fabiana Ferrari, MD, LAquila, Italy (*Presenter*) Nothing to Disclose
Fernando Smaldone, MD, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesco Arrigoni, Coppito, Italy (*Abstract Co-Author*) Nothing to Disclose

Anna Miccoli, MD, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Eva Fascetti, MD, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose
Carlo Masciocchi, MD, L'Aquila, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the effectiveness of MRgFUS as mini-invasive alternative therapy in the treatment of submucosal fibroids and to discuss about its safety and feasibility.

METHOD AND MATERIALS

From July 2012 to June 2014, 13 patients (mean age 48 years), affected by submucosal uterine fibroids, were treated using MRgFUS. The patients were submitted to preliminary MRI to classify the sub-mucosal fibroids (FIGO classification) and to measure the pre-treatment fibroid volumes. Sub-mucosal fibroids of type 0, 1 and 2 (measuring between 1.5 and 4 cm) were treated using MRgFUS. Five out of 13 patients presented only a single submucosal fibroid (2 of type 1, 2 of type 2 and 1 of type 0). Eight out of 13 patients were simultaneously affected by sub-mucosal fibroids (6 of type 2, 3 of type 1 and 2 of type 0) and other fibroids (type 3-6). The patients were submitted to one treatment alone. Immediately after treatment, the patients were submitted to c.e. MRI to evaluate the Non Perfused Volume (NPV) on the c.e. T1–weighed sequences and measure the radicalization of the treatment in comparison to the pre-treatment volume and after 2-4 years from the treatment.

RESULTS

All treated patients presented a mean extension of the NPV of 90% with a significant radicalization of the treatment without complications or side effects. After 2-4 years from the treatment, 7/13 (54%) showed progressive reduction of the volume with a regularization of the uterine wall. Five out of 13 patients (38%) showed significant reduction of fibroid volume (about 80%.) In one patient (8%), the fibroids of type 0 were partially eliminated from inside the uterine cavity. In this case, the patient was submitted to close MRI follow-up, which showed progressive elimination of the necrotic product. A poor vaginal bleeding lasted 15 days without necessity of hysteroscopy.

CONCLUSION

MRgFUS represent a valid mininvasive and radical approach in the treatment of submucosal fibroids. It allows treatment of the intramural part of the fibroid that cannot be completely treated with hysteroscopy.

CLINICAL RELEVANCE/APPLICATION

MRgFUS is promising technique in submucosal fibroids without significant risks and complications.

SSJ11-05 Uterine Fibroids treated with MR guided High Intensity Focused Ultrasound (MRgFUS): Clinical Outcome in Comparison to Current Therapeutic Strategies

Tuesday, Nov. 29 3:40PM - 3:50PM Room: E353B

Participants
Fabrizio Andrani, Roma, Italy (*Presenter*) Nothing to Disclose
Carola Palla, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Federica Ciolina, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Michele Anzidei, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Alessandro Napoli, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To prospectively evaluate clinical outcome of patients affected by uterine leiomyoma and treated using Magnetic Resonance Focused Ultrasound (MRgFUS), Uterine Artery Embolization (UAE) or Surgery.

METHOD AND MATERIALS

570 women affected by symptomatic uterine leiomyoma referred our department for treatment of uterine fibroids with MRgFUS. Pre-treatment evaluation assessed fibroids MR characteristics and MRgFUS eligibility. 166 of 182 eligible patients (group A) were treated with MRgFUS, while 388 women resulted ineligible. 33/388 patients underwent UAE (group B), 140/388 myomectomy (group C) and 58/388 hysterectomy (group D). Clinical efficacy for each treatment was determined by Symptoms Severity Score (SSS) pre-treatment and at 3- and 12-month follow-up intervals. Further data concerning number and type of complications, days of hospitalization and days of convalescence were also collected and compared.

RESULTS

MRgFUS group showed a mean decrease in SSS of 24,6% at 3 months and 55,8% at 12 months. SSS drop in UAE group was 51,2% and 57,4%, respectively. SSS reduction in myomectomy was 71,5% and 66,0%. After hysterectomy SSS decrease was 96,6% and 94,5%. MRgFUS group demonstrated the least number of adverse events (3 patients, 1,8 %), while the major adverse events rate was experienced in UAE group (37 patients, 26,4 %). MRgFUS patients were treated in outpatient setting, while mean days for hospitalisation and convalescence for other groups were respectively 3,1±2 and 12,4±9 days for group B; 4,5±2 and 17,2±12 days for group C; 4±1 and 26,3±14 days for group D.

CONCLUSION

MRgFUS clinical efficacy for uterine fibroids treatment is comparable to UAE and only slightly lower than myomectomy. However, MRgFUS is feasible in an outpatient setting and complications rate is significantly lower than other therapeutic strategies.

CLINICAL RELEVANCE/APPLICATION

MRgFUS added a new therapeutic strategy for uterine fibroids, being validated as a non-invasive, safe and effective option for selected patients.

SSJ11-06 Post Ablation Tubal Sterilization Syndrome (PATSS), A Complication of Endometrial Ablation and Surgical Sterilization: New Entity Under-Diagnosed by Radiologists

Tuesday, Nov. 29 3:50PM - 4:00PM Room: E353B

Awards
Student Travel Stipend Award

Participants
Sumin S. Lee, MD, Winston-Salem, NC (*Presenter*) Nothing to Disclose
Keyanoosh Hosseinzadeh, MD, Winston Salem, NC (*Abstract Co-Author*) Nothing to Disclose
James J. Perumpillichira, MD, Winston-Salem, NC (*Abstract Co-Author*) Nothing to Disclose
Pooja H. Doshi, MD, Winston Salem, NC (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

PATSS is a debilitating condition, an under-recognized complication of combined endometrial ablation and surgical sterilization. The aim is to determine imaging features of PATSS in symptomatic women.

METHOD AND MATERIALS

Retrospective chart review revealed 104 women who had endometrial ablation (EA) and surgical sterilization (SS). Inclusion criteria consisted of symptomatic women with imaging studies. 38 patients with total of 55 studies were included.Two radiologists independently reviewed randomized studies in a blinded fashion for presence or absence of: cornual hematometra, central hematometra, hematosalpinx or fluid filled fallopian tube, adhesions, endometriosis, and adenomyosis. Discordances were resolved by a third radiologist. Interobserver agreement was assessed by kappa statistics for the imaging features and diagnosis of PATSS (fluid filled fallopian tube and either central or cornual hematometra).

RESULTS

18 CT, 34 ultrasound, and 3 MRI studies were performed. Kappa values for CT and US were: cornual hematometra (0.77 vs 0.59), central hematometra (0.43 vs 0.15), fluid filled fallopian tube (0.63 vs 0.69), PATSS (0.68 vs 0.64), adhesions (0.15 vs 0.42), adenomyosis (0.55 vs 0.39), and endometriosis (1.0 vs 0.65). Interobserver analysis on MRI was excluded due to the small number. PATSS was diagnosed in 6/34 (18%) US, 5/18 (28%) CT, and 3/3 (100%) MRI.Concordance rates for PATSS with final radiology reports were: 4/6 (67%) US, 2/5 (40%) CT, and 3/3 (100%) MRI. 4 out of 11 (36%) women diagnosed with PATSS underwent hysterectomies, often without salpingectomies, with pathology report demonstrating changes consistent with only endometrial ablation.

CONCLUSION

PATSS is under-diagnosed in symptomatic women with history of endometrial ablation and surgical sterilization, with fair to good agreement by US and CT. Limited hysterectomy pathologies are not diagnostic for PATSS. Rather, given the data above, radiologic studies should be considered diagnostic in evaluation of this new entity given management considerations.

CLINICAL RELEVANCE/APPLICATION

Radiologists need to recognize imaging features related to complications of EA and SS procedure with increasing awareness of PATSS.

SSJ25

Vascular Interventional (Aortic Imaging and Intervention)

Tuesday, Nov. 29 3:00PM - 4:00PM Room: E352

VA CT IR

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

FDA Discussions may include off-label uses.

Participants
Graham J. Robinson, MBBCh, Hull, United Kingdom (*Moderator*) Proctor, W. L. Gore & Associates, Inc; Proctor, Cook Group Incorporated;
Kenneth J. Kolbeck, MD, PhD, Portland, OR (*Moderator*) Nothing to Disclose

Sub-Events

SSJ25-01 Abdominal Aortic Aneurysm Screening Practices: Impact of the 2014 United States Preventive Services Task Force Recommendations

Tuesday, Nov. 29 3:00PM - 3:10PM Room: E352

Awards
Student Travel Stipend Award

Participants
Evan J. Zucker, MD, Boston, MA (*Presenter*) Nothing to Disclose
Alexander S. Misono, MD,MBA, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
George R. Oliveira, MD, East Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anand M. Prabhakar, MD, Somerville, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

On 6/24/2014, the U.S. Preventive Services Task Force (USPSTF) released updated abdominal aortic aneurysm (AAA) ultrasound (US) screening recommendations, more inclusive of screening selected male never-smokers and female ever-smokers compared to 2005 guidelines. We sought to determine if the new guidelines have been associated with changes in screening practices.

METHOD AND MATERIALS

All AAA screening US exams performed in our radiology dept. in the 15 months before and after the new guideline release (3/1/2013 through 9/11/2015) were retrospectively reviewed to assess changes in exam volume and appropriateness, patient demographics, aneurysm incidence and size at diagnosis, frequency and type of incidental findings, and radiologist recommendations. Appropriateness was based on patient age, gender, and smoking status. Exams were considered "definitely appropriate" in male ever-smokers ages 65-75 and "possibly appropriate" in other men in this age range. Exams after the new guidelines were additionally considered "possibly appropriate" in female ever-smokers ages 65-75. The t-test was used to compare means.

RESULTS

831 AAA screening US exams were reviewed, 417 (50.2%) performed before and 414 (49.8%) after the new guidelines. Overall mean (SD) age was 67.9 (6.8) years, 89.2% male. The fraction of definitely or possibly appropriate exams increased from 289/417 (69.3%) before to 327/414 (79.0%) after the guideline release ($p = 0.001$), mostly due to definitely appropriate exams (253/417 or 60.1% before vs. 286/414 or 69.1% after the guidelines). Aneurysm incidence increased from 23/417 (5.5%) exams before to 39/414 (9.4%) exams after the revisions ($p = 0.03$). Mean (SD) aneurysm size (cm) at diagnosis was smaller after (3.3 [0.6]) compared to before (3.8 [0.7]) the revisions ($p = 0.01$). Exam volume, demographics, and rates of incidentals and recommendations remained similar. Incidentals arose in 15.6% of all exams, often iliac artery aneurysms or renal masses. Recommendations were made in 4.9%, generally for imaging follow-up of AAA or further mass characterization.

CONCLUSION

The revised USPSTF guidelines have been associated with an increase in AAA screening appropriateness and aneurysm detection yield in our practice, with smaller aneurysm size at diagnosis.

CLINICAL RELEVANCE/APPLICATION

The revised 2014 USPSTF guidelines for AAA US screening are associated with more appropriate exam referrals and greater diagnostic yield of exams performed.

SSJ25-02 Endoleaks after Endovascular Aortic Aneurysm Repair: Detection with Noise-Optimized Virtual Monochromatic Dual-Energy Computed Tomography

Tuesday, Nov. 29 3:10PM - 3:20PM Room: E352

Participants
Simon S. Martin, MD, Frankfurt, Germany (*Presenter*) Nothing to Disclose
Julian L. Wichmann, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Jan-Erik Scholtz, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Doris Leithner, MD, Frankfurt am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Volkmar Jacobi, MD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Moritz H. Albrecht, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess image quality and diagnostic performance of a noise-optimized algorithm for reconstruction of virtual monoenergetic images (VMI+) regarding detection and localization of endoleaks after endovascular abdominal aortic aneurysm repair (EVAR) in dual-energy CT angiography (DE-CTA).

METHOD AND MATERIALS

Sixty-nine patients (42 men; 65.9±14.1 years) underwent DE-CTA following EVAR. Arterial phase images were acquired in dual-energy mode for reconstruction of standard linear blended (F_0.5, 50% low-keV spectrum), VMI+ and traditional monoenergetic (VMI) images in 10-keV intervals from 40 to 100 keV. Attenuation measurements were performed in the descending aorta, the iliofemoral arteries and the area of leakage for objective signal-to-noise (SNR) and contrast-to-noise ratio (CNR) calculation in patients with findings of endoleaks. Based on objective image quality results, best series for each reconstruction technique were chosen (F_0.5, 40-keV VMI+, 70-keV VMI) for further analysis. Five-point scales were used to evaluate contrast enhancement, overall image quality, and suitability for endoleak detection. Diagnostic accuracy for the diagnosis of arterial hemorrhage of these series was assessed and receiver operating characteristics (ROC) curve analysis was performed.

RESULTS

Thirty-two patients showed findings of endoleak subsequent to EVAR. Objective image quality metrics were highest in 40-keV VMI+ compared to VMI series, which showed highest values at 70-keV, and F_0.5 images (CNR: 20.8±11.6, 10.4±9.5, and 13.3±9.8, respectively; all P<0.001). 40-keV VMI+ series were found most suitable for endoleak detection (P<0.001). Sensitivity and specificity for detection of endoleaks were 98% and 68% for 40-keV VMI+, 96% and 57% for 70-keV for VMI, and 96% and 64% for F_0.5 reconstructions. Area under the curve (AUC) was significantly superior (P≤0.005) for 40-keV VMI+ (0.98) compared to 70-keV VMI (0.81) and F_0.5 series (0.84).

CONCLUSION

Diagnostic accuracy in the assessment of endoleaks after EVAR can be significantly increased using 40-keV VMI+ reconstructions compared with standard linearly blending and traditional VMI technique in arterial phase DE-CTA.

CLINICAL RELEVANCE/APPLICATION

Diagnostic performance for detection and localization of endoleaks after EVAR can be significantly improved with 40-keV VMI+ reconstructions.

SSJ25-03 Dual Source Dual Energy CTA for the Detection of Endoleaks after (Thoracic) Endovascular Aneurysm Repair

Tuesday, Nov. 29 3:20PM - 3:30PM Room: E352

Participants
Lydia Maaskant, Rotterdam, Netherlands (*Presenter*) Nothing to Disclose
Ronald Booij, RT, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Marcel L. Dijkshoorn, RT, Rotterdam, Netherlands (*Abstract Co-Author*) Consultant, Siemens AG
Jasper Florie, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Adriaan Moelker, MD, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Mohamed Ouhlous, MD, PhD, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study was to evaluate the diagnostic value of Dual Source Dual Energy CTA (DS DECTA) in the detection of endoleaks after (thoracic) endovascular aneurysm repair ((T)EVAR).

METHOD AND MATERIALS

In total, 52 patients scanned with a dual contrast phase DECTA on a 2nd generation DS DECT-scanner (n=30) and on a 3rd generation DS DECT-scanner (n=22) were included in this retrospective study. These patients were compared with patients scanned on a single source CT (n=53). The virtual non-contrast (VNC) and DECTA images were analysed by two observers for overall quality, endoleak detection, and VNC calculation errors. Additional Hounsfield Units (HU), noise (measured by SD), and iodine measurements were performed, by drawing ROI's in the "true" lumen and the thrombus of the aorta. In addition, differences in radiation dose between the scanners were assessed by calculating the effective dose as DLP * conversion factor.

RESULTS

The median overall quality and calcium subtraction of the VNC images were according to both reviewers 'good' or 'excellent' in all images. In addition, there were no missing or additional structures in 84.4-93.3% of the VNC images. Also the noise was significantly higher in the true unenhanced CT than in the VNC images. Observer 1 detected thirteen endoleaks and observer 2 eleven endoleaks (agreement kappa = 0.78). Consensus was achieved for all cases after individual detection. In addition, the diagnostic certainty based on the DECTA and VNC images was 88.5-94.2%, with no diagnostic changes by observer 1 and two diagnostic changes by observer 2. Furthermore, the iodine measurement for the detection of endoleaks had a sensitivity and specificity of 100% and 92.1%, respectively. Finally, replacing the true unenhanced CT with VNC images resulted in a radiation dose reduction of 26.5-45.8% in the 2nd generation DS DECT-scanner and 6.8-9.3% in the 3rd generation DS DECT-scanner.

CONCLUSION

DS DECTA with the use of iodine measurements increases the detection of endoleaks. Furthermore, replacing the true unenhanced CT with VNC images results in a radiation dose reduction.

CLINICAL RELEVANCE/APPLICATION

Dual Energy CTA can replace the single-energy CTA with additional true unenhanced CT in post-(T)EVAR patients. Better endoleak detection and radiation dose reduction can be achieved.

SSJ25-04 Can Arterial Phase CTA Be Replaced with a Virtual Arterial Phase Reconstruction From a Venous Phase CT During a Triple Phase CT in the Evaluation of Postoperative Aorta using a Detector-Based Spectral CT

Tuesday, Nov. 29 3:30PM - 3:40PM Room: E352

Awards
Student Travel Stipend Award

Participants
Anish A. Patel, MD, Dallas, TX (*Presenter*) Nothing to Disclose
Ali Alian, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Yin Xi, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Patrick D. Sutphin, MD, PhD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Sanjeeva P. Kalva, MD, Dallas, TX (*Abstract Co-Author*) Consultant, CeloNova BioSciences, Inc

PURPOSE

Detector-based spectral CT allows for the utilization of virtual monoenergetic (VME) images to approximate the attenuation (HU) of polyenergetic grayscale images from conventional CT while reducing artifacts such as beam hardening. Spectral CT also allows for the retrospective augmentation of vascular enhancement to further interrogate a region of interest. The purpose of this study is to compare the signal-to-noise ratios (SNR) of true arterial phase CT data with virtual arterial phase monoenergetic data reconstructed from the venous phase of a triple phase CT during the evaluation of the aorta after endovascular repair.

METHOD AND MATERIALS

The arterial phase CT was compared to VME data from venous phase CT in 16 patients using the same acquisition parameters on a detector-based spectral CT (IQon, Philips Healthcare) at various anatomic locations (sagittal aorta, aorta at celiac axis and renal arteries, common iliac arteries, femoral arteries). VME images were reconstructed at various energy levels ranging from 42-58 keV in 2 keV increments. ROIs were drawn and average attenuation (HU) and standard deviations were obtained. The equivalent test with tolerance margin 15 and 10 was used for signal and noise, respectively. The SNR was defined as the ratio of mean HU attenuation to standard deviation on ROIs. Approximation of arterial images by virtual venous images was defined as a difference in mean SNR within 5.

RESULTS

Statistically significant ($p < 0.05$) arterial approximations at measured locations were seen at the following energies: sagittal aorta (42-58 keV), celiac aorta (42-58 keV), renal aorta (42-58 keV), right common iliac (48-58 keV), left common iliac (54-58 keV), right femoral (56-58 keV), left femoral (58 keV).

CONCLUSION

A nearly identical reconstruction of virtual arterial phase CT angiography based on the SNR is feasible using spectral CT reconstruction of the venous phase CTA, allowing only a single phase CTA to routinely evaluate post-operative aortas. Central arterial vessels can utilize monochromatic energies from 42-58 keV to best approximate the arterial phase while more peripheral vessels required energies around 54-58 keV for the same effect, likely due to contrast dilution.

CLINICAL RELEVANCE/APPLICATION

The retrospective simulation of arterial enhancement using only a single venous phase will limit both the contrast and radiation dose to patients undergoing routine evaluation of postoperative aortas.

SSJ25-05 Aortic Bulge Sign: Predicting Aortoenteric Fistula before Catastrophe

Tuesday, Nov. 29 3:40PM - 3:50PM Room: E352

Awards
Student Travel Stipend Award

Participants
Patrick J. Kennedy, MD, Hamilton, ON (*Presenter*) Nothing to Disclose
Michelle Kuang, Hamilton, ON (*Abstract Co-Author*) Nothing to Disclose
Fernando Gastaldo, MD, Dundas, ON (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Aortoenteric fistula (AEF) is typically interpreted on computed tomography (CT) in the context of clinical gastrointestinal (GI) bleeding or graft infection. The purpose of this study is to introduce the aortic bulge sign, a novel finding observed retrospectively on CT prior to the acute presentation of AEF, and determine its diagnostic value.

METHOD AND MATERIALS

Following research ethics board approval, a retrospective chart review was undertaken to isolate all cases of AEF at our institution from 2011 to 2015. CTs on presentation and operative reports were reviewed to confirm the presence of AEF. Comparison was made to available previous abdominal CTs, regardless of indication or protocol. Demographics, known premorbid conditions, and clinical outcomes were documented from clinical notes. The previous CTs of patients who eventually presented with AEF were combined with age and gender matched control CTs into a case bank. Seven radiology residents and staff were instructed in observing the aortic bulge sign: a focal anterior outpouching in the aorta or aortic graft extending toward a nearby bowel loop. These observers then reviewed the case bank as part of a blinded analysis to determine the interobserver reliability and diagnostic value of the aortic bulge sign.

METHOD AND MATERIALS

Following research ethics board approval, a retrospective chart review was undertaken to isolate all cases of AEF at our institution from 2011 to 2015. CTs on presentation and operative reports were reviewed to confirm the presence of AEF. Comparison was made to available previous abdominal CTs, regardless of indication or protocol. Demographics, clinical outcomes, and known vascular conditions and risk factors were documented from clinical notes. The previous CTs of patients who eventually presented with AEF were combined with age and gender matched control CTs into a case bank. Six radiology residents and staff were instructed in observing the aortic bulge sign: a focal anterior outpouching in the aorta or aortic graft extending toward a nearby bowel loop. These observers then reviewed the case bank as part of a blinded analysis to determine the interobserver reliability

and diagnostic value of the aortic bulge sign.

RESULTS

Fourteen cases of AEF were identified. Nine patients died within 30 days of presentation, yielding a mortality rate of 64.3%. All 14 patients had CTs on presentation, with direct signs of AEF present in nine cases. Eleven patients had previous CTs available for review. The time intervals between these CTs and the onset of GI bleeding ranged from eight to 2096 days (mean 417.3 days). Blinded analysis of the previous CTs yielded the following mean values for the aortic bulge sign: sensitivity 68.8%, specificity 96.4%, positive predictive value 98.0%, negative predictive value 55.1%, and accuracy 76.2%. Substantial interobserver reliability was demonstrated (k = 0.61).

CONCLUSION

The aortic bulge sign has been retrospectively identified as a reliable CT finding of eventual AEF prior to the acute presentation.

CLINICAL RELEVANCE/APPLICATION

Impending AEF may be predicted on CT prior to the acute presentation by identifying an anterior bulge in the abdominal aorta.

SSJ25-06 Feasibility of Shear Wave Elasticity Imaging to Detect Endoleak and Evaluate Thrombus Organization after Endovascular Repair of Abdominal Aortic Aneurysm

Tuesday, Nov. 29 3:50PM - 4:00PM Room: E352

Participants
Antony Bertrand-Grenier, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Nicolas Voizard, Montreal, QC (*Presenter*) Nothing to Disclose
Husain M. Alturkistani, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Eric Therasse, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
An Tang, MD, Montreal, QC (*Abstract Co-Author*) Advisory Board, Imagia Cybernetics Inc
Stephane Elkouri, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Claude Kauffmann, PhD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Guy Cloutier, PhD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Gilles P. Soulez, MD, Montreal, QC (*Abstract Co-Author*) Speaker, Bracco Group Speaker, Siemens AG Research Grant, Siemens AG Research Grant, Bracco Group Research Grant, Cook Group Incorporated Research Grant, Object Research Systems Inc

PURPOSE

To investigate the feasibility of shear wave elasticity imaging (SWI) for detection of endoleaks and characterization of abdominal aortic aneurysms (AAAs) healing after endovascular aneurysm repair (EVAR), using a combination of duplex ultrasound (DUS) and CT-scan as the reference standard.

METHOD AND MATERIALS

Endoleaks areas were detected on SWI by 2 readers and compared with DUS and CT in 25 patients. Elasticity values of endoleaks and thrombus were calculated and compared. Analysis included: a) Correlation between thrombus elasticity and AAA diameter and volume and their variation over time and b) Correlation between endoleak and fresh thrombus areas and aneurysm diameter and volume.

RESULTS

Endoleaks were present in 6 patients. SWI, DUS and CT respectively detected 5 (83%), 3 (50%) and 4 (67%) of these endoleaks. SWI detected 2 endoleaks not seen on DUS and two others not seen on CT. SWI reported 6 false positives (specificity of 76%). Elasticity moduli in endoleaks and thrombi regions were estimated at 0.08 ± 0.13 kilopascal (kPa) and 17.9 ± 11.4 kPa, respectively ($P < 0.001$). Thrombus elasticity of AAA with and without endoleaks were not significantly different ($P = 0.792$). No significant correlations were found between thrombus elasticity moduli and AAA diameter and volume and their variation over time. The surface of fresh thrombi (less rigid and non-organized thrombi; 3-19 kPa) or fresh thrombi and endoleak was associated with larger AAA diameters and volumes ($P < 0.001$).

CONCLUSION

This clinical study evaluated SWI as a biomarker of endoleak and thrombus stiffness in 25 patients with AAA after EVAR. AAAs were evaluated and correlated with SWI, DUS and CT-scan. SWI provides real time mechanical information on AAA sac content that is complementary to B-mode and DUS assessments. Our results suggest that not only SWI may help detecting endoleak but it may also detect aneurysm likely to grow by identifying the amount of fresh thrombus that is likely to be associated with post EVAR aneurysm enlargement.

CLINICAL RELEVANCE/APPLICATION

SWI has the potential to identify endoleaks and to detect aneurysms that are likely to grow after EVAR. As both techniques are implemented on the same imaging modality, SWI may be combined with DUS in post-EVAR surveillance of endoleak. SWI could reduce costs, exposure to ionizing radiation and nephrotoxic contrast agents associated with CT-scan follow-up.

SSJ26

Vascular Interventional (Venous Interventions)

Tuesday, Nov. 29 3:00PM - 4:00PM Room: N230B

VA IR

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

Participants
Nael E. Saad, MBBCh, Saint Louis, MO (*Moderator*) Research Consultant, Veran Medical Technologies, Inc; Proctor, Sirtex Medical Ltd
Charles T. Burke, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose

Sub-Events

SSJ26-01 Extracellular Matrix Remodeling in Venous Hypertension

Tuesday, Nov. 29 3:00PM - 3:10PM Room: N230B

Participants
Rahmi Oklu, MD, PhD, Scottsdale, AZ (*Presenter*) Nothing to Disclose
Sanjay Misra, MD, Rochester, MN (*Abstract Co-Author*) Data Safety Monitoring Board, Flexible Stenting Solutions, Inc
Hassan Albadawi, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Extracellular matrix remodeling has been implicated in a number of vascular conditions, including venous hypertension and varicose veins. However, to date no systematic analysis of matrix remodeling in human veins has been performed.

METHOD AND MATERIALS

Following IRB approval, normal and varicose venous tissues were processed for cell culture, histology, protein purification and gene expression assays. For mass spectrometry analysis, tryptic peptides from processed NaCl and GuHCl extracts were separated on a nanoflow LC system. Gel and in-solution LC-MS/MS analysis were performed. LC-MS/MS analysis was also performed in normal veins following chymase and tryptase digestion. Mass spectrometry data was subsequently confirmed by Western blot analysis, RT-QPCR and immunohistochemistry. A p-value of <0.05 was considered significant for all tests used.

RESULTS

The proteomics analysis revealed the presence of more than 150 extracellular matrix proteins, of which 48 had not been previously detected in venous tissue. Extracellular matrix remodeling in varicose veins was characterised by a loss of aggrecan and several small leucine-rich proteoglycans and a compensatory increase in collagen I and laminins. Gene expression analysis of the same tissues suggested that the remodeling process associated with venous hypertension predominantly occurs at the protein rather than the transcript level. Loss of aggrecan in varicose veins was paralleled by a reduced expression of aggrecanases. Chymase and tryptase ß1 were among the upregulated proteases. The effect of these serine proteases on the venous extracellular matrix was further explored by incubating normal saphenous veins with recombinant enzymes. Proteomics analysis revealed extensive extracellular matrix degradation after digestion with tryptase ß1. In comparison, chymase was less potent and degraded predominantly basement membrane-associated proteins.

CONCLUSION

The present proteomics study provides unprecedented insight into the expression and degradation of structural and regulatory components of the vascular extracellular matrix in varicosis.

CLINICAL RELEVANCE/APPLICATION

In conclusion, varicosis is intimately related to dynamic changes in the vascular ECM and its associated proteins. Our findings may lead to newer targeted therapies for venous hypertension as well as hypertension in general.

SSJ26-02 Incidence of Infection in Patients undergoing Chest Port Placement: A Cohort Study Utilizing Pooled, Multi-institutional Electronic Health Record Data

Tuesday, Nov. 29 3:10PM - 3:20PM Room: N230B

Participants
Stephanie Soriano, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Indravadan J. Patel, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Jon Davidson, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the effectiveness of the use of antibiotic prophylaxis for chest port placement, and examine the incidence of infection at the 16- and 30-day post-procedure interval.

METHOD AND MATERIALS

A retrospective cohort analysis was performed utilizing a HIPAA-compliant, patient de-identified clinical database from a large multi-institution electronic health records data web application EPM:Explore (Explorys Inc, Cleveland, Ohio), identifying patients who underwent port placement. Cohorts were created based on patients who underwent initial port placement, and further divided into those who received antibiotic prophylaxis prior to the procedure, specifically cefazolin, vancomycin, or clindamycin, and those who did not. We then evaluated the incidence of central line infections within 16 and 30 days of the procedure. Statistical analysis was performed utilizing IBM SPSS version 23.

RESULTS

There were 110,250 patients who underwent initial chest port placement. The infection rates within 16 and 30 days of the procedure, with antibiotics, were 1.8% and 2.2%, respectively. The infection rates within 16 and 30 days of the procedure, without antibiotics, were 1.2% and 1.4%, respectively. Of the patients that were diagnosed with infection, 83.7% and 84.6% were diagnosed in the first 16 days, in the population prophylactically treated with and without antibiotics, respectively.

CONCLUSION

Our analysis showed no benefit of prophylactic antibiotic use for port placement. Of the population that was diagnosed with central line infection, the majority were diagnosed within the first 16 days post procedure.

CLINICAL RELEVANCE/APPLICATION

Due to the large population sample this is likely to have a profound impact on the judicious use of peri-procedural antibiotic in regards to chest port placement.

SSJ26-03 Adrenal Venous Sampling in Primary Aldosteronism: External Validation of Multinomial Regression Modelling to Detect Aldosterone Hypersecretion Lateralization When the Right Adrenal Vein Sampling is Missing

Tuesday, Nov. 29 3:20PM - 3:30PM Room: N230B

Participants
Florence Perrault, Montreal, QC (*Presenter*) Nothing to Disclose
Gregory Kline, Calgary, AB (*Abstract Co-Author*) Nothing to Disclose
Gilles P. Soulez, MD, Montreal, QC (*Abstract Co-Author*) Speaker, Bracco Group Speaker, Siemens AG Research Grant, Siemens AG Research Grant, Bracco Group Research Grant, Cook Group Incorporated Research Grant, Object Research Systems Inc
Miguel Chagnon, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Patrick Gilbert, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Vincent L. Oliva, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Marie-France Giroux, MD, Montreal, QC (*Abstract Co-Author*) Research Grant, Johnson & Johnson Research Grant, BIOTRONIK GmbH & Co KG Stockholder, Abbott Laboratories
Isabelle Bourdeau, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Andre Lacroix, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Eric Therasse, MD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the external validity of multinomial regression modelling (MRM) of adrenal venous sampling (AVS) to detect lateralization of aldosterone secretion (LAS) when the right AVS is missing.

METHOD AND MATERIALS

All consecutive AVS from 2 university medical centers were included from1990 (center #1) and 2005 (center #2) to 2015. Non selective AVS and AVS with missing data were excluded. Bilateral simultaneous AVS were performed before (basal) and after intravenous injection of 250 ug of cosyntropin in both centers. LAS was defined as an adrenal vein aldosterone /cortisol ratio >2 the opposite side for basal AVS and >4 after cosyntropin. MRMs of AVS from center #1 were built to detect LAS without the right AVS. Sensitivity and specificity to predict LAS with MRM were compared between both centers at a specificity cut off useful for clinical decision making. This specificity was set at 95% from the receiver operating characteristic curve of MRM of AVS from center #1.

RESULTS

AVS of 174/197 patients (69.5% men, mean age 53.3 years) from center #1 and 122/133 patients (60.2% men, mean age 51.4 years) from center #2 were analyzed. In center #1 and #2, basal LAS was found respectively in 142/180 (78.9%) and 86/122 (70.5%) AVS (p=0.096), while after cosyntropin LAS was found respectively in 107/176 (60.8%) and 60/122% (49.2%) AVS (p=0.047). In center #2, specificity for right and left LAS detection was respectively 91.8 % and 93.2% for basal AVS and 93.8% and 95.3% after cosyntropin (p>0.30 for all comparisons with 95% set in center #1). Sensitivity to detect LAS in center #1 and #2 was respectively 65.5% (93/142) and 59.3% (51/86) (p=0.35) for basal AVS, and respectively 72.9% (78/107) and 61.7% (37/60) (p=0.13) after cosyntropin. With basal AVS, there were 4 (3 in center #1, 1 in center #2) false positives that showed contralateral LAS. Post-cosyntropin, there was no false positives that showed contralateral LAS in both centers.

CONCLUSION

Minimal changes in diagnostic accuracy from one center to another validate the use of MRM of AVS to predict LAS when the right adrenal vein sampling is missing.

CLINICAL RELEVANCE/APPLICATION

External validation of MRM of AVS to predict LAS could allow its use in any centers plagued by low AVS diagnostic performance due to failure to cannulate the right adrenal vein.

SSJ26-04 Totally Implantable Venous Access Port Placement via The axillary Vein in Patients with Head and Neck Cancer

Tuesday, Nov. 29 3:30PM - 3:40PM Room: N230B

Participants
Sun Hong, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Tae Seok Seo, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Myung Gyu Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate clinical outcomes and complications of totally implantable venous access ports (TIVAPs) implantation via the axillary

vein in patients with head and neck cancer.

METHOD AND MATERIALS

A total 133 TIVAPs were placed via the axillary vein in 131 head and neck cancer patients between May 2012 and June 2015. All cases were placed under fluoroscopic guidance in the intervention suite. The patients were 108 men and 23 women with the mean age of 58.5 years (range: 19 ~79 years). TIVAPs were implanted by right and left axillary vein access in 89 (66.9%) and 44 cases (33.1%), respectively. Medical records were retrospectively reviewed for patient's demographics, procedure related complications, catheter related infections and reasons of TIVAPs removal. The presence of central vein stenosis, catheter related thrombus and catheter migration were evaluated on neck CT images.

RESULTS

The total TIVAPs indwelling time was 59742 catheter days and the mean indwelling time was 449 catheter days (range of 4 to 1207 days). Of 133 implanted TIVAPs, complications developed in 10 cases (10/133, 7.5%) and incidence was 0.017 events/1000 catheter days. Complication related axillary vein access was developed in 4 cases (4/133, 3%) and incidence was 0.167 events/1000 catheter days. All patients presented thrombus in axillary or subclavian vein. Other complications were 3 cases (3/133, 2.3%) of catheter related blood stream infection, 2 cases (2/133, 1.5%) of central vein stenosis and 1 case (1/133, 0.8%) of tissue hypertrophy on needling site. There was no procedure related complication or catheter migration. Among 10 complication cases, 7 TIVAPs were removed except 3 cases which were one case of left brachiocephalic vein stenosis and two cases of axillary vein thrombosis.

CONCLUSION

TIVAPs implantation via the axillary vein in patients with head and neck cancer seems to be safe and feasible with low complication rate related with axillary vein access.

CLINICAL RELEVANCE/APPLICATION

The axillary vein would be a good access route for TIVAPs implantation in the patients with head and neck cancer instead of the internal jugular vein.

SSJ26-05 Vascular Imaging in the Asymptomatic High Risk Cancer Population: A Role for Thrombosis Screening and Therapy Management

Tuesday, Nov. 29 3:40PM - 3:50PM Room: N230B

Awards
Student Travel Stipend Award

Participants
Zhongxia Hu, MD, Rochester, NY (*Presenter*) Nothing to Disclose
Katherine A. Kaproth-Joslin, MD, PhD, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Burke Morin, DO, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Susan K. Hobbs, MD, PhD, Pittsford, NY (*Abstract Co-Author*) Nothing to Disclose
Charles Francis, MD, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose
Alok Khorana, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Deborah J. Rubens, MD, Rochester, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

We will discuss the utility of screening for venous thromboembolism events (VTE) with lower extremity venous US and chest CTs as a secondary endpoint in a study designed to evaluate the benefit of thromboprophylaxis in a prospective cohort of initially asymptomatic cancer patients with a Khorana score ≥ 3 initiating outpatient chemotherapy.

METHOD AND MATERIALS

117 asymptomatic cancer patients starting new therapy and found to be high-risk for VTE with a predictive risk model were enrolled in a prospective cohort study. Initial US and CTs excluded patients with VTEs from the intervention phase. Subsequently, patients were randomly sorted into observation only or dalteparin prophylaxis groups and were screened with serial US for up to 12 weeks and chest CT at 12 weeks. Additional imaging performed for restaging or for symptomatic events was also evaluated for VTE.

RESULTS

All PE and DVT events recorded were non-fatal. 10 patients were found to have VTE on baseline exam (9%). In the observation only group (48 patients), 10 developed VTE (21%). Screening detected 7 asymptomatic patients (15%) with VTE: 7 with DVT (15%), 2 with PE (4%), and 1 with PE and DVT (2%). In the dalteparin group (50 patients), 6 developed VTE (12%). Screening detected 4 asymptomatic patients with VTE (8%): 2 with DVT (4%) and 2 with PE (4%). 2 developed symptomatic PE (4%). 8 out of 98 patients developed major or clinically significant bleeding, which 7 were in the dalteparin group.Overall, screening exams identified 21 of the 26 patients with VTE in this study (81%). In addition, of the 28 VTE events, 18 were DVTs (64%), of which 13 occurred in the lower extremities (72%).

CONCLUSION

This study confirms validity of the Khorana risk score as 9% of the high risk patients had asymptomatic VTE on initial screening and a total of 22% of patients developed VTE during the study. All cases of detection changed management, which suggests utility in screening for asymptomatic VTEs. More than half of the VTEs detected were DVTs and a majority of them in the lower extremities. As lower extremity veins are not typically examined as part of cancer staging, routine screening lower extremity US may be useful in high risk asymptomatic patients.

CLINICAL RELEVANCE/APPLICATION

This study finds screening CT/US often discover DVT/PEs in some asymptomatic cancer patients that change management, suggesting that screening maybe warranted for a subset of high risk patients.

SSJ26-06 Dynamic Effects of Therapy - Induced Changes in Microcirculation after Percutaneous Treatment of

Vascular Malformations using Contrast-Enhanced Ultrasound (CEUS) and Time Intensity Curve (TIC) analyses

Tuesday, Nov. 29 3:50PM - 4:00PM Room: N230B

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

PURPOSE

Quantification of dynamic micro-vascularization differences of peripheral vascular malformations with CEUS and TIC.

METHOD AND MATERIALS

After general examination with B-Scan, and Doppler imaging CEUS war performed after injection of 1-2.4 ml of sulfur hexafluoride microbubbles using a 6-9 MHz linear probe. Digitally stored cine loops up to 1 minute after the injection were analysed by an independent reader. Regions of interest (10x 30 mm) were defined in the centre, and at the margins of the malformation as well as in the healthy tissue. TIC with Time to Peak (TTP), and Area und the Curve (AUC) were calculated using special software.

RESULTS

Evaluation of the capillary micro-vascularization in all cases was only possible by using CEUS. There were no complications after the i.v. contrast injection. Retrospective analysis of 197 patients (136 female; 61 male; 3-86 years) with 135 venous (VM), 39 arterio-venous (AVM), and 23 combined peripheral vascular malformations before and after percutaneous treatment.After the treatment there was a significant decrease in AUC for VM in the centre down to 337.7 rU (p=0.043) and in the surrounding tissue to 139.9 rU (p=0.022). After the treatment TTP for AVM increased to 17.7 sec in the centre and to 23.2 sec in the surrounding tissue After the treatment the AUC for AVM in the centre decreased to 518.9 rU at the margins 417.6 rU, and in the surrounding tissue 181.1 rU.

CONCLUSION

By recording capillary perfusion CEUS and TIC analysis offer a possibility of monitoring therapy-induced changes of vascular malformations and help planning interventional procedures by displaying feeder vessels.

CLINICAL RELEVANCE/APPLICATION

CEUS and TIC before and after percutaneous treatment help to plan and control the success of interventional procedures.

RC414

Interventional Course (An Interactive Session)

Tuesday, Nov. 29 4:30PM - 6:00PM Room: S404CD

IR

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

Participants

Steven M. Zangan, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Rakesh C. Navuluri, MD, Chicago, IL, (IR@uchicago.edu) (*Presenter*) Nothing to Disclose
Jafar Golzarian, MD, Minneapolis, MN (*Presenter*) Chief Medical Officer, EmboMedics Inc

LEARNING OBJECTIVES

1) Recognize vascular and non-vascular conditions and their image-guided treatment in the chest, abdomen and pelvis. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

ABSTRACT

RC450

Targeted Treatment and Imaging of Liver Cancers: Basic to Advanced Techniques in Minimally-Invasive Therapies and Imaging

Tuesday, Nov. 29 4:30PM - 6:00PM Room: S403B

GI OI IR

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

FDA Discussions may include off-label uses.

Participants
Jinha Park, MD, PhD, Duarte, CA (*Presenter*) Speakers Bureau, Bayer AG;
Steven S. Raman, MD, Santa Monica, CA (*Presenter*) Nothing to Disclose
John J. Park, MD, PhD, Duarte, CA (*Presenter*) Proctor, Sirtex Medical Ltd; Advisory Board, Guerbet SA; Speakers Bureau, Medtronic plc
Marcelo Guimaraes, Charleston, SC, (guimarae@musc.edu) (*Presenter*) Consultant, Cook Group Incorporated ; Consultant, Baylis Medical Company; Consultant, Terumo Corporation; Patent holder, Cook Group Incorporated
Andrew C. Price, MD, Gilbert, AZ, (Andrew.Price@bannerhealth.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the role of the interventional radiologist in the treatment and management of patients with primary and metastatic liver cancer as part of the multidisciplinary team. 2) Learn best practice techniques in the treatment of liver cancers, with emphasis on both locoregional and focal therapeutic approaches, and indications for treatment. 3) Explore various tips and tricks for each treatment modality and learn how to avoid complications through good patient selection, choosing the appropriate techniques, and knowing what common mistakes to avoid. 4) Learn about newer and developing techniques and devices, their potential roles and indications, and potential pitfalls. 5) Explore advanced imaging modalities in the detection of tumors and for monitoring treatment response.

ABSTRACT

Primary and metastatic liver disease may benefit from combined techniques such as bland/chemoembolization and liver ablation. The presentation will provide the rationale for the association of techniques, patient selection, tips and tricks, equipment and supplies necessary, protective techniques and how to avoid complications. Also, it will be discussed the results and current literature to support the association of techniques.

ED007-WE

Interventional Radiology Wednesday Case of the Day

Wednesday, Nov. 30 7:00AM - 11:59PM Room: Case of Day, Learning Center

IR

AMA PRA Category 1 Credit ™: .50

Participants

Anne M. Covey, MD, New York, NY (*Presenter*) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose
Bradley B. Pua, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
John A. Kaufman, MD, Portland, OR (*Abstract Co-Author*) Advisory Board, Bio2 Technologies, Inc; Consultant, Cook Group Incorporated; Consultant, Guerbet SA; Stockholder, Hatch Medical LLC; Stockholder, VuMedi, Inc; Stockholder, Veniti, Inc; Royalties, Reed Elsevier; Advisory Board, Delcath Systems, Inc; Researcher, W. L. Gore & Associates, Inc; Researcher, EKOS Corporation; Stockholder, EndoShape, Inc; Advisory Board, AV Medical Technologies Ltd; Advisory Board, Javelin Medical

TEACHING POINTS

1) The objective of the Interventional Radiology Case of the Day at RSNA 2016 is to provide participants the opportunity to review challenging cases and synthesize cogent a differential diagnosis based on limited history and images.

RC514

Interventional Series: Non-Vascular Interventions

Wednesday, Nov. 30 8:30AM - 12:00PM Room: S102AB

IR

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

FDA Discussions may include off-label uses.

Participants
Peter R. Mueller, MD, Boston, MA (*Moderator*) Consultant, Cook Group Incorporated
Jonathan M. Lorenz, MD, Chicago, IL (*Moderator*) Nothing to Disclose

ABSTRACT

Sub-Events

RC514-01 Treating Ascites: Paracentesis, TIPs, PleuRx, Denver Shunt. Which One and Why?

Wednesday, Nov. 30 8:30AM - 8:45AM Room: S102AB

Participants
Albert A. Nemcek JR, MD, Chicago, IL, (aan728@northwestern.edu) (*Presenter*) Consultant, B. Braun Melsungen AG

LEARNING OBJECTIVES

1) Analyze the etiology of ascites as a prelude to therapy. 2) Discuss options for treatment of symptomatic benign and malignant ascites. 3) Comprehend advantages and disadvantages of the various treatment options.

ABSTRACT

RC514-02 Transthoracic Biopsy Considerations

Wednesday, Nov. 30 8:45AM - 9:00AM Room: S102AB

Participants
Jonathan M. Lorenz, MD, Chicago, IL (*Presenter*) Nothing to Disclose

RC514-03 Biopsy of Abdominal Focal Lesions under Contrast-Enhanced Ultrasound Guidance: A Multicenter Study

Wednesday, Nov. 30 9:00AM - 9:10AM Room: S102AB

Participants
Giampiero Francica, MD, Castel Volturno, Italy (*Presenter*) Nothing to Disclose
Ilario De Sio, Naples, Italy (*Abstract Co-Author*) Nothing to Disclose
Maurizio Pompili, MD, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Eugenio Caturelli, Viterbo, Italy (*Abstract Co-Author*) Nothing to Disclose
Maria Franca Meloni, Milano, Italy (*Abstract Co-Author*) Nothing to Disclose
Maddalena Iadevaia, Naples, Italy (*Abstract Co-Author*) Nothing to Disclose
Laura Riccardi, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Angela Sannino, Napoli, Italy (*Abstract Co-Author*) Nothing to Disclose
Paola Roselli, Viterbo, Italy (*Abstract Co-Author*) Nothing to Disclose
Mariano Scaglione, MD, Castel Volturno, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Aim of this study was to quantify the use of Contrast-Enhanced Ultrasound (CEUS) as guidance technique for biopsy of Abdominal Focal Lesions (AFL) in field practice of five centers with high volume of ultrasound interventional activity

METHOD AND MATERIALS

The five participating centers retrospectively selected all patients in whom biopsy needles had been positioned into AFL during CEUS with a Low Mechanical Index Ultrasound Contrast Agent. The rate of CEUS-guided biopsies was calculated on the whole bioptic activity of each center between 2005 and 2015. In addition, contrast media consumption, procedure indications, diagnostic yield and complications were evaluated.

RESULTS

CEUS-guided biopsy of AFL was carried out in 73 patients (47 M / 26 F, mean age 65.7 yrs.) with 63 liver focal lesions (mean size 26.8 mm) and 10 extra-hepatic abdominal masses (mean size 53.9 mm) by using cutting needles (18-20g) in 65 cases (89%). The interventional maneuver under CEUS guidance represented 2.2% (range 0.8-6.6%) of 3321 biopsies on AFL carried out at the participating centers. 18 out of 73 patients (24.6%) had a previous non-diagnostic cyto-histological exam performed under non-enhanced ultrasound (US) guide. Indications to CEUS-guided biopsy were: a target lesion not visible on non-enhanced US (23.3%), improvement of conspicuity of the target (32.9%), choice of non-necrotic area inside the target (43.8%). A single needle pass and single standard dose (2,4 ml) of medium contrast were used in 40 patients (54.8%). Bioptic samples yielded a specific diagnosis in 69 cases (94.5%): 60 AFL proved to be malignant (82.2%), mostly primary or secondary liver tumors (51 out of 60). No complications ensued either biopsy or infusion of contrast medium.

CONCLUSION

To the best of our knowledge, it is the first time that the use of CEUS as guidance system for abdominal biopsy has been

To the best of our knowledge, it is the first time that the use of CEUS as guidance system for abdominal biopsy has been quantified. In experienced hands such a procedure seems to have limited indication (2.2% of 3321 biopsies), but is deemed necessary to reach both small, ill-defined focal lesions and non-necrotic areas in complex targets, even of large size.

CLINICAL RELEVANCE/APPLICATION

Quantification of the use of CEUS-guided biopsy for abdominal focal lesions in field practice of high-volume ultrasound interventional centers

RC514-04 Intrabiliary Radiofrequency-Enhanced Local Chemotherapeutic Deposit in Bile Duct Walls Using a Needle-Integrated Balloon Catheter: A Feasibility Study on Survival Pigs

Wednesday, Nov. 30 9:10AM - 9:20AM Room: S102AB

Participants
Feng Zhang, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Jun Gao, MD, PhD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Yin Jin, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Xiaoming Yang, MD, PhD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the feasibility and safety of using intrabiliary radiofrequency hyperthermia (RFH) to enhance local chemotherapeutic drug deposit in bile duct walls of survival pigs with a needle-integrated balloon catheter.

METHOD AND MATERIALS

Ten pigs were randomly allocated into two survival study groups: (i) five pigs received intrabiliary chemodrug delivery alone; and (ii) five pigs received a combination of intrabiliary chemotherapeutic drugs plus RFH at 42 ▌. Via a transcholecystic approach and under fluoroscopy guidance, a mixture of 10mg 5-fluouracil (5-FU) and 125μg motexafin gadolinium (MGd) was injected into common bile duct wall through a needle-integrated balloon catheter (Mercator Medsystem). Then, pigs were kept alive for 24 hours. 5-FUs in bile duct tissues were extracted and quantified using high performance liquid chromatography (HPLC). The harvested bile duct tissues were further assessed by optical imaging and confocal microscopy to confirm the penetration and distribution of MGd in bile duct walls. Subsequent histology was used to correlate imaging findings and examine potential bile duct injuries. The quantities of 5-FU in two groups were statistically compared.

RESULTS

All pigs survived very well without any abnormalities of vital signs. Immediate cholangiograms after intrabiliary chemotherapeutic drug injection and RFH showed no extravasation of agents outside bile duct lumens. Histology confirmed no bile duct injuries. HPLC analysis demonstrated a higher content of 5-FU in bile ducts treated with intrabiliary injection of chemotherapeutic drugs and RFH, compared to bile ducts with injection of 5-FU alone (5-FU, 6.4±0.19mg VS 2.7±0.21mg, $P<0.0001$), which indicates RFH can enhance the deposit of 5-FU in pig bile duct tissues. Optical imaging and confocal microscopy further confirmed diffusive fluorescence of MGd throughout bile walls.

CONCLUSION

It is safe and effective using intrabiliary RFH to enhance the deposit of intrabiliarily delivered chemotherapeutics with a needle-integrated balloon catheter, which provides an alternative to treat pancreatobiliary malignancies.

CLINICAL RELEVANCE/APPLICATION

The technique of intrabiliary radiofrequency hyperthermia-enhanced chemotherapy has the great potential to be traslated to clinical practice for effectively managing obstructive pancreatobiliary malignancies.

RC514-05 Correlation of Height Restoration and Kyphosis with Clinical Outcome after Percutaneous Vertebroplasty in Patients with Vertebral Compression Fractures

Wednesday, Nov. 30 9:20AM - 9:30AM Room: S102AB

Participants
Tao Pan, MD,PhD, Nanjing, China (*Presenter*) Nothing to Disclose
Hai-Dong Zhu, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose
Shi-Cheng He, MEd, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose
Jin-He Guo, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose
Gao-Jun Teng, MD, Nanjing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Percutaneous vertebroplasty (PVP) is widely used for the treatment of painful vertebral compression fractures (VCFs). It is unclear whether height restoration affects clinical outcome and whether kyphosis should be improved. The objective is to evaluate the correlation of restoration of vertebral body height and kyphosis with pain relief and clinical outcome after PVP in patients with VCFs.

METHOD AND MATERIALS

Between January 2007 and December 2013, 241 patients with VCFs who had failed conservative treatment and underwent PVP were included. Restoration of vertebral body height and kyphosis were measured on standardized radiographs. Pain and clinical outcome were assessed using the visual analogue scale (VAS) score and the Ronald Morris Disability Questionnaire (RMDQ) score, respectively. Pre- and post-operative restoration of vertebral body height and kyphosis and VAS and RMDQ scores were compared using the paired t test. Correlations between the height restoration and kyphosis and VAS and RMDQ scores were determined via Pearson correlation coefficient (r).

RESULTS

The height, wedge angle and local angle of the fractured vertebral body, and VAS and RMDQ scores, improved significantly after PVP. VAS and RMDQ scores correlated positively with the height restoration and kyphosis; the highest correlation was between the VAS score and wedge angle ($r=0.95$).

CONCLUSION

PVP is a simple and viable treatment for VCFs patients as most patients experienced pain relief and improvement of clinical function after the pressure. In terms of VAS and RMDQ scores, preoperative height restoration and kyphosis can be prognostic indicators for the outcome of PVP.

CLINICAL RELEVANCE/APPLICATION

PVP is a simple and viable treatment for VCFs patients and preoperative height restoration and kyphosis can be prognostic indicators for the outcome.

RC514-06 Refractory Abscess Management

Wednesday, Nov. 30 9:30AM - 9:45AM Room: S102AB

Participants
Rakesh C. Navuluri, MD, Chicago, IL, (IR@uchicago.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss strategies for treating refractory and complex abscesses. 2) Gain a greater appreciation for the role of IR as an integral component of the multidisciplinary team.

RC514-07 Cholecystostomy: An update for 2016

Wednesday, Nov. 30 9:45AM - 10:00AM Room: S102AB

Participants
Charles T. Burke, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Gain a broad understanding for the management of acute cholecystitis. 2) Gain a better understanding of the usage of cholecystostomy catheters in the current healthcare environment.

RC514-08 Celiac Plexus and Other Abdominal Blocks

Wednesday, Nov. 30 10:15AM - 10:30AM Room: S102AB

Participants
Mitchell T. Smith, MD, Aurora, CO (*Presenter*) Consultant, Cook Group Incorporated

RC514-09 Primary Biliary Stenting

Wednesday, Nov. 30 10:30AM - 10:45AM Room: S102AB

Participants
Joseph P. Erinjeri, MD, PhD, New York, NY, (erinjerj@mskcc.org) (*Presenter*) Nothing to Disclose

RC514-10 Thoracic Duct Embolization

Wednesday, Nov. 30 10:45AM - 11:00AM Room: S102AB

Participants
Chieh-Min Fan, MD, Boston, MA, (cfan@partners.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Differentiate between thoracic duct embolization and thoracic duct disruption as methods for thoracic duct ablation in terms of technique and clinical efficacy. 2) Describe the anatomy of the truncal lymphatic system. 3) Identify patients appropriate for referral for thoracic duct embolization.

RC514-11 Comparison of Intranodal Lymphangiography Thoracic Duct Embolization and Thoracic Duct Disruption in Percutaneous Management of Chylous Leaks: A Single-Center Experience of 62 Patients Over 5 Years

Wednesday, Nov. 30 11:00AM - 11:10AM Room: S102AB

Awards
Student Travel Stipend Award

Participants
Michael P. Yannes, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose
Donghoon Shin, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Ernesto Santos, MD, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Chylous leaks are infrequent, often post-surgical, effusions. Pedal lymphangiography has become a percutaneous treatment with high clinical success rates. A new therapy, intranodal lymphangiography (INL), is less well studied. INL has the potential to reduce total examination time, since contrast material is infused at the groin versus the foot. The clinical benefit of performing INL in combination with thoracic duct embolization (TDE) and disruption (TDD) is not well known. This study is the largest to date to evaluate the clinical success of INL.

METHOD AND MATERIALS

Patients over a five-year period were included. Procedures were performed or supervised by a single senior Interventional

Radiologist. All patients underwent INL. Patients preferentially underwent TDE if the thoracic duct could be cannulated. Clinical success was defined as avoidance of subsequent surgery and removal of draining catheters.
Fisher's Exact Test was performed to compare clinical success between TDD and TDE. A Kaplan-Meier curve was then calculated based on median time to clinical resolution between TDD and TDE.

RESULTS

62 patients underwent evaluation. INL was technically successful in 60/62 patients. 23 patients underwent INL only. 24 patients underwent INL and TDE. 13 patients underwent INL and TDD.
The clinical success rate of all therapies was 70%; when a leak was identified, the clinical success rate was 74%. Patients who underwent INL with TDE were more likely to achieve clinical success compared to TDD (p=0.0425), regardless of whether a leak was identified during INL. Patients undergoing TDE had earlier clinical resolution compared to patients undergoing TDD, with a median time to resolution of 3 days versus 7 days (p =0.0055).

CONCLUSION

Patients undergoing INL have similar clinical success rates to those reported with pedal lymphangiography. Patients who underwent TDE were more likely to achieve clinical resolution, and more likely to achieve clinical resolution earlier. This was independent of fluoroscopic identification of a leak. Findings suggest that TDE may be superior to TDD with respect to clinical resolution.

CLINICAL RELEVANCE/APPLICATION

Prior treatments for chylous leaks have mainly consisted of dietary adjustment, surgery, and/or pedal lymphangiography. In this abstract, we investigate the clinical efficacy of one center's experience with a new percutaneous therapy, intranodal lymphangiography.

RC514-12 Thoracic Ductography by Transvenous Retrograde Cannulation: Initial Experience

Wednesday, Nov. 30 11:10AM - 11:20AM Room: S102AB

Participants
Shuji Kariya, MD, PhD, Hirakata, Japan (*Presenter*) Nothing to Disclose
Miyuki Nakatani, Hirakata, Japan (*Abstract Co-Author*) Nothing to Disclose
Rie Yagi, Hirakata, Japan (*Abstract Co-Author*) Nothing to Disclose
Yutaka Ueno, Hirakata, Japan (*Abstract Co-Author*) Nothing to Disclose
Asami Yoshida, Hirakata, Japan (*Abstract Co-Author*) Nothing to Disclose
Atsushi Komemushi, MD, PhD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose
Noboru Tanigawa, MD, Hirakata, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study was to report our initial experience with transvenous retrograde cannulation of the thoracic duct.

METHOD AND MATERIALS

The subjects were 12 patients in whom transvenous retrograde cannulation of the thoracic duct was indicated for the purposes of diagnosing the site of chylous leakage or embolization for leakage. Lymphangiography was performed, and the junction of the thoracic duct with the vein from where lipiodol in the thoracic duct was discharged into the vein was identified. A microcatheter was inserted into the thoracic duct retrogradely via the thoracic duct-vein junction from the vein. Successful transvenous thoracic ductography was defined as the case in which the entire thoracic duct and cisterna chyli were visualized by injecting contrast media via the microcatheter.

RESULTS

The catheter was successfully inserted to the cervical part, thoracic part, and cisterna chyli in 11, 8, and 6 of the patients, respectively (91.7%, 66.7%, and 50.0%). Successful transvenous thoracic ductography was performed in 7 of 12 patients (58.3%). The microcatheter could be inserted into the thoracic duct beyond the junction of the thoracic duct and vein, but the cervical part of the thoracic duct was branched into a plexiform configuration beyond which the microcatheter could not be advanced to reach the thoracic part in three unsuccessful cases.

CONCLUSION

Transvenous thoracic ductography was successful in 7 of 12 patients (58.3%). In cases in which the cervical part of the thoracic duct had a plexiform configuration, the catheter could not be passed retrogradely through that point.

CLINICAL RELEVANCE/APPLICATION

Transvenous retrograde cannulation to the thoracic duct is a safe method with low invasiveness; thus, in cases of chylous leakage, diagnosis and embolization with this technique may be indicated before conservative treatment.

RC514-13 Push versus Pull Gastrostomy: A Single Center Retrospective Analysis of Complications and Technical Success Rates

Wednesday, Nov. 30 11:20AM - 11:30AM Room: S102AB

Awards
Student Travel Stipend Award

Participants
Brian M. Currie, MD , New York, NY (*Presenter*) Nothing to Disclose
George I. Getrajdman, MD, New York, NY (*Abstract Co-Author*) Medical Advisory Board, CareFusion Corporation
Anne M. Covey, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
William Alago Jr, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Joseph P. Erinjeri, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Majid Maybody, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Franz E. Boas, MD,PhD, New York, NY (*Abstract Co-Author*) Co-founder, ClariPACS

PURPOSE

To compare the technical success and complication rates of push versus pull gastrostomy tubes in cancer patients.

METHOD AND MATERIALS

We performed a retrospective review of 304 patients between July 2000 and October 2015 who were referred for primary gastrostomy tube placement (excluding secondary replacements or exchanges), 88 of whom had a previously unsuccessful attempt at percutaneous endoscopic gastrostomy (PEG) placement. Variables that were analyzed included method of insertion (push versus pull), clinical indications for gastrostomy, technical success rates, operator experience level, and minor and major procedure-related complications up to 30 days after placement.

RESULTS

This was a varied population of cancer patients: 156 had head and neck cancer, 121 had abdominal and pelvic malignancies, and 27 had other malignancies. The indication for gastrostomy placement was feeding in 189 patients and palliative decompression in 115 patients. Technical success was 91%--78% after endoscopy had previously been unsuccessful and 96% when excluding failures associated with prior endoscopy. In the first 30 days, there were 29 minor complications (17.2%, most commonly dislodgement) in patients who received a push gastrostomy, and only 8 minor complications (7.5%, most commonly clogging) in patients who received a pull gastrostomy ($p < 0.05$); there was no significant difference in major complications (push gastrostomy 5.3%, pull gastrostomy 5.6%). There was no difference in complications or technical success rates for more versus less experienced operators.

CONCLUSION

Pull gastrostomy tube placement had a lower rate of minor complications than push gastrostomy tube placement, and the same rate of major complications. The technical success rate was high, even after a failed attempt at endoscopic placement. Both the rates of success and complications were independent of operator experience.

CLINICAL RELEVANCE/APPLICATION

Pull gastrostomy tube placement may be preferable to push gastrostomy tube placement, due to a lower rate of complications. However, push gastrostomy tube placement may be preferable in patients with airway issues or head and neck cancer.

RC514-14 Debate: Push or Pull Gastrostomy

Wednesday, Nov. 30 11:30AM - 11:45AM Room: S102AB

Participants
Steven M. Zangan, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Peter R. Mueller, MD, Boston, MA (*Presenter*) Consultant, Cook Group Incorporated

LEARNING OBJECTIVES

1) Describe the different techniques: Push Gastrostomy vs Pull Gastrostomy. 2) Describe the advantages of each technique. 3) review the type and difference indications and complications for both techniques.

Honored Educators

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

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

RC514-15 Advanced Genitourinary Procedures

Wednesday, Nov. 30 11:45AM - 12:00PM Room: S102AB

Participants
Charles T. Burke, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The learner will gain a better understanding in the use of a variety of tools available to the radiologist in treating complex problems of the genitourinary system.

RC531

Image-guided Biopsy of the Spine (Hands-on)

Wednesday, Nov. 30 8:30AM - 10:00AM Room: E263

MK NR IR

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

Participants
John L. Go, MD, Los Angeles, CA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss and demonstrate spine biopsy techniques including CT and fluoroscopic approaches, anatomic landmarks, needle selection, special technical considerations for dealing with soft tissue masses, and fluid accumulations, lytic and blastic lesions, and hypervascular conditions. 2) Hands on exposure will be provided in order to familiarize participants with the vast number of biopsy devices that are clinically available. 3) Training models will also be used in order to teach technical skills with respect to approach and technique. 4) Advantages and disadvantages of various biopsy devices and techniques, and improve their understanding of how to maximize the reliability and safety of these spine biopsy procedures.

ABSTRACT

Sub-Events

RC531A Pre- and Post Biopsy Assessment

Participants
Richard Silbergleit, MD, Royal Oak, MI (*Presenter*) Consultant, Relievant Medsystems, Inc

LEARNING OBJECTIVES

1) Be familiar with all required aspects of the pre-biopsy work-up, including medications, laboratory values, and review of relevant prior imaging. 2) Be familiar with solutions to address to complications or other unexpected events which may arise during the course of spine biopsy. 3) Be comfortable in performing the post procedure assessment of the patient after spinal biopsy.

RC531B Equipment Used for Image-guided Biopsies of the Spine

Participants
Michele H. Johnson, MD, New Haven, CT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Demonstrate the types of needles used for spine biopsy. 2) Selecting the proper types of needles used for spine biopsy. 3) Case demonstration of the proper use of single or coaxial needle sets for spine biopsy and the advantages or disadvantages of each.

RC531C Thoracic and Lumbar Biopsies

Participants
John L. Go, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the anatomy of the thoracic and lumbar spine relevant to spine biopsy. 2) Describe the approaches used to approach various anatomical regions within the thoracic and lumbar spine. 3) Provide case examples of various approaches used to biopsy the thoracic and lumbar spine.

ABSTRACT

RC531D Cervical Spine Biopsies

Participants
A. Orlando Ortiz, MD, MBA, Mineola, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Demonstrate the various approaches used to biopsy lesions of the cervical spine. 2) Determine the selection of the proper needles to use to biopsy the spine. 3) Provide case examples of cervical biopsies and the thought process used to perform these procedures.

ABSTRACT

Cervical spine biopsies can be challenging procedures to perform, hence they tend to be performed by a limited number of proceduralists. C-spine biopsy is often performed to evaluate potential neoplastic or infectious processes of the cervical spine. The key to performing these procedures effectively and safely is in appropriate patient selection, careful image analysis in order to properly position the patient and choose an approach, identification of critical structures (such as the carotid artery) and neck

spaces that should be avoided, and use of coaxial biopsy techniques. The procedure can be safely performed with CT and/or CT fluoroscopy. Specimen sampling principles and specimen handling are also discussed they can help to optimize this procedure.

RC531E Disc Biopsy and Aspiration

Participants
Amish H. Doshi, MD, New York, NY, (amish.doshi@mountsinai.org) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To reveiw the indications for spinal biopsies in the setting of discitis and osteomyelitis of the spine. 2) The various techniques and imaging modalities for these biopsies will be reviewed. 3) Sample collection and analysis as well as typical diagnostic yield will also be reviewed.

ABSTRACT

RC550

Techniques of Musculoskeletal Interventional Ultrasound (Hands-on)

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

MK IR US

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

Participants

Stephen C. O'Connor, MD, Boston, MA (*Presenter*) Nothing to Disclose
Veronica J. Rooks, MD, Honolulu, HI (*Presenter*) Nothing to Disclose
Mabel Garcia-Hidalgo Alonso, MD, Majadahonda , Spain (*Presenter*) Nothing to Disclose
Patrick Warren, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Carmen Gallego, MD, Madrid, Spain, (cgallego@salud.madrid.org) (*Presenter*) Nothing to Disclose
James W. Murakami, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Michael A. Mahlon, DO, Tacoma, WA (*Presenter*) Nothing to Disclose
Paolo Minafra, MD, Pavia, Italy (*Presenter*) Nothing to Disclose
Nathalie J. Bureau, MD, MSc, Montreal, QC, (Nathalie.bureau@umontreal.ca) (*Presenter*) Equipment support, Siemens AG
Michael A. Dipietro, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Paula B. Gordon, MD, Vancouver, BC (*Presenter*) Stockholder, OncoGenex Pharmaceuticals, Inc ; Scientific Advisory Board, Hologic, Inc; Scientific Advisory Board, Real Imaging Ltd
Horacio M. Padua Jr, MD, Boston, MA (*Presenter*) Nothing to Disclose
Peter L. Cooperberg, MD, Vancouver, BC (*Presenter*) Nothing to Disclose
Ebonee Carter, Honolulu, HI (*Presenter*) Nothing to Disclose
Ulises Barajas, MD, Juarez, Mexico (*Presenter*) Nothing to Disclose

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.

ABSTRACT

Ultrasound Guided Foreign Body Removal: Simulation Training and Clinical implementation Outcomes Purpose: USFBR can be taught to radiologists to generate competency. Radiologists can apply the technique in the patient setting to remove foreign bodies. Materials and Methods: Proof of concept was performed by a radiologist and surgeon removing nine 1-cm foreign bodies using the USFBR method (P) and traditional surgery (S) with and without wire guidance (W) on the cadaver model. Next, USFBR was taught to 48 radiologists at 4 hospitals. Training included didactic and hands-on instruction covering 7 components: instrument alignment, hand/transducer position, forceps use, foreign body definition, forceps grasp, recognition of volume averaging, and oblique cross cut artifact. Pre-training testing assessed single toothpick removal from turkey breast in 15 minutes. Post-training evaluation consisted of 5 toothpick removals. Ongoing clinical implementation data of USFBR by trained radiologists are being collected. Parameters including age of patient, which radiologist, removal success, type and size of foreign body, incision size, foreign body retention time, reason for removal, symptoms, modalities used in detection, wound closure, and sedation are recorded. Data analyzed using chi-squared and Fisher's exact tests for categorical outcomes and analysis of variance for continuous outcomes. Results: USFBR technique shows a higher success rate and smaller incision size in comparison to surgical technique alone in the cadaver. Removal success: P 100%, S 78%, and W 89%. Radiologists' scores improved from 21-52% pre-training to 90-100% post-training ($p<0.001$ for each component). In the clinical setting to date, USFBR has been 100% successful, ages 9-73 years, by four radiologists. Parameters included; length 4 to 30 mm, retention 2 to 864 days, incision, 2 to 8 mm. Conclusion: USFBR is superior to non-guided surgical technique. The approach taught in simulation improves radiologist technique and outcomes.

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/

Michael A. Dipietro, MD - 2016 Honored Educator

SSK19

Vascular Interventional (Chemoembolization and Radioembolization)

Wednesday, Nov. 30 10:30AM - 12:00PM Room: E351

GI IR NM

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

FDA Discussions may include off-label uses.

Participants
Juan C. Camacho, MD, Atlanta, GA (*Moderator*) Nothing to Disclose
Ronald S. Arellano, MD, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

SSK19-01 The Effect and Safety of Preoperative Hepatic and Regional Arterial Chemotherapy (PHRAC) for Stage II and III Colorectal Cancer-Multicenter Clinical Trial Results

Participants
Bo Zhou, Shanghai, China (*Presenter*) Nothing to Disclose
Zhiping Yan, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Jianhua Wang, MD, PhD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Jianmin Xu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate whether preoperative hepatic and regional arterial chemotherapy is able to prevent liver metastasis and improve overall survival in patients receiving curative colorectal cancer resection.

METHOD AND MATERIALS

Patients in five medical centers with stage II or stage III colorectal cancer (CRC) were randomly assigned to receive preoperative hepatic and regional arterial chemotherapy (PHRAC group, n = 341) or surgery alone (control group, n = 347). The primary endpoint was disease-free survival (DFS), whereas secondary Outcomes include Cumulative incidence of liver metastasis (LM), overall survival (OS) and Safety. Clinical trial Number: NCT00643877.

RESULTS

There were no significant differences in baseline characteristics between PHRAC and Control groups. The 5y-DFS was 75% in PHRAC group vs 61% in control group (P<0.001). Three years liver metastasis (LM) was 7% in PHRAC group vs 15% in control (P<0.001). And 5-LM was 8% vs 18% (P<0.001). The 3y OS was 89% in PHRAC group and 79% in control, 5y OS was 81% vs 72%, HR 0.59 (95%CI 0.42-0.84,P=0.003). Subgroup analysis, 3y-DFS was 89% and 5y-DFS was 84% for patients with stage II CRC in PHRAC, while 3y-DFS was 80% and 5y-DFS was 74% in control, HR 0.64(95%CI 0.39-1.04,P=0.068). There was also no significant difference between the 2 groups in LM and OS for patients with stage II CRC. In stage III patients, 3y-DFS was 72% and 5y-DFS was 68% in PHRAC, while 3y-DFS was 62% and 5y-DFS was 51% in control, HR 0.62(95%CI 0.41-0.92,P=0.017). Three years LM was 9% and 5y-LM was 11% in PHRAC, while 3y-LM was 21% and 5y-DFS was 25% in control, HR 0.37(95%CI 0.19-0.71,P=0.002). Three years OS was 86% and 5y-OS was 75% in PHRAC, while 3y-OS was 74% and 5y-OS was 64% in control, HR 0.57(95%CI 0.35-0.94,P=0.023). Toxicities, such as hepatic toxicity and leukocyte decreasing, were mild and could be cured with medicine.

CONCLUSION

Preoperative hepatic and regional arterial chemotherapy, in combination with surgical resection, could be able to reduce and delay the occurrence of liver metastasis and therefore improve survival rate in patients with stage III colorectal cancer.

CLINICAL RELEVANCE/APPLICATION

Preoperative hepatic and regional arterial chemotherapy, in combination with surgical resection, could be able to reduce and delay the occurrence of liver metastasis

SSK19-02 Initial Study of the Rheological Impact of a Balloon-occulsion Approach for Magnetic Resonance Navigation Liver Chemoembolization on 8 Pigs

Wednesday, Nov. 30 10:40AM - 10:50AM Room: E351

Participants
Alexandre Bigot, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Ning Li, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Maxime Gerard, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Francois Michaud, BSC, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Samuel Kadoury, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Gilles P. Soulez, MD, Montreal, QC (*Presenter*) Speaker, Bracco Group Speaker, Siemens AG Research Grant, Siemens AG Research Grant, Bracco Group Research Grant, Cook Group Incorporated Research Grant, Object Research Systems Inc
Sylvain Martel, Montreal, ON (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Magnetic Resonance Navigation (MRN) is an interventional MRI technique which aims to navigate magnetic therapeutic beads using the imaging gradients of the scanner. Our targeted application is liver chemoembolization for hepatocellular carcinoma using an implantable port catheter system. We currently investigate a balloon-occlusion approach in order to greatly reduce the hepatic blood flow and the systolic-diastolic flow variation.

METHOD AND MATERIALS

We collected physiological and rheological data and evaluated the impact of a balloon catheter placed in the proper hepatic artery on eight pigs (mean weight ± SD = 31.9 ± 2.03 kg). Measurements were performed with an electromagnetic probe placed on the common hepatic artery for 4 pigs and with Doppler Ultrasound for 4 pigs. The experimental protocol was approved by the Institutional Animal Care and Use Committee of the Research Center of Centre Hospitalier de l'Universite de Montreal.

RESULTS

Average diameter of proper hepatic artery is 4.67 ± 0.65 mm and average distance between the tip of the catheter and the first bifurcation is 17.6 ± 8.48 mm. The average blood velocity in normal conditions is 40.5 ± 26.5 cm/s and drops to 6.09 ± 5.19 cm/s when the balloon is inflated. This represents a reduction of 84%. In addition, we found that the average systole-diastole range decreases from 48.2 ± 31.8 cm/s to 11.5 ± 12.5 cm/s with and without the inflated balloon respectively. These velocities under flow occlusion should be compatible with MRN of 250 µm-diameter magnetic drug eluting beads with a magnetization of 60 emu/g and a propulsion gradient of 40 mT/m.

CONCLUSION

A balloon-occluded approach enables reduction the blood flow and elimination the pulsatile behavior of the blood in the liver. Future experiments will be focused on evaluating in vitro that the magnetic performance of the MRI and magnetic beads are sufficient to achieve balloon-occlusion MRN using a clinical MRI scanner.

CLINICAL RELEVANCE/APPLICATION

Magnetic Resonance Navigation has a great potential in the planning and treatment of HCC. Combining this technology with an implantable port catheter chamber could enable the development of less invasive chemoembolization treatments and therefore improve patient care.

SSK19-03 Does Stratified or Total Serum Bilirubin Predict Survival for Patients Undergoing Drug Eluting Bead Chemoembolization?

Wednesday, Nov. 30 10:50AM - 11:00AM Room: E351

Awards
Student Travel Stipend Award

Participants
Francis Kang, MD, Aurora, CO (*Presenter*) Nothing to Disclose
David T. Johnson, MD, PhD, Centennial, CO (*Abstract Co-Author*) Nothing to Disclose
Robert K. Ryu, MD, Chicago, IL (*Abstract Co-Author*) Consultant, Cook Group Incorporated Stockholder, EndoVention Inc Consultant, IORAD

PURPOSE

Increased total serum bilirubin has been commonly cited as an independent risk factor that affects overall survival in patients undergoing drug eluting bead transarterial chemoembolization (DEB-TACE) for hepatocellular carcinoma (HCC). This study aims to determine and compare overall survival rates based on stratification of total bilirubin levels in patients undergoing DEB-TACE for HCC.

METHOD AND MATERIALS

A retrospective cohort analysis was performed on all HCC patients who underwent DEB-TACE for HCC from November 2008-March 2015. The overall survival was stratified by total serum bilirubin groups (< 2.0, 2.0-2.4, 2.5-2.9, 3.0-3.4, 3.5-3.9, and > 3.9). The survival analysis was carried out comparing each group to a control group (total bilirubin < 2.0). Multivariable linear regression using a Cox model was used to evaluate the effect of various prognostic factors on overall survival. Survival distribution across all groups was compared using a Wilcoxon test.

RESULTS

407 patients underwent DEB-TACE for HCC in the time period assessed. The median overall survivals for the six total bilirubin groups were 48, 47, 81, 47, 32, and 77 months respectively. Survival distributions were compared amongst all groups using the Wilcoxon test; there was no significant difference (P = 0.527). The survival analysis showed an increase of 7.7%, decrease of 3.9%, increase of 48%, 54%, and decrease of 38% in mortality risk for total bilirubin groups 2.0-2.4, 2.5-2.9, 3.0-3.4, 3.5-3.9, and > 3.9 respectively. However, the results were not statistically significant (P > 0.05). The only prognostic factors which were independent predictors of overall survival ECOG performance status (HR 1.38, 95% CI 1.10-1.72, P = 0.005), AFP (HR 1.55, 95% CI 1.30-1.84, P < 0.000001), length of hospital stay after DEB-TACE (HR 1.24, 95% CI 1.10-1.41, P = 0.0007), and segmental or lobar treatment (HR 1.75, 95% CI 1.08-2.85, P = 0.023).

CONCLUSION

In this cohort, bilirubin was not predictive of poor outcome. In fact, there was a trend to increased survival in patients with the highest bilirubin. In this population, the total serum bilirubin alone was insufficient to predict survival or candidacy of patients with HCC for DEB-TACE.

CLINICAL RELEVANCE/APPLICATION

Elevated total bilirubin should not be a contraindication for patients undergoing DEB-TACE for HCC.

SSK19-04 Liver Transplant Outcomes after Locoregional Therapy for Hepatocellular Carcinoma: A Large Single-Center Experience

Wednesday, Nov. 30 11:00AM - 11:10AM Room: E351

Awards
Student Travel Stipend Award

Participants

Tyler J. Fraum, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Neeta Vachharajani, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Aaron Gould, MD, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Min Xu, St. Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Nael E. Saad, MBBCh, Saint Louis, MO (*Abstract Co-Author*) Research Consultant, Veran Medical Technologies, Inc; Proctor, Sirtex Medical Ltd
Kathryn J. Fowler, MD, Chesterfield, MO (*Abstract Co-Author*) Nothing to Disclose
William Chapman, MD, Saint Louis, MO (*Abstract Co-Author*) Founder, Pathfinder Therapeutics, Inc

PURPOSE

Locoregional therapy (LRT), such as transarterial chemoembolization (TACE), is a mainstay of managing hepatocellular carcinoma (HCC) in patients with cirrhosis. In such cases, LRT serves as a bridge to liver transplant (LT) by either maintaining tumor burden at acceptable levels or down-staging extensive disease to within the Milan criteria. The aim of this study was to evaluate the long-term survival of patients undergoing LT following LRT for HCC with respect to pre-transplant tumor burden and LRT-related variables.

METHOD AND MATERIALS

From 2000-2014, 258 adult patients with HCC pre-operatively treated with LRT underwent LT at our institution. For this retrospective analysis, we collected demographic information, LRT details, and post-LT clinical outcomes from our transplant database. These data were stratified according to whether each patient's HCC disease burden prior to LRT fell within the Milan criteria (WMC) or beyond the Milan criteria (BMC). Kaplan-Meier curves were generated for both groups for overall survival (OS), disease-free survival (DFS), and disease-specific survival (DSS). The log-rank test was used to evaluate for differences up to 10 years post-LT.

RESULTS

A total of 258 patients with 417 HCCs underwent 431 LRTs prior to LT. At presentation, 201 patients (78%) were classified as WMC. These patients underwent fewer LRTs prior to LT than BMC patients (1.5 v. 2.3, $p < 0.001$). The interval between first LRT and LT was longer for BMC patients (276 v. 171 days, $p < 0.001$). A higher percentage of BMC patients had imaging evidence of post-LRT disease progression (28 v. 14%, $p = 0.01$) at some point prior to LT. 257 patients (99.6%) satisfied Milan criteria by the time of LT. There was no significant difference between WMC and BMC patients with respect to OS ($p = 0.20$), DSS ($p = 0.42$), or DFS ($p = 0.13$).

CONCLUSION

BMC patients required more LRTs and were more likely to progress following LRT than WMC patients. As a result, BMC patients generally waited longer for LT. Once BMC patients were sufficiently down-staged and underwent LT, there were no significant survival differences between the WMC and BMC groups. To our knowledge, this analysis constitutes the largest single-center outcomes study of HCC patients treated with LRT before LT.

CLINICAL RELEVANCE/APPLICATION

Patients presenting with HCC exceeding the Milan criteria require longer and/or more extensive pre-transplant therapy but have similar post-transplant outcomes.

SSK19-05 Prediction of Early Response to Transpulmonary Chemoembolization and Transarterial Chemoperfusion in the Interventional Treatment of Unresectable Primary and Secondary Lung Cancer by Using Diffusion-Weighted MR Imaging: Preliminary Experience

Wednesday, Nov. 30 11:10AM - 11:20AM Room: E351

Awards
Student Travel Stipend Award

Participants
Iliana Bednarova, MD, Udine, Italy (*Presenter*) Nothing to Disclose
Andrei Roman, Cluj-Napoca, Romania (*Abstract Co-Author*) Nothing to Disclose
Nour-Eldin A. Nour-Eldin, MD,PhD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Nagy N. Naguib, MD, MSc, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Chiara Zuiani, MD, Udine, Italy (*Abstract Co-Author*) Nothing to Disclose
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine whether the change of apparent diffusion coefficient (ADC) value after transpulmonary chemoembolization (TPCE) or transarterial chemoperfusion (TACP) in a palliative intention could predict the early response in unresectable lung cancer and lung metastases.

METHOD AND MATERIALS

- From January 2012 to February 2016, 295 patients (138 males/157 females) were treated with TPCE or TACP session in 4-week intervals. Finally, 11 patients (mean age: 58.8; age range 24-75) with primary lung tumor (bronchial carcinoma, n=4) and lung metastases from different primaries (breast cancer, n=2; thyroid cancer, n=1; renal cellular cancer, n=1; colorectal carcinoma, n=1; esophageal cancer, n=1; carcinoid, n=1) underwent chest MR imaging (1.5 Tesla) including DWI before and after the first treatment with TPCE or TACP.- DWI and ADC maps were acquired using b-values of 0 and 800 s/mm2 and the tumor's mean ADC value was calculated and compared in a 4-weeks interval.- The grouping reference was based on serial CT scans according to Response Evaluation Criteria in Solid Tumors (RECIST, version 1.1).

RESULTS

- All patients tolerated well the treatment and had no major complications.- According to the follow-up imaging data 3 patients presented a partial response (PR) and 8 patients a stable disease (SD). No patient belonged to complete response or progressive disease group. - The pretherapy ADC values had no significant difference between the PR group [(0.97±0.18) x 10(-3) mm(2)/s] and SD group [(0.88±0.27) x 10(-3) mm(2)/s] (p>0.05). The change of ADC value was statistically significantly higher in PR group

[(0.63±0.17) x 10(-3) mm(2)/s] compared with that in SD group [(0.19±0.15) x 10(-3) mm(2)/s] ($p<0.05$).

CONCLUSION

- From our preliminary results, the changes in ADC value were significant between the PR and SD group. - Noninvasive DWI could be potentially used to early predict and monitor unresectable primary and secondary lung cancer response to transpulmonary chemoebolization and transarterial chemoperfusion.

CLINICAL RELEVANCE/APPLICATION

The change of ADC value might have the potential to monitor and predict the treatment response of transpulmonary chemoembolization and transarterial chemoperfusion in patients with unresectable primary and secondary lung cancer.

SSK19-06 Prospective Trial Using Internal Pair-production Positron-emission Tomography (PET) after Radioembolization to Determine the Optimal Yttrium-90 (90Y) Dose for Objective Response of Hepatic Tumors

Wednesday, Nov. 30 11:20AM - 11:30AM Room: E351

Awards
Student Travel Stipend Award

Participants
Keith T. Chan, MD, MS, Seattle, WA (*Presenter*) Spouse, Employee, Health Advocacy Strategies, LLC
Adam M. Alessio, PhD, Seattle, WA (*Abstract Co-Author*) Research Grant, General Electric Company
Sandeep Vaidya, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Guy E. Johnson, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Wayne L. Monsky, MD, PhD, Sacramento, CA (*Abstract Co-Author*) Research Consultant, NexGen Medical Systems, Inc
Sharon W. Kwan, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Ann E. Wilson, MS, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
David H. Lewis, MD, Seattle, WA (*Abstract Co-Author*) Research funded, Eli Lilly and Company
Siddharth A. Padia, MD, Seattle, WA (*Abstract Co-Author*) Consultant, BTG International Ltd; Research Grant, Koninklijke Philips NV

PURPOSE

90Y internal pair-production PET can provide a quantitative assessment of radiation dose delivered to intrahepatic tumors after radioembolization. This study prospectively assessed the required threshold dose for effective radioembolization of liver tumors.

METHOD AND MATERIALS

A single-arm prospective trial was performed at a single institution under IRB approval. Thirty-five patients with unresectable hepatocellular carcinoma (HCC) or non-HCC intrahepatic malignancies were recruited. Inclusion criteria were: ECOG performance status 0–2, Childs-Pugh A or B, and receiving first 90Y radioembolization treatment as part of routine clinical care. Time-of-flight PET imaging without additional tracer administration was performed the same day after 90Y treatment. Volumetric analysis of the tumors was performed using a proprietary software and radiation dose calculated for each tumor. Radiographic best response was assessed on follow-up imaging.

RESULTS

A total of 52 hepatic tumors (38 HCC, 14 non-HCC) were treated with median follow-up of 684 days. Median tumor size was 5.5 cm (range 2.8–17.9). Most treatments were performed via lobar hepatic artery infusion (76%) using glass microspheres (94%). HCC treatments showed 84% objective response (OR), 11% stable disease (SD), and 5% progressive disease (PD) based on best mRECIST response. Responders had a higher mean 90Y dose to tumor than non-responders (261Gy vs 104Gy, $p<0.01$). All non-responders had tumor dose <200Gy. No statistical difference was found between responders and non-responders for patient age, tumor volume, multifocal or extrahepatic disease, portal vein invasion, or injected 90Y activity.Treatment of non-HCC tumors showed 14% OR, 29% SD, and 57% PD based on best response RECIST 1.1. There was no significant difference in mean dose between responders and non-responders. No difference was found between the two groups for multifocal disease or injected 90Y activity.

CONCLUSION

HCC responders had a statistically greater mean tumor dose of 261Gy compared to 104Gy in non-responders. Delivered tumor dose significantly impacts treatment response in HCC, and can be assessed by PET.

CLINICAL RELEVANCE/APPLICATION

90Y-PET tumor dosimetry permits immediate assessment of HCC treatment adequacy after radioembolization, and may predict tumor response.

SSK19-07 Same Day Y90 Radioembolization: An EffectiveTreatment Model

Wednesday, Nov. 30 11:30AM - 11:40AM Room: E351

Participants
Ahmed Gabr, MD, MBBCh, Chicago, IL (*Presenter*) Nothing to Disclose
Joseph R. Kallini, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Vanessa L. Gates, MS, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Ryan Hickey, MD, Chicago, IL (*Abstract Co-Author*) Advisor, BTG International Ltd
Nadine Abouchaleh, BA, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Kush R. Desai, MD, Chicago, IL (*Abstract Co-Author*) Speakers Bureau, Cook Group Incorporated; Consultant, Cook Group Incorporated
Bartley G. Thornburg, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Robert J. Lewandowski, MD, Chicago, IL (*Abstract Co-Author*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc
Riad Salem, MD, MBA, Chicago, IL (*Abstract Co-Author*) Research Consultant, BTG International Ltd Research Grant, BTG

International Ltd

PURPOSE

To assess the feasibility of conducting pretreatment mesenteric angiography, coil embolization, technetium-99m macroaggregated albumin (99mTc-MAA) scanning, and yttrium-90 (Y90) radioembolization treatment in a single, same-day, combined outpatient encounter.

METHOD AND MATERIALS

78 patients from 2008 to 2015 were managed in a single outpatient encounter under the guidance of interventional radiology and nuclear medicine. Pretreatment planning was performed by reviewing baseline imaging and tumoral region of interest (ROI) was estimated by 3-D software; pre-treatment Y90 glass microsphere dosimetry was performed assuming a lung shunt of 10% for hepatocellular carcinoma (HCC) and 5% for liver metastases. Subsequently, mesenteric angiography and 99mTc-MAA scanning were performed followed by Y90 treatment in one outpatient encounter. Total in-room procedure time was recorded.

RESULTS

All patients underwent same-day pretreatment angiography, 99mTc-MAA and Y90 radioembolization. 16 patients received multiple segmental treatments to both lobes, 44 received right lobe treatment, and 18 received left lobe treatment. Median dose was 106 Gy. Median number of glass Y90 vials needed for complete treatment was 2 (1-6 vials). Median in-room time was 160 minutes (75-250 minutes). 18% (14/78) of patients were local residents, 55% (43/78) traveled from outside city limits, 18% (14/78) were from out-of-state, and 9% (7/78) were international. 77% (61/78) of patients treated presented with HCC, 22% (17/78) with liver metastases. Median lung dose was 3.5 Gy.

CONCLUSION

This study demonstrates the feasibility of same-day Y90 evaluation and treatment while maintaining the principles of safe and effective Y90 infusion including tumoricidal dosimetry, mitigation of non-target flow, and minimization of lung dose.

CLINICAL RELEVANCE/APPLICATION

We propose that same-day treatment paradigm to be considered for patients receiving radioembolization in selected cases. Indications include distant residence, elderly patients, contrast allergy, renal impairment, small/limited disease and absence of portal vein invasion. Convenience for patients is an important consideration as this approach is adopted in the future. Finally, we believe a room time averaging just over 2.5 hours makes this approach feasible and should translate into significant cost and time savings.

SSK19-08 Early Response Detected by DWI Predicts Survival of Patients Undergoing Y90-Radioembolisation for Hepatic Metastases

Wednesday, Nov. 30 11:40AM - 11:50AM Room: E351

Participants
Alexandra Barabasch, MD, Aachen, Germany (*Presenter*) Nothing to Disclose
Alexander Ciritsis, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Alexander Heinzel, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Nils A. Kraemer, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Christiane K. Kuhl, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Y90-Radioembolisation (RE) is a valuable treatment option for otherwise therapy-refractory liver malignancies. DWI has been shown to be helpful to assess response of liver metastases as early as 4 to 6 weeks after lobar treatment. Aim of this study was to evaluate whether change of lesion ADC early after treatment (within 6 weeks) can help predict patients' overall survival.

METHOD AND MATERIALS

Between May 2010 and April 2014, 41 consecutive patients (28 female, mean age 60 ± 10 years) underwent DW-MRI with b = 0, 50, and 800 at 1.5T within 6 weeks before and 6 weeks after lobar RE to treat secondary progressive liver metastases from solid cancers (21 colorectal, 16 breast, 4 other). Three target lesions per patient were assessed according to RECIST, and change of minimal ADC (ADCmin) was measured, with an increase of ADCmin by at least 30% regarded as indicating response. Patient survival was assessed by long-term follow-up. Comparison analysis was performed by the logrank test.

RESULTS

38/41 patients were followed until their death. Two patients (one with colorectal, the other with breast cancer) treated 1765 and 761 weeks ago, are still alive. One patient was lost after 13 weeks of follow-up. Overall median survival was 69 ± 67 weeks.
An ADC increase by 30% or more (i.e., response) was observed in 27/41 patients (66%). Median survival in this "DWI-responder" group was 86 ± 74 weeks, compared to 35 ± 43 weeks in the "DWI-non-responder" group ($p < 0.05$).
Based on RECIST analysis, metastases in 4/41 (10%) patients were categorized as progressive (PD), in another 4/41 as partial response (PR), and in 33/41 (80%) as stable (SD). Median survival was 64 ± 57 weeks in the PD-group, 67 ± 68 weeks in the SD group, and 87 ± 87 weeks in PR-group ($p > 0.05$).

CONCLUSION

Patients who, at 4 to 6 weeks after Y-90-RE treatment, exhibit response on DWI, can expect significantly longer overall survival than patients without such response. No such correlation was observed for tumor size changes according to RECIST.

CLINICAL RELEVANCE/APPLICATION

DW-MRI can be used to predict overall survival after RE of patients with liver metastases.

SSK19-09 Dynamic 4D-CT Angiography of the Abdomen for Guiding TACE: Impact on Reduction of Contrast Material, Operator Radiation Exposure, Catheter Consumption and Diagnostic Confidence

Wednesday, Nov. 30 11:50AM - 12:00PM Room: E351

Awards
Student Travel Stipend Award

Participants
Moritz H. Albrecht, MD, Charleston, SC (*Presenter*) Nothing to Disclose
Thomas J. Vogl, MD, PhD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Julian L. Wichmann, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Stefan Zangos, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
U. Joseph Schoepf, MD, Charleston, SC (*Abstract Co-Author*) Research Grant, Astellas Group; Research Grant, Bayer AG; Research Grant, General Electric Company; Research Grant, Siemens AG; Research support, Bayer AG; Consultant, Guerbet SA; ; ;
Carlo N. De Cecco, MD, PhD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Thomas Lehnert, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Sebastian Fischer, MD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Andreas Bucher, MD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Martin Beeres, MD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Nour-Eldin A. Nour-Eldin, MD,PhD, Frankfurt Am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Ralf W. Bauer, MD, Frankfurt, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens Healthcare GmbH; Speakers Bureau, Bayer Healthcare; Speakers Bureau, GE Healthcare
Christian Tesche, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the impact of 4D computed tomography angiography (4D-CTA) prior to transarterial chemoembolization (TACE) regarding administered contrast media, operator radiation exposure, catheter consumption, and diagnostic confidence.

METHOD AND MATERIALS

4D-CTA examinations prior to initial TACE of 29 patients (20 men; mean age, 65.7±11.5 years) with malignant liver tumors were analyzed. Multiplanar-reformate (MPR), volume-rendering-technique (VRT) and maximum-intensity-projection (MIP) series were reconstructed enabling a direct selective catheterization of the tumor-supplying artery without prior conventional digital subtraction angiography (DSA) of the abdominal aorta, coeliac trunk, superior mesenteric artery, and indirect portography. Twenty-nine patients who underwent traditional TACE served as the control group. The amount of administered contrast media, operator radiation exposure, and catheter consumption was compared between the different TACE workflows. Diagnostic confidence in the exclusion of portal vein thrombosis was assessed by two radiologists using 5-point Likert scales.

RESULTS

4D-CTA TACE resulted in a significant overall contrast media reduction of 12.8 ml (-13.8 %, $p<0.001$) and 61.0 ml less contrast were administered intra-arterially (-66.3%, $p<0.001$) compared to traditional TACE. Scattered radiation could be reduced by 50.5% for 4D-CTA compared to standard TACE ($p<0.001$). 4D-CTA TACE was performed using 0.7 less catheters on average ($p=0.063$). Diagnostic confidence in the exclusion of portal vein thrombosis could be significantly increased using 4D-CTA compared to traditional DSA images (scores, 3.9 and 2.4, respectively; $p<0.001$).

CONCLUSION

4D-CTA enables TACE with substantially reduced amount of contrast material, decreases operator radiation exposure, and increases diagnostic confidence in the exclusion of portal vein thrombosis.

CLINICAL RELEVANCE/APPLICATION

4D-CTA prior to TACE can reduce the intra-arterial amount of utilized contrast material by two-thirds. Thus, this technique may decrease the risk of CIN and enable TACE for patients with renal impairment, while 4D-CTA portography allows for a higher diagnostic confidence than conventional DSA images.

VIS-WEA

Vascular Interventional Wednesday Poster Discussions

Wednesday, Nov. 30 12:15PM - 12:45PM Room: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

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

Sub-Events

VI255-SD-WEA1 Developing TACE 2.0:Targeting Hepatocellular Carcinoma Cells through the Unfolded Protein Response, Hypoxia Inducible Factor, and Autophagy Inhibition

Station #1

Awards
Student Travel Stipend Award

Participants
Mikhail Silk, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Hillary Nguyen, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Stephen J. Hunt, MD,PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Gregory J. Nadolski II, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Terence P. Gade, MD, PhD, New York, NY (*Abstract Co-Author*) Research Grant, Guerbet SA

PURPOSE

There is increasing evidence that hepatocellular carcinoma cells (HCC) mount an adaptive response to transarterial chemoembolization (TACE)-induced ischemia to enable their survival as well as induce resistance to cell cycle specific chemotherapeutic agents (i.e. Doxorubicin). The unfolded protein response (UPR), Hypoxia-Inducible Factor (HIF)-1 Regulatory Pathway, and Autophagy are several response pathways which enable tumor cell survival under ischemia. We hypothesize HCC cells surviving severe TACE-like ischemia are susceptible to inhibition of the UPR, HIF and autophagy pathways and combination of the inhibition of these pathways would lead to synergistic effects.

METHOD AND MATERIALS

Viability assays and cytotoxicity profiles of HepG2, SNU-387, and SNU-449 HCC cell lines were studied under standard (21% O2 with complete medium) and severely ischemic conditions (0.5 or 1% O2, 1% serum, 1 mM glucose) with an inhibitor of the UPR (GSK2606141), a HIF-1 alpha inhibitor (BAY 87-2243) and an inhibitor of autophagy (Hydroxychloroquine). Cytotoxicity measurements were derived from measured dose-response curves using the WST-1 cytotoxicity assay.

RESULTS

Each of the three cell lines tested demonstrated decreased cellular viability with incubation of either of the inhibitory agents (EC50 GSK2606141, BAY 87-2243, Hydroxcychloroquine of 75-150μM, 400-500μM, 100-200μM respectively). Ischemia potentiated the cytotoxicity of GSK2606141 and Hydroxychloroquine more than BAY87-2243, however all agents showed increased cytotoxicity under ischemic conditions (EC50 GSK2606141, BAY 87-2243, Hydroxcychloroquine of 25-50μM, 200-400μM, 50-80μM respectively). Combination of the three drugs under TACE-like ischemia lead to a synergistic response showing cell death at concentrations well below any single drug alone.

CONCLUSION

Inhibition of the UPR, HIF, and autophagy independently lead to a reduction in viability of HCC cells. Combination of the three drugs under TACE-like ischemia lead to a synergistic response and should be considered as potential chemotherapeutics for TACE.

CLINICAL RELEVANCE/APPLICATION

Inhibition of the Unfolded Protein Response, Hypoxia-Inducible Factor, and Autophagy show synergistic reduction in HCC viability under ischemic conditions and should be considered for TACE procedures.

VI256-SD-WEA2 Pulmonary Hemorrhage in Patients Undergoing Percutaneous CT Guided Lung Biopsy: A Retrospective Review of Risk Factors, including Aspirin Usage

Station #2

Participants
Brigid A. Bingham, MD, Houston, TX (*Presenter*) Nothing to Disclose
Steven Y. Huang, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Pamela L. Chien, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Joe Ensor, Houston, TX (*Abstract Co-Author*) Consultant, Aetna, Inc
Sanjay Gupta, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Michael J. Wallace, MD, Houston, TX (*Abstract Co-Author*) Speaker, Siemens AG Research support, Siemens AG

PURPOSE

To identify risk factors (RF), including use of aspirin, associated with increased incidence and volume of hemorrhage in patients undergoing percutaneous CT guided lung biopsy.

METHOD AND MATERIALS

From 09/2013 to 12/2014, 252 patients on aspirin undergoing CT guided lung biopsy at a single institution were included in our retrospective study. Waiver of informed consent by the institutional review board was obtained. Of the 252 study patients, 49 (18.4%) stopped aspirin ≤ 4 days prior to biopsy; 203 (80.6%) stopped aspirin ≥ 5 days prior to biopsy. The impact of withholding aspirin (≤ 4 days vs. ≥ 5 days), age, sex, platelet count (K/μL), INR, GFR (mg/mmol), lesion composition, lesion volume (cm3), location, type of biopsy, and size of vessels transgressed upon incidence and volume of biopsy related hemorrhage was retrospectively evaluated. Hemorrhage was quantified volumetrically from CT images obtained following biopsy.

RESULTS

Clinical hemoptysis was documented in 13 of 252 procedures (5.2%); all cases were managed conservatively. Pulmonary hemorrhage, as identified by CT, was documented in 174 cases (69.0%). Higher grade hemorrhage (>10cm3) occurred in 70 procedures (27.8%). Univariate analysis identified the following risk factors (RFs) influencing the incidence of hemorrhage: increased distance from lesion to pleura (P<0.0001), largest vessel transgressed (P<0.0001), lesion volume (P<0.0001), and aspirin use within 4 days of biopsy (P=0.0154); multivariate analysis revealed that longer distance from pleura (odds ratio, OR, 1.902) and lesion volume (OR 0.976) were the most important RFs. For volume of hemorrhage, univariate analysis identified longer distance from pleura (P<0.0001), largest vessel transgressed (P<0.0001), lesion volume (P=0.0044), and aspirin use within 4 days of biopsy (P=0.0297) as RFs; multivariate analysis revealed that longer distance from pleura (P=0.0021) and lesion volume (P<0.0001) were the most important RFs.

CONCLUSION

In CT guided coaxial needle biopsy, lesion distance from the pleura and lesion volume are the greatest predictors for increased incidence and volume of hemorrhage. Aspirin therapy stopped within 4 days of biopsy is not an independent RF for increased incidence or severity of pulmonary hemorrhage.

CLINICAL RELEVANCE/APPLICATION

Pulmonary hemorrhage following lung biopsy is multi-factorial; aspirin use is not an independent predictor of increased risk.

VI257-SD-WEA3 The Application of Tc99m Tagged Red Blood Cells (TRBC) SPECT/CT Scan for Detection and Localization of Gastrointestinal (GI) Bleeding: Potential for Guiding Subsequent Angiographic Intervention

Station #3

Participants
Shayandokht Taleb, MD, Minneapolis, MN (*Presenter*) Nothing to Disclose
Rakhee S. Gawande, MD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Jerry W. Froelich, MD, Minneapolis, MN (*Abstract Co-Author*) Researcher, Siemens AG
Jafar Golzarian, MD, Minneapolis, MN (*Abstract Co-Author*) Chief Medical Officer, EmboMedics Inc

PURPOSE

To determine the added value of SPECT/CT scan in conjunction with TRBC planar imaging for detection of GI bleeding and guiding subsequent endovascular intervention.

METHOD AND MATERIALS

A retrospective review of clinical and imaging records of all patients who underwent SPECT/CT scan in addition to TRBC planar imaging for suspected GI bleeding between 09/2011 and 12/2015, was performed. A single reviewer, blinded to clinical information, evaluated all planar TRBC images separately, and then in conjunction with SPECT/CT scan. The reviewer also determined whether the SPECT/CT scan helped with anatomical localization of bleeding compared to planar images. The imaging interpretations were compared with interventional angiographic and/or endoscopy/colonoscopy results.

RESULTS

A total of 137 patients were included in this study. The average age at the time of scan was 54.32 ± 18.2 years; and 83 (60.5%) patients were men. The TRBC SPECT/CT scans were interpreted as positive in 58/137 (42%) patients. In only 1 patient, SPECT/CT scan changed the interpretation for GI bleeding from negative to positive compared to planar images. On the other hand, the SPECT/CT helped with anatomical localization in 57/58 patients (98%) compared to planar imaging. Within 1 month of imaging, 19 (14%) patients underwent angiography, 78 (57%) had colonoscopy, 75 (55%) had upper GI endoscopy, and 28 (20%) had capsule endoscopy. The colonoscopy/angiographic studies were positive in 51 (88%) of 58 patients with positive SPECT/CT; whereas, only 8/79 (6%) patients with negative SPECT/CT interpretation had active bleeding in endoscopy/colonoscopy exam. Angiography was able to identify the bleeding vessel in 11/18 (61%) patients, all of whom had positive SPECT/CT interpretation for GI bleeding. There was 100% concordance between the site of bleeding vessel on angiography and the SPECT/CT localization.

CONCLUSION

The addition of SPECT/CT scan to TRBC planar imaging slightly improved the accuracy for detection of GI bleeding; however, combined imaging substantially helped with precise anatomical localization of the site of GI bleeding, and was able to guide the subsequent angiographic intervention.

CLINICAL RELEVANCE/APPLICATION

The TRBC SPECT/CT scan helps with precise anatomic localization of the site of GI bleeding and can guide angiographic intervention; thus, potentially lowers the procedure duration and patients' radiation exposure.

VI258-SD-WEA4 Solution for Problematic Antegrade SFA Canulation in Interventions of SFA and BTK Arteries

Station #4

Participants
Johan W. Marsman, MD,PhD, Hilversum, Netherlands (*Presenter*) Nothing to Disclose

PURPOSE

Antegrade canulation of the SFA is frequenltly hampered by erroneous entering the DFA. Goal of this work is to test a dedicated 'SFA finding' guidewire and compare it with conventinal guidewires, without making use of fluoroscopic or other manipulations.

METHOD AND MATERIALS

A true to life transparant silicon 3D model of the femoral bifurcation using CT data is used. An experimental guidewire with a double curve is tested and compared with conventional angled-tip and J-tip guidewires. The CFA is punctured at verious distances proximally from the femoral bifurcation. The guidewire is inserted into the needle with the tip end of the double curve, angled-tip or J-tip turned anteriorly. Subsequently, without any manipulation, the guidewire is pushed through the needle into the CFA. Guidewire movements inside the CFA are filmed. For each type of guidewire the number of movements entering the SFA or DFA are scored, for each needle position relatively to the bifurcation.

RESULTS

Three needle tip positions relatively to the femoral bifurcation were used:1) needle tip at the bifurcation,2) needle tip 1cm proximally to bifurcation,3) needle tip 2cm proximally to bifurcation.In position 1 and 2 the double curved tip entered the SFA in 100%, and the conventional tips in 0%.In position 3 the double curved tip entered the SFA in 100%, and the conventional tips in 25%.

CONCLUSION

In a true to life 3D model of the femoral bifurcation a double curved guidewire successfully entered the SFA in 100%, no matter the distance of the needle to the bifurcation. Conventional guidewires entered the SFA only when the needle to bifurcation distance amounted 2cm, and even in that situation only in 25%. When the needle was closer to the bifurcation, the conventional wires enevitably entered the DFA instead of the SFA.

CLINICAL RELEVANCE/APPLICATION

Erroneous entering the DFA instead of the SFA in antegrade canulation of the SFA is a common clinical problem in interventions of the SFA and/or lower leg arteries.In a 3D model a double curved guidewire appears advantageous compared to conventional guidewires.Therefore, a clinical trial with a double curved guidewire is justified.

VI259-SD-WEA5 Utility of 4D-Flow Magnetic Resonance Angiography in Assessment of Patients for Uterine Fibroid Embolization

Station #5

Awards
Student Travel Stipend Award

Participants
Christopher D. Malone, MD, San Diego, CA (*Presenter*) Nothing to Disclose
Marcus T. Alley, PhD, Stanford, CA (*Abstract Co-Author*) Research funded, General Electric Company; Research Consultant, Arterys Inc
Shreyas S. Vasanawala, MD, PhD, Stanford, CA (*Abstract Co-Author*) Research collaboration, General Electric Company; Consultant, Arterys Inc; Research Grant, Bayer AG;
Anne C. Roberts, MD, La Jolla, CA (*Abstract Co-Author*) Nothing to Disclose
Albert Hsiao, MD, PhD, San Diego, CA (*Abstract Co-Author*) Founder, Arterys, Inc Consultant, Arterys, Inc Research Grant, General Electric Company

PURPOSE

To assess the utility of 4D Flow MRA in the assessment of patients with uterine fibroids either before or after uterine fibroid embolization (UFE).

METHOD AND MATERIALS

With HIPAA-compliance and IRB-approval we retrospectively reviewed all pelvic MRIs performed with 4D Flow between September 2015 and March 2016. Four patients without fibroids and 12 patients with fibroids were analyzed; 7 had yet to undergo UFE, 2 underwent UFE after MR, and 3 underwent UFE before MR. All fibroid patients were assessed as either right or left dominant based on multiphasic contrast-enhanced MRI. Blood flow (mL/min) within the distal abdominal aorta, bilateral common, external and internal iliac arteries was measured in triplicate using Arterys software. Ratios of ipsilateral internal and external iliac flow (I/E) and the ratio of dominant and nondominant internal iliac flow (I/I) were calculated. Statistical significance was determined using t-tests.

RESULTS

The I/E ratio was markedly increased in patients with uterine fibroids compared to controls, with flow of the internal iliac artery exceeding that of the external in 4 of 12 patients (0.80+ 0.38, range 0.24-1.92, vs. 0.47+0.1, p=0.001). I/E ratio was lower in patients who were status post UFE with decrease in fibroid size compared to those pre-procedure (0.57+0.26 vs. 0.87+0.39, p=0.05). Pre-UFE patients whose fibroids showed a definite lateral dominance demonstrated significantly higher I/I ratios compared to control patients (1.86+0.56 vs. 1.14+0.12, p=0.02). In 2 patients who later had UFE, higher amounts of embolic material were used on the dominant side compared to the nondominant.

CONCLUSION

4D Flow MRA can complement routine MRI sequences in assessment of fibroid burden and response to UFE by enabling measurement of total and fractional iliac blood flow. In addition, flow ratios between dominant and nondominant internal iliac arteries may help to anticipate the amount of embolic needed during UFE.

CLINICAL RELEVANCE/APPLICATION

Quantification of total and fractional iliac blood flow may be a promising biomarker to assess fibroid burden before and after UFE.

VI260-SD- Evaluation of Detection Methods for Local Marginal Recurrence after Transcatheterarterial

WEA6 Chemoembolization of Hepatocellular Carcinoma: Comparison between Parenchymal Blood Volume (PBV) Mapping using Cone Beam CT (DynaCT) and Multiphase Dynamic CT

Station #6

Awards
Student Travel Stipend Award

Participants
Na Rae Kim, MD, Dajeon metropolitan city, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ji-Dae Kim, Dajeon metropolitan city, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the usefulness of parenchymal blood volume (PBV) mapping using cone beam CT (DynaCT) compare to multiphase dynamic CT for detecting local marginal recurrence after transcatheter arterial chemoembolization of hepatocellular carcinoma.

METHOD AND MATERIALS

This retrospective study was approved by the IRB. From March 2015 to January 2016, we included 20 patients with 28 HCC lesions who previously underwent TACE and considered recurred tumor on follow up CT.We compared with multiphase dynamic CT within 1 month prior to receive TACE and parenchymal blood volume (PBV) mapping using cone beam CT during TACE to detect local marginal recurrence of HCC.We considered presence of viable or recurred tumor by dense accumulation of oil during chemoembolization.

RESULTS

All patients were successfully completed TACE without complication.The sensitivity, specificity, and predictive value of PBV mapping using cone beam CT (DynaCT) was better than multiphase dynamic CT.In two cases, PBV mapping was able to demonstrate that lesions unidentified at multiphase dynamic CT due to beam hardening artifact, were in fact viable marginal tumor.On the other hand, 5 cases which considered recurrent HCC on multiphase dynamic CT were proven to be negative lesions by observing no uptake of iodizied oil during chemoembolization .And, one case which was unable to distinguish between arterioportal shunt and HCC on multiphase dynamic CT was in fact proven to be arterioportal shunt in PBV mapping.

CONCLUSION

Multiphase dynamic CT has limitation in interpretation after chemoembolization because of beam hardening artifact from iodized the oil.Otherwise, parenchymal blood volume (PBV) mapping using cone beam CT (DynaCT) is free from beam hardening artifact. In addition, this method applies quantitative assessment of tumor angiogenesis, easy to get images during chemoembolization, and exposure to radiation is less than that of computed tomography (CT).Compared with multiphase dynamic CT, our study shows parenchymal blood volume (PBV) mapping using cone beam CT (DynaCT) is more feasible follow-up modality for detecting local marginal recurrence after transcatheter arterial chemoembolization..

CLINICAL RELEVANCE/APPLICATION

Parenchymal blood volume (PBV) mapping using cone beam CT (DynaCT) is more feasible follow-up modality for detecting local marginal recurrence after transcatheter arterial chemoembolization than CT.

VI261-SD-WEA7 Dual Energy CT Evaluation of Deep Inferior Epigastric Perforators (DIEP)

Station #7

Participants
Chenchan Huang, MD, New York, NY (*Presenter*) Nothing to Disclose
Ankur Doshi, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Chika C. Obele, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Justin M. Ream, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare low energy (50 keV) virtual monoenergetic images with standard high energy (100 keV) images for assessment of small caliber DIEP vessels.

METHOD AND MATERIALS

In this IRB-approved, HIPAA-compliant study, 36 consecutive patients underwent dual source dual energy CTA studies for preoperative assessment of DIEP anatomy. Virtual monoenergetic datasets were retrospectively reconstructed at both low energy (50 keV; near the iodine k-edge of 33 keV) and high energy (100 keV; simulating standard single energy acquisition), for all 36 patients. A radiologist determined the maximum attenuation within the intramuscular portion of the dominant DIEP vessel on each side (HUDIEP)and recorded the mean attenuation of a region of interest in the adjacent rectus muscle (HUmuscle) to derive a modified relative attenuation index (mRA) at both energy levels (mRA=HUDIEP/HUmuscle). Two additional radiologists independently assessed the number of perforators visualized on each side as well as multiple qualitative parameters (1-5 scale), such as clarity of intramuscular (IM) course and separation of the artery and paired vein. Wilcoxon signed rank test was used to compare results from 50 keV and 100 keV reconstructions.

RESULTS

Relative to the standard 100 keV dataset, the low energy 50 keV reconstruction showed significantly greater mRA (9.2 vs 3.1; $p<0.0001$). Readers identified a greater number of perforator vessels at the low energy reconstruction (R1:3.1 vs 1.9; R2: 6.1 vs 5.5; both $p<0.0001$). Low energy reconstruction significantly improved vessel conspicuity (R1:4.8 vs 3.0; R2:4.8 vs 4.0; both $p<0.0001$), clarity of the IM course (R1:4.7 vs 3.0; R2:4.6 vs 3.3; both $p<0.0001$), separation of the artery and paired vein (R1:4.8 vs 2.9; R2:3.7 vs 3.0; both $p<0.0001$), and reader confidence (R1:4.7 vs 3.1; R2:4.7 vs 3.4; both $p<0.0001$).

CONCLUSION

Using low energy virtual monoenergetic datasets derived from dual energy acquisition allows for better separation of small DIEP

vessels from the surrounding muscle, allows for identification of more perforator vessels, and improves several qualitative measures of vessel assessment.

CLINICAL RELEVANCE/APPLICATION

Low keV monoenergetic reconstructions from dual energy CTA improve detection of small perforator vessels, which may aid preoperative planning in patients undergoing DIEP free flap reconstruction.

VI158-ED-WEA8 Venous Sampling of Thyroid and Jugular Veins in the Case of Hyperparathyroidism: How to Proceed an Examination and to Interpret the Results

Station #8

Participants
Takayuki Yamada, MD, PhD, Yokohama, Japan (*Presenter*) Nothing to Disclose
Masaya Ikuno, Yokohama, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasumoto Shinjyo, Yokohama, Japan (*Abstract Co-Author*) Nothing to Disclose
Shoichiro Matsushita, Kawasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Tsuyoshi Morimoto, MD, Kawasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Reiko Kumano, MD, Yokohama, Japan (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To know1. the anatomy of thyroid veins on multi-detector row CT before venous sampling2. where we sample the venous blood in the jugular and thyroid veins3. how to interpret the sampling results to localize the responsible region for hyperparathyroidism

TABLE OF CONTENTS/OUTLINE

A. The pathophysiology of hyperparathyroidismB. Depiction of thyroid veins using multi-detector row CT (MDCT) before venous sampling and their anatomical variationC. Correlation of the anatomy of thyroid veins between venous angiography and MDCTD. Where do we sample the venous blood in the jugular and thyroid veins ?E. Interpretation of the sampling results referring to MDCT scans and 99mTc-MIBI scintigram

VIS-WEB

Vascular Interventional Wednesday Poster Discussions

Wednesday, Nov. 30 12:45PM - 1:15PM Room: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

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

Sub-Events

VI262-SD-WEB1 Monitoring of Liver MW Ablation in an Ex-vivo Bovine Model with Point Shear Waves Elastography (pSWE)

Station #1

Participants
Laura Crocetti, MD, Pisa, Italy (*Presenter*) Nothing to Disclose
Francesca Calcagni, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Giulia Gherarducci, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Francesco P. Tarantino, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Nevio Tosoratti, PhD, MA, Roma, Italy (*Abstract Co-Author*) Employee, HS Hospital Service SpA
Claudio Amabile, Aprilia (LT), Italy (*Abstract Co-Author*) Employee, HS Hospital Service SpA
Simone Cassarino, Aprilia (LT), Italy (*Abstract Co-Author*) Employee, HS Hospital Service SpA
Roberto Cioni, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Davide Caramella, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the reliability of point shear wave elastography (pSWE) to delineate, in ex-vivo bovine liver tissue, the boundaries of ablation zone produced by microwave ablation (MWA).

METHOD AND MATERIALS

Cuboidal specimens of at least 5 cm side were obtained from ex-vivo bovine liver and ablated by a commercial MWA system (HS AMICA®, H.S. Hospital Service SpA). B-mode imaging and shear wave velocity (SWV) were acquired simultaneously (Virtual Touch™ Tissue Quantification, Siemens Healthcare). Based on our previous experimental work, MWA was performed at 60 W until a SWV of 3m/sec was reached in a Region Of Interest (ROI) that was placed 1.5 cm radially from the antenna feed point. Afterwards, SWV was measured in several ROIs at established distances ranging from 10 mm to 40 mm from the antenna feed, acquiring 10 SWV determinations for each ROI. Finally, the specimens were cut along the antenna to obtain a gross-pathologic measurement of the coagulation necrosis boundary. An average SWV contour map was created, superimposing the pathology picture of the liver necrosis with the B-mode ultrasound images of ROIs' positions. The best SWV threshold for discriminating ablated from non-ablated tissue was identified by maximizing the predictive accuracy.

RESULTS

In all the experiments, the gross-pathology evaluation confirmed that the necrosis boundary was at approximately 1.5 cm from the antenna feed. The highest accuracy (0.86) of the pSWE-SWV contour maps was obtained with a threshold of 2.5 m/s, based on the 22 independent determinations of SWV available up to date. This finding is in good agreement with the results of our previous study, where we showed a steep and irreversible increase of the SWV when the tissue temperature exceeds 60°C. Reducing the number of SWV determinations in each ROI didn't change the threshold value for best accuracy.

CONCLUSION

pSWE can provide an elasticity threshold predictive of the presence of coagulation necrosis during and after MW ablation in ex-vivo liver model. An accurately determined elasticity threshold might help monitoring the boundaries of ablation zones in vivo.

CLINICAL RELEVANCE/APPLICATION

Initial results demonstrate clinical promise of elastosonography in thermal ablation procedures as a mean to provide accurate, non-invasive, real-time determinations of the ablation boundary.

VI263-SD-WEB2 Prevalence of Malignancy and Invasive Cancer in Analysis of 350 Ground-Glass Nodules 20mm or Smaller Obtained with CT-Guided Core Needle Biopsy

Station #2

Participants
Minako Azuma, Miyazaki, Japan (*Presenter*) Nothing to Disclose
Hiroshi Nakada, MD, PhD, Miyazaki-city, Japan (*Abstract Co-Author*) Nothing to Disclose
Mei Shimomura, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Youhei Hattori, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Koichi Kawanaka, MD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Yasuyuki Yamashita, MD, Kumamoto, Japan (*Abstract Co-Author*) Consultant, DAIICHI SANKYO Group
Toshinori Hirai, MD, PhD, Miyazaki, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

CT-guided core-needle lung biopsy is useful for evaluating pathology of ground-glass nodule (GGN). The aim of this study was to

determine the prevalence of malignancy and invasive cancer for GGNs 20mm or smaller using CT-guided core needle biopsy.

METHOD AND MATERIALS

We included 350 GGNs of 333 consecutive patients (204 women, 129 men; age range, 28-86 years; mean age, 67 years) from April 2011 to October 2015, with pulmonary GGN 20 mm or smaller suspected malignancy on CT images. All underwent percutaneous CT-guided core needle lung biopsy; 18G core biopsy needle and co-axial introducer needle were used. The type of GGNs was divided into two categories: pure or part solid type. Specimens were examined for both histology and microbiology. An experienced pathologist assessed the presence of malignancy and the invasiveness of cancer. The differences between the pure and part solid GGN groups were assessed with the chi-square test.

RESULTS

The success rate of CT-guided lung biopsy was 348 of 350 (99.4%) lesions. The prevalence of malignant tumor was 77.7% for GGNs 10 mm or smaller and 86.0% for GGNs from 11 to 20 mm. For pure GGNs, the prevalence of invasive cancer was 15.4% for lesions 10 mm or smaller and 24.5% for 11 to 20 mm. With regard to part solid GGNs, the prevalence of invasive cancer was 42.3% for lesions 10mm or smaller and 38.9% for 11 to 20 mm. Regardless of lesion size, the prevalence of invasive cancer was significantly higher for part solid GGNs than pure GGNs ($p < 0.05$).

CONCLUSION

Of GGNs 20mm or smaller, approximately 80% exhibits malignancy and the prevalence of invasive cancer is about 20%.

CLINICAL RELEVANCE/APPLICATION

For GGNs 20 mm or smaller, CT-guided core needle biopsy is useful for the diagnosis and the prevalence of invasive cancer may be higher than expectation.

VI264-SD-WEB3 Intrahepatic Biloma after Transcatheter Arterial Chemoembolization for Hepatocellular Carcinoma: Incidence, Imaging Features and Management

Station #3

Participants
Bo Zhang, Guangzhou, China (*Presenter*) Nothing to Disclose

PURPOSE

To investigate the clinical course, incidence, imaging features and outcome and to explore the reasonable therapy scheme of intrahepatic biloma after transcatheter arterial chemoembolization (TACE) for hepatocellular carcinoma (HCC).

METHOD AND MATERIALS

A total of 4,695 TACE procedures were performed for the 1,923 patients with HCC. Twenty patients with intrahepatic biloma after TACE were studied retrospectively.

RESULTS

The incidence of intrahepatic biloma was 1.04% in this study. The 20 patients underwent 55 TACE procedures (mean 2.75). Portal vein invasion was found in half of the patients. Eleven patients developed round solitary or multiple cystic biloma, 6 patients appeared branched biloma and 3 patients demonstrated both cystic and branched biloma. Percutaneous drainage was applied for 4 patients. One patient underwent partial hepatectomy and one died because of progressive biloma and multiple organ failure.

CONCLUSION

Intrahepatic biloma is one of the complications after TACE and has a broad spectrum of imaging features. Although the severe intrahepatic biloma is rare, a timely and appropriate management including percutaneous drainage, partial hepatectomy and antibiotics should be recommended for those patients.

CLINICAL RELEVANCE/APPLICATION

A timely and appropriate management including percutaneous drainage, partial hepatectomy and antibiotics should be recommended for those patients with severe intrahepatic biloma after TACE.

VI265-SD-WEB4 IVC Filter Complications in Radiology Reports vs Image Review

Station #4

Awards
Student Travel Stipend Award

Participants
Lawrence Lin, BA, Milwaukee, WI (*Presenter*) Nothing to Disclose
Sarah B. White, MD,MS, Philadelphia, PA (*Abstract Co-Author*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, IO Rad
Stephanie Dybul, Milwaukee, WI (*Abstract Co-Author*) Nothing to Disclose
Eric J. Hohenwalter, MD, Milwaukee, WI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study is to determine the accuracy of the diagnostic radiology report in reporting complication rates of IVC filters as determined by image review.

METHOD AND MATERIALS

A retrospective review of patients undergoing IVC filter placement from 2006-2013 was performed after IRB approval was obtained. 200 patients were randomly selected as a representative group for IVC filter placements from an institutional QA/QI database. Demographic data was collected, as was filter type, when and if the filters were removed, and follow-up time. Complication data,

specifically filter strut penetration, filter tilt or migration and IVC thrombosis, was extracted through review of radiology reports in the patient EMR. Those same cross-sectional imaging studies were then evaluated for the presence of those same complications. Strut penetration was graded on a scale of 0-4 (0: all filter struts confined within IVC lumen; 1: filter strut external but immediately adjacent to the IVC wall; 2: struts completely outside IVC lumen, as demonstrated by a halo of retroperitoneal fat; 3: struts adjacent to or inserting into an adjacent organ or retroperitoneal structure). Filter migration was determined using the in-software distance measurement tool comparing the difference between filter locations at time of placement with the most recent imaging.

RESULTS

101 male and 99 female patients with a mean age of 62 (range 23-101) and mean follow-up of 2.5 years (range 0-9.3) were reviewed. There were 81 permanent, 112 retrievable and 7 convertible filter placements with 43 filter retrievals, 5 conversions and 4 failed retrievals. The complication rates as extracted from the radiology reports vs. imaging review were strut penetration 3% vs. 13% (p = 0.0003), migration 0.5% vs. 8.5% (p = 0.0001), tilt 2.5% vs. 7.5% (p = 0.0365) and IVC thrombosis 4.5% in both. There were 17 grade 3, 4 grade 2 and 5 grade 1 filter strut penetrations. All filter migration was found to be caudal. Average migration distance was 33mm (range 14-65).

CONCLUSION

Complication rates of IVC filters as determined by image review were significantly different than reporting of strut penetration, migration and tilt.

CLINICAL RELEVANCE/APPLICATION

There is under-documentation of low mortality IVC filter complications, however radiology reports accurately capture clinically significant complications.

VI266-SD-WEB5 Implementation of a Magnetic-free Pulsating Flow Phantom: Comparison of Five 2D Phase-contrast Processing Systems

Station #5

Participants
Karine Warin-Fresse, Nantes, France (*Presenter*) Nothing to Disclose
Pauline Fourquet, Nantes cedex 1, France (*Abstract Co-Author*) Nothing to Disclose
Patrice Guerin, MD,PhD, Nantes cedex 1, France (*Abstract Co-Author*) Nothing to Disclose
Beatrice Guyomarc'h Delassalle, nantes cedex 1, France (*Abstract Co-Author*) Nothing to Disclose
Thomas Senage, MD, Nantes cedex 1, France (*Abstract Co-Author*) Nothing to Disclose
Marc Sirol, MD, PhD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Jean-Nicolas Dacher, MD, Rouen, France (*Abstract Co-Author*) Consultant, General Electric Company

PURPOSE

MRI is a non invasive and functional imaging technique. The 2D phase contrast (2D PC) sequence allows flow quantification. The first aim of the study was to design and build a magnetic free pulsating flow phantom. Second one was to compare, 5 different 2D PC solutions: Argus® (Siemens), Syngo® (Siemens), CVI® (Circle), Medis® and Terarecon®. The reference values were provided by the flow meter included in the device.

METHOD AND MATERIALS

Pulsating flow was generated by an artificial heart to obtain controlled values. Output and volumes were measured by 2D PC ranging 1.6 - 7 l/mn and on the following vessel diameters; 1.7cm, 2 cm and 3.5 cm. Each measure was performed three times with different velocity encoding from 100cm/s to 500 cm/s. Finally, all 285 measures were processed independently with each software.

RESULTS

Percentage changes between software results and control value were Argus® 12,4% ±14,8, Syngo 9,9%±10,4, CVI® 15,5% ± 11,3, Medis® 15.8% ± 15.5, terarecon® 13.3% ± 14.2. The Friedman test showed a significant difference (p<0,001) between the 5 solutions and control values. Medis® overestimated the mean outflow and antegrade volume (Wilcoxon test p=0,001).

CONCLUSION

This study showed a significant difference between 5 commercially available solutions in the evaluation of mean outflow and an overestimation of the mean outflow by Medis® comparatively to control values.

CLINICAL RELEVANCE/APPLICATION

MRI is a reliable tool for the assessment of pulsatil flow.

VI267-SD-WEB6 Clinical Significance of Stent Abutment in Gastroduodenal Stent Placement for Gastric Outlet Obstructions: Experience in 318 Patients

Station #6

Participants
Jung-Hoon Park, PhD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Guk Bae Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ho-Young Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Namkug Kim, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Stockholder, Coreline Soft, Inc
Jiaywei Tsauo, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Min Tae Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the clinical significance of stent abutment after gastroduodenal stent placement in 318 patients with gastric outlet obstruction (GOO) due to unresectable gastric cancer.

METHOD AND MATERIALS

A retrospective study was performed in a single, tertiary-referral, university hospital to identify the incidence and clinical significance for stent abutment in patients who underwent placement of a self-expandable metallic stent (SEMS). Stent abutment was defined as abutment of the distal end of the stent to the duodenal wall and/or superior duodenal flexure. Outcomes analyzed included technical and clinical success, complications, re-intervention, stent patency, and survival.

RESULTS

A total of 318 patients met our inclusion criteria, including 107 patients in stent abutment (SA) group and 211 patients in non-stent abutment (NSA) group. Stent abutment occurred partially (n = 64, 59.8%) and completely (n = 43, 40.2%). The technical, clinical outcomes and survival were similar in the two groups. Complication and re-intervention rates were higher in the SA than in the NSA group (P = 0.001 and P = 0.008, respectively). Food impaction rate was higher in the SA than in the NSA group (P < 0.001) and was associated with complete SA (P = 0.007). Stent patency rate was lower in the SA than in the NSA group (P = 0.003).

CONCLUSION

Stent abutment was associated with increased food impaction, resulting in higher stent malfunction and shorter stent patency compared with non-stent abutment. The novel concept of stent abutment may be useful in improving the stent patency and avoiding food impaction.

CLINICAL RELEVANCE/APPLICATION

Stent abutment was associated with frequent food impaction resulting in a shortening of stent patency and an increase of overall complication and re-intervention rates.

VI268-SD-WEB7 Outcomes of a New Very Small Diameter Drug Eluting Embolic Beads for Transarterial Chemoembolization in Unresectable Hepatocellular Carcinoma: A Single Center Experience

Station #7

Participants
Ahmed K. Abdel Aal, MD, PhD, Birmingham, AL (*Presenter*) Consultant, St. Jude Medical, Inc; Consultant, Baxter International Inc; Consultant, C. R. Bard, Inc
Bradford Jackson, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
George R. Newman, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Christopher G. Baalmann, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Keith Pettibon, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Annie L. Harris, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Anand R. Patel, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Zachary A. Lambertsen, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Sherif M. Moawad, MBBCh, MSc, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose
Mauro M. Hanaoka, MD, Sao Paulo, Brazil (*Abstract Co-Author*) Nothing to Disclose
Amr S. Moustafa, MBBCh , Little Rock, AR (*Abstract Co-Author*) Nothing to Disclose
Souheil Saddekni, MD, Birmingham, AL (*Abstract Co-Author*) Consultant, St. Jude Medical, Inc

PURPOSE

The purpose of the study is to evaluate the tumor response rate and survival outcomes of a transarterial chemoembolization (TACE) of unresectable hepatocellular carcinoma (HCC) using 75 microns Oncozene (Boston Scientific, MA, USA) drug-eluting beads (DEB).

METHOD AND MATERIALS

We retrospectively reviewed the medical records and radiologic studies of 67 patients who had their first TACE for HCC between November 2013 and December 2015 using 75 microns Oncozene DEB. The primary endpoint of the study was tumor response rate which was categorized according to the modified Response Evaluation Criteria in Solid Tumors (mRECIST) and the toxicity profile of the DEB using Common Terminology Criteria for Adverse Events (CTCAE) version 3.0. The secondary endpoint was patient survival.

RESULTS

The study included 52 males and 15 females with a mean age of 63.8 years. HCV was seen in 58% of the patients. Overall tumor response on follow up CT and/or MRI done 4-6 weeks after TACE was 24% complete response, 78% objective response and 88% disease control. Complete response, objective response and disease control were 27%, 75% and 88% respectively in Child-Pugh A patients, and 26%, 79% and 91% respectively in Barcelona Clinic Liver Cancer (BCLC) stages A and B patients. Grades 3 toxicity was seen in 9% of the patients. There was no grade 4 toxicity recorded. The 6 and 12 month survival were 98% (95% CI: 89.4-99.9%, p<0.0001) and 90% (95% CI: 68.3-98.8%, p<0.001) respectively.

CONCLUSION

The present study shows very good tumor response rate to TACE using 75 microns Oncozene DEB, with very low toxicity profile. Short-term survival outcomes appear to be promising with 98% and 90% survival at 6 and 12 months respectively.

CLINICAL RELEVANCE/APPLICATION

The present study shows that TACE using 75 microns Oncozene DEB is effective with very good radiologic response and short-term survival outcomes, and safe with very low toxicity profile, for treatment of nonresectable HCC.

VI155-ED-WEB8 Portal Vein Embolization: "Who, What, Where, When, Why, and How"

Station #8

Participants
Daniel B. Gans, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Jon Davidson, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose
Eric D. McLoney, MD, Chapel Hill, NC (*Abstract Co-Author*) Nothing to Disclose
Sidhartha Tavri, MBBS, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Christopher M. Sutter, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose

Indravadan J. Patel, MD, Cleveland, OH (*Abstract Co-Author*) Nothing to Disclose

TEACHING POINTS

To review the patient selection, pathophysiology, indications/contraindications, technique, outcomes, and imaging involved in portal vein embolization.

TABLE OF CONTENTS/OUTLINE

"What" Brief review of percutaneous, endovascular, and surgical therapies for primary hepatic malignancies Liver regeneration pathophysiology "Why" Justification of procedure prior to liver resection "Where" Anatomy and diagnostic imaging Preprocedural imaging and procedural planning "When" Timeline of liver regeneration prior to resection "Who" Patient selection Indications/contrainidcations "How" How to perform procedure Technical considerations Outcomes Success rates Complications

VSIO41

Interventional Oncology Series: Mechanisms Matter: Basic Science Every IO Should Know

Wednesday, Nov. 30 1:30PM - 6:00PM Room: S405AB

GI IR

AMA PRA Category 1 Credits ™: 4.25
ARRT Category A+ Credits: 5.00

FDA Discussions may include off-label uses.

Participants
S. Nahum Goldberg, MD, Jerusalem, Israel, (sgoldber@bidmc.harvard.edu) (*Moderator*) Consultant, AngioDynamics, Inc; Research support, Cosman Medical, Inc; Consultant, Cosman Medical, Inc;

LEARNING OBJECTIVES

1) Gain an appreciation of the basic scientific underpinnings of interventional oncology. 2) Understand how and why these mechanistic studies can have an impact on both daily clinical practice and future therapeutic paradigms. 3) Characterize the most important advances of tumor ablation over the last two decades. 4) Gain a better understanding of the cutting edge imaging techniques that facilitate successful state of the art interventional oncologic practice.

ABSTRACT

The first half of the session has been organized into a thematic unit entitled: "Mechanisms Matter: Basic science every IO should know" and will be dedicated to gaining an appreciation of the basic scientific underpinnings of interventional oncology and understand how and why such studies can have an impact on both daily clinical practice and future therapeutic paradigms. This will include an initial lecture outlining the many insights and lessons that can be directly applied from radiation therapy and hyperthermia, followed by lectures that center upon key mechanistic pathways that are being used to improve transcatheter embolization and tumor ablation. Two presentations will outline our current understanding of the potential systemic effects of post-procedure, cytokine-mediated inflammation - the negative effects leading to tumorigenesis and the potential beneficial immune (abscopic) effects of IO therapies. A highlight of the session will be a keynote address "20 years of thermal ablation: Progress, Challenges and Opportunities". Dr. Solomon, a noted thought leader in the field will not only characterize the most important advances of tumor ablation over the last two decades and place them in their proper historical and developmental context, but will also identify key areas of research in device and technique development that hold the potential to propel the field forward in the upcoming decade. The second half of the session "Advancing IO with cutting-edge imaging techniques" will be dedicated to the cutting edge imaging modalities that facilitate successful state of the art IO practice. Leading authorities will provide an in depth look at advances and adaptation of 5 of the main technologies as they relate to enhancing interventional oncology including: advanced ultrasound and fusion techniques; state-of-the-art angiographic imaging (including Cone beam CT and subtraction reconstruction); tailoring MR for IO; the the role of PET/CT; and molecular imaging.

Sub-Events

VSIO41-01 Thermal Biophysiology - The Basis for Improving Tumor Ablation

Wednesday, Nov. 30 1:30PM - 1:45PM Room: S405AB

Participants
Christopher L. Brace, PhD, Madison, WI, (clbrace@wisc.edu) (*Presenter*) Shareholder, NeuWave Medical Inc Consultant, NeuWave Medical Inc Shareholder, Symple Surgical Inc Consultant, Symple Surgical Inc

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-02 Ischemia - The Primer Mover: Apoptosis, Hif-1a and VEGF Pathways

Wednesday, Nov. 30 1:45PM - 2:00PM Room: S405AB

Participants
Bradford J. Wood, MD, Bethesda, MD (*Presenter*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, W. L. Gore & Associates, Inc ; Researcher, Cook Group Incorporated; Patent agreement, VitalDyne, Inc; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; ; ; ;

LEARNING OBJECTIVES

View learning objectives under the main course title.

VSIO41-03 Sensitivity of Hepatocellular Cell Lines to Aerobic and Glycolytic Metabolic Inhibitors under Simulated Heat Shock and Hypoxia

Wednesday, Nov. 30 2:00PM - 2:10PM Room: S405AB

Awards
Student Travel Stipend Award

Participants
Andrew J. Barrow, MD, Houston, TX (*Presenter*) Nothing to Disclose
Andrea Cortes, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Rony Avritscher, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Derek L. West, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study is to explore targeted killing of hepatocellular cancer cells surviving incomplete thermal ablation through the use of metabolic inhibitors. We investigate the sensitivity of hepatocellular cell lines to various metabolic inhibitors under the following conditions: normal culture conditions, following sub-lethal heat exposure, and hypoxic conditions, in order to simulate the effects of incomplete ablation.

METHOD AND MATERIALS

Human Hep3B and HepG2 and rat RH-7777 hepatocellular tumor lines were exposed to sub-lethal heat shock at 43 C or to normal incubation temperature of 37 C. Cells were then treated with serial dilutions of the glycolytic inhibitors: 3-bromopyruvate or FX-11, or modulators of oxidative phosphorylation: neutralized dichloroacetic acid (DCA), antimycin A, carbonyl cyanide-4-trifluoromethoxy phenylhydrazone (FCCP), or a combination of FX-11 and antimycin A. Hypoxia experiments were performed by pre-incubating cells in a hypoxic environment, and then treating with serial dilutions of doxorubicin, FX-11, and Antimycin A. Cell viability was assessed using resazurin indicator and plate reader.

RESULTS

All hepatocellular cell lines demonstrated cytotoxicity to all of the glycolytic and anaerobic inhibitors in a concentration dependent manner. Heat shock experiments demonstrated that hepatocellular cell lines exposed to sub-lethal heat shock were surprisingly less sensitive to 3-bromopyruvate than controls maintained at normal culture conditions. For the other inhibitors, no significant differences in sensitivity were observed between sub-lethal heat shock groups and control groups. Hypoxia experiments revealed that all hepatocellular cell lines demonstrated increased sensitivity to doxorubicin in hypoxic conditions. In addition, this effect was further potentiated by the glycolytic inhibitor FX-11, but not oxidative phosphorylation inhibitor (OXPHOS) antimycin A.

CONCLUSION

Hypoxia increases the sensitivity of hepatocellular cell lines to doxorubicin, an effect which is further potentiated by the glycolytic inhibitor FX-11, but not by OXPHOS inhibitor Antimycin A.

CLINICAL RELEVANCE/APPLICATION

Our results imply that oxidative phosphorylation is important in doxorubicin sensitivity, and that FX-11 is a useful candidate to increase the efficacy of hypoxia inducing cancer treatments such as chemoembolization and anti-VEGF therapy

VSIO41-04 Tailoring Nanodrugs for IO: Free Radicals, Heat Shock Proteins, and Beyond

Wednesday, Nov. 30 2:10PM - 2:25PM Room: S405AB

Participants
S. Nahum Goldberg, MD, Jerusalem, Israel, (sgoldber@bidmc.harvard.edu) (*Presenter*) Consultant, AngioDynamics, Inc; Research support, Cosman Medical, Inc; Consultant, Cosman Medical, Inc;

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-05 Thermal Ablation: Induction of Tumorigenesis Factors by in Vitro Hyperthermia

Wednesday, Nov. 30 2:25PM - 2:35PM Room: S405AB

Participants
Aurelia Markezana, MSc, Jerusalem, Israel (*Presenter*) Nothing to Disclose
Elina Zorde Khvalevsky, PhD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose
Eithan Galun, MD, PhD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Svetlana Gourovich, BSC, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
S. Nahum Goldberg, MD, Jerusalem, Israel (*Abstract Co-Author*) Consultant, AngioDynamics, Inc; Research support, Cosman Medical, Inc; Consultant, Cosman Medical, Inc;

PURPOSE

To determine whether the moderate hyperthermic doses, routinely encountered in the periablational zone during radiofrequency and microwave ablation, induce pro-tumorigenic genetic and proteomic activation of tumor cells and hepatocytes.

METHOD AND MATERIALS

An in vitro assay was established to asses the effect of hyperthermia on tumorigenesis factor induction. R3230 rat mammary tumor cells (n=2.5x10^5) were heated in 250 µl RPMI+10%FCS medium to 45±1ºC or 43±1ºC for 0, 2, 5, & 10 min and then incubated at 37ºC in a humidified incubator for 1.5, 3, 8, or 24 hr (n=3 trials each; total N=135). Primary mouse hepatocytes (n=4x10^5) were also heated in 1ml DMEM/F12+5%FCS medium to 45±1ºC or 44±1ºC (N=48). mRNA expression profile of factors and cytokines implicated in RF-induced tumorigenesis including IL-6, TNFα,STAT3, hepatocyte growth factor (HGF) and vascular endothelial growth factor (VEGF) were evaluated by relative quantitative Real-Time PCR. Heat shock protein (HSP) 70 was used as control. Secretion of cytokine IL-6 at 3 and 8 hr following 45±1ºC heating for 5 min was assessed by ELISA, with intracellular transcription factor STAT3 assessed by Western blot.

RESULTS

Dose and time dependent elevation of HSP70, IL-6, TNFα, and HGF gene expression were observed. For R3230, IL-6 and TNFα mRNA levels were maximum at 3hr incubation following 45ºCx10min heating (11.8±7.8 and 19.1±15.9 fold induction, respectively). HGF expression peaked at 8hr with a maximal induction of 24.1±17.8. HSP70 expression also peaked at 8 hr with a maximal induction of 156.2± 17.8 fold over unheated controls. Likewise, IL-6 expression doubled at 44ºC for hepatocytes. For both cell types, STAT3 doubled its expression at 3hr. VEGF expression showed little if any upregulation. At 43ºC HSP70 was the only gene with elevated expression. ELISA of IL-6 confirmed a significant time dependent increase of IL-6 secretion by 14±3 % over controls ($p<0.05$) at 8hr. Likewise, Western blot of R3230 demonstrated an increase of 20 ±10% ($p<0.05$) STAT3 total protein at 8hr compared to unheated controls.

CONCLUSION

Both hepatocytes and some tumor cell populations react to heating by increasing transcription, secretion, and protein production of factors that are known to induce increased post-ablation tumorigenesis.

CLINICAL RELEVANCE/APPLICATION

Elucidation of the pathways that can potentially induce tumorigenesis post-ablation may allow us to uncover robust methods to eliminate these unwanted secondary effects.

VSIO41-06 Non-thermal Percutaneous Ablation: Cryo, IRE and More

Wednesday, Nov. 30 2:35PM - 2:50PM Room: S405AB

Participants
Stephen B. Solomon, MD, New York, NY (*Presenter*) Research Grant, General Electric Company

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-07 Optimizing Irreversible Electroporation (IRE) Ablation with a Bipolar Electrode

Wednesday, Nov. 30 2:50PM - 3:00PM Room: S405AB

Participants
Ayelet Wandel, MD, Holon, Israel (*Presenter*) Nothing to Disclose
Eliel Ben-David, MD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Mohamed Faroja, MD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Isaac Nissenbaum, BSc, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Svetlana Gourovich, BSC, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
S. Nahum Goldberg, MD, Jerusalem, Israel (*Abstract Co-Author*) Consultant, AngioDynamics, Inc; Research support, Cosman Medical, Inc; Consultant, Cosman Medical, Inc;

PURPOSE

To prospectively optimize bipolar irreversible electroporation (IRE) by characterizing the effects of electrical parameters and controlling tissue electrical properties.

METHOD AND MATERIALS

Single electrode bipolar IRE was performed in 28 in-vivo pig livers (78 ablations). First, effects of voltage (2,700- 3,000V), number of pulses, repeated cycles (1-6), and pulse width (70- 100µsec) were studied. Next, electrical conductivity was altered by instillation of hypertonic and hypotonic fluids. Finally, effects of thermal stabilization were assessed using internal electrode cooling. Treatment effect was evaluated 2-3hr post-IRE. Dimensions were compared and subjected to statistical analysis.

RESULTS

Delivering 3,000 V at 70µsec for a single 90 pulse cycle yielded 3.8±0.4 x 2.0±0.3cm of ablation. Applying 6 cycles of energy increased the ablation to 4.5±0.4 x 2.6±0.3cm ($p<0.001$). Further increasing pulse lengths to 100µsec (6 cycles) increased ablation to 5.0±0.4 x 2.9±0.3cm ($p<0.001$), but resulted in electric spikes and system crashes in 40-50% of cases. Increasing tissue electrical conductivity via hypertonic solution instillation in surrounding tissues increased the frequency of generator crashes, whereas continuous instillation of distilled water eliminated this arcing phenomenon, but reduced ablation to 2.3±0.1cm. Controlled instillation of distilled water when electrical arcing was suspected from audible popping produced ablations of 5.3±0.6 x 3.1±0.3cm without crashes. Finally, 3.1±0.1cm short-axis ablation was achieved without system crashes with internal electrode perfusion at 37°C vs. 2.3±0.1cm with 4-10°C perfusion ($p<0.001$).

CONCLUSION

Bipolar IRE ablation zones can be increased with repetitive high voltage and greater pulse widths while performing maneuvers such as judicious instillation of hypotonic fluids or internal electrode perfusion that minimize accompanied unwanted electrical arcing.

CLINICAL RELEVANCE/APPLICATION

The development of single insertion IRE devices that can achieve clinically meaningful ablation sizes will facilitate appropriate adoption of this platform for clinical practice.

VSIO41-08 Understanding Post-Procedure Inflammation: AKT and C-Met Pathways

Wednesday, Nov. 30 3:00PM - 3:15PM Room: S405AB

Participants
David A. Woodrum, MD, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-09 Systemic Implications of IO Therapies: Increased Tumorigenesis?

Wednesday, Nov. 30 3:15PM - 3:30PM Room: S405AB

Participants
Muneeb Ahmed, MD, Wellesley, MA, (mahmed@bidmc.harvard.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

VSIO41-10 Targeting STAT3 to Suppress the Systemic Pro-Oncogenic Effects of Hepatic RF Ablation

Wednesday, Nov. 30 3:30PM - 3:40PM Room: S405AB

Participants
Gaurav Kumar, PhD, Boston, MA (*Presenter*) Nothing to Disclose
S. Nahum Goldberg, MD, Jerusalem, Israel (*Abstract Co-Author*) Consultant, AngioDynamics, Inc; Research support, Cosman Medical, Inc; Consultant, Cosman Medical, Inc;
Eithan Galun, MD, PhD, Jerusalem, Israel (*Abstract Co-Author*) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To identify key expressed genes in the periablational rim after hepatic radiofrequency ablation (RFA) and their role in driving the stimulation of distant tumor growth in small animal models.

METHOD AND MATERIALS

First, gene expression analysis (Illumina array) was performed after RFA of normal liver in C57BL mice. 12 mice were allocated to receive RFA (70ICx5min) or sham electrode placement (no RF). Periablational liver was harvested at 24, 72h, and 7d post RFA. Data was analyzed for differentially expressed genes (>2 fold change) and their functional annotations. Next, STAT3 was identified as a key periablational mediator, and 16 F344 animals were allocated to hepatic RFA or sham treatment ± STAT3 inhibitor S3I-201 (4 groups, n=4) for pSTAT3 immunohistochemistry (IHC) at 24h. Finally, 24 rats were implanted with subcutaneous R3230 adenocarcinoma and allocated to RFA or sham ± S3I-201 arms (4 groups; n=6). Outcomes included tumor growth analysis, tumor proliferation (Ki67) and microvascular density(MVD) analysis.

RESULTS

At 24h post-RFA, 217 genes had altered expression (107 up-regulated/110 down-regulated). This decreased to 55 genes (27 up/28 down) and 18 genes at 72h and 7d post-RF, respectively. At 24h, functional annotations identified 7 activated pathways of which the STAT3 gene occurred in 4 including those associated with various pro-oncogenic genes and pathways. Correlative IHC of the periablational rim 24h after hepatic RFA confirmed elevated pSTAT3 activation, which was suppressed using S3I-201 (31.7±3.4 vs. 3.8±1.7% cells/field; $p<0.001$). The addition of S3I-201 with hepatic RFA reduced systemic distant R3230 tumor growth including compared to the sham arm (at 7d, RFA/S3I-201: 11.8±0.5mm; RFA alone: 19.8±0.7mm; S3I-201 alone: $p<0.001$; sham: 15±0.7mm, $p<0.001$ for all comparisons). Distant tumor proliferation and MVD mirrored trends in tumor growth between arms.

CONCLUSION

STAT3 activation is observed after hepatic RFA in rodents and can be suppressed using adjuvant STAT3 inhibitor. This may represent a clinically implementable solution for blocking unwanted 'off-target' effects of RFA generated by several upstream genes such as IL-6.

CLINICAL RELEVANCE/APPLICATION

Local STAT3 inhibition after hepatic RFA may offer a clinically implementable solution for blocking systemic tumorigenic effects of RFA generated by upstream cytokines/factors.

VSIO41-11 Systemic Implications of IO Therapies: Beneficial Immune Effects?

Wednesday, Nov. 30 3:40PM - 3:55PM Room: S405AB

Participants
Joseph P. Erinjeri, MD, PhD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-12 Panel Discussion: So What Does all This Mean?

Wednesday, Nov. 30 3:55PM - 4:05PM Room: S405AB

Participants

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-13 Trancatheter IO: 30 Years of Progress, Challenges and Opportunities

Wednesday, Nov. 30 4:05PM - 4:20PM Room: S405AB

Participants
Jean-Francois H. Geschwind, MD, Westport, CT, (jeff.geschwind@yale.edu) (*Presenter*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC

LEARNING OBJECTIVES

1. Learn the scientific rationale for intra-arterial therapy in Liver Cancer2. Understand the pharmacokinetic principles of TACE3. Recognize the impact of Cone Beam CT imaging on the efficacy of TACE

ABSTRACT

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-14 Advancing IO with Cutting-edge Imaging Techniques

Participants

LEARNING OBJECTIVES

View learning objectives under main course title.

VSIO41-15 Advanced Ultrasound and Fusion Techniques

Wednesday, Nov. 30 4:30PM - 4:45PM Room: S405AB

Participants
Luigi Solbiati, MD, Rozzano, Italy, (lusolbia@tin.it) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

VSIO41-16 Response Assessment by Volumetric Iodine-uptake Measurement: Preliminary Experience in Patients with Intermediate-advanced Hepatocellular Carcinoma Treated with Radioembolization

Wednesday, Nov. 30 4:45PM - 4:55PM Room: S405AB

Participants
Giulia Lorenzoni, Pisa, Italy (*Presenter*) Nothing to Disclose
Alessandro Grigolini, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Irene Bargellini, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Laura Crocetti, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Roberto Cioni, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose
Davide Caramella, MD, Pisa, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the volumetric iodine-uptake (VIU) changes by dual-energy CT (DECT) in assessing early response to selective internal radiotherapy (SIRT) in hepatocellular carcinoma (HCC) patients, compared with RECIST 1.1 and mRECIST.

METHOD AND MATERIALS

Nineteen patients treated with 24 sessions of SIRT were included in this retrospective study. At baseline and early (4-8 weeks) follow-up, target lesion response was assessed by RECIST 1.1, mRECIST, tumor volume (cm3), mean iodine content (µg/cm3) and VIU (mg). Cox regression and Kaplan-Meyer analysis were used to explore differences in overall survival between responders and non-responders for each method.

RESULTS

There were 18 (75%) responders for tumor volume (≥10% decrease), 9 (37.5%) responders for iodine content (≥20% decrease) and 18 (75%) responders for VIU. Cumulative survival significantly ($p<0.01$) correlated with all these parameters, with the strongest correlation found with the iodine content. As opposite, there was no significant association between survival and RECIST 1.1 (CR+PR: 16.7%, 4 patients) and mRECIST (CR+PR: 33.3%, 8 patients).

CONCLUSION

Early assessment of volume and iodine content changes after SIRT can differentiate responders from non-responders, overcoming the limitations of RECIST 1.1 and mRECIST.

CLINICAL RELEVANCE/APPLICATION

Volumetric iodine-uptake changes can assess early response to radioembolization in hepatocellular carcinoma patients, correlating with cumulative survival.

VSIO41-17 State-of-the-Art Angiographic Imaging: Cone Beam CT and Beyond

Wednesday, Nov. 30 4:55PM - 5:10PM Room: S405AB

Participants
Ming De Lin, PhD, Cambridge, MA, (ming.lin@philips.com) (*Presenter*) Employee, Koninklijke Philips NV

LEARNING OBJECTIVES

-Discuss the role of cone-beam computed tomography (CBCT) for intraprocedural imaging during transcatheter arterial chemoembolization (TACE)-Explain the advantages of CBCT over standard 2D angiography in the detection of hepatocellular carcinoma lesions and their feeding arteries-Describe how CBCT during TACE can be used to assess the technical endpoint of embolization-Show how 3D quantification can be used in CBCT and how this fits into the treatment workflow along with MR and MDCT.

ABSTRACT

Cone-beam computed tomography (CBCT) is an imaging technique that provides 3D imaging intraprocedurally from a rotational scan

acquired with a C-arm equipped with a flat panel detector. Utilizing CBCT images during interventional procedures bridges the gap between the world of diagnostic imaging, where the image acquisition is typically performed separately from the procedure, and that of interventional radiology, which traditionally has been 2-dimensional (fluoroscopy and angiography).In the scope of transcatheter arterial chemoembolization (TACE), CBCT is capable of providing more information than standard two-dimensional imaging alone in localizing and/or visualizing liver tumors ("seeing" the tumor) and targeting tumors though precise microcatheter placement in close proximity to the tumors ("reaching" the tumor). It can also be useful in evaluating treatment success at the time of procedure ("assessing" treatment success). We will also look into how 3D quantification can be used in CBCT and how this fits into the treatment workflow along with MR and MDCT.

LEARNING OBJECTIVES

1) Discuss the role of cone-beam computed tomography (CBCT) for intraprocedural imaging during transcatheter arterial chemoembolization (TACE). 2) Explain the advantages of CBCT over standard 2D angiography in the detection of hepatocellular carcinoma lesions and their feeding arteries. 3) Describe how CBCT during TACE can be used to assess the technical endpoint of embolization. 4) Show how 3D quantification (qEASL) can be used in CBCT and how this fits into the treatment workflow along with MR and MDCT.

ABSTRACT

Cone-beam computed tomography (CBCT) is an imaging technique that provides 3D imaging intraprocedurally from a rotational scan acquired with a C-arm equipped with a flat panel detector. Utilizing CBCT images during interventional procedures bridges the gap between the world of diagnostic imaging, where the image acquisition is typically performed separately from the procedure, and that of interventional radiology, which traditionally has been 2-dimensional (fluoroscopy and angiography).In the scope of transcatheter arterial chemoembolization (TACE), CBCT is capable of providing more information than standard two-dimensional imaging alone in localizing and/or visualizing liver tumors ("seeing" the tumor) and targeting tumors though precise microcatheter placement in close proximity to the tumors ("reaching" the tumor). It can also be useful in evaluating treatment success at the time of procedure ("assessing" treatment success). We will also look into how 3D quantification (qEASL) can be used in CBCT and how this fits into the treatment workflow along with MR and MDCT.

VSIO41-18 Validation of a CBCT Virtual Injection and Perfusion Planning Tool with Selective CBCT Angiography and Radiopaque Bead Embolization

Wednesday, Nov. 30 5:10PM - 5:20PM Room: S405AB

Participants
William F. Pritchard Jr, MD, PhD, Bethesda, MD (*Presenter*) Nothing to Disclose
Martijn Van Der Bom, MSC, Andover, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
William van der Sterren, MSc, Best, Netherlands (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Haydar Celik, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Alessandro G. Radaelli, PHD, MS, Best, Netherlands (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, W. L. Gore & Associates, Inc ; Researcher, Cook Group Incorporated; Patent agreement, VitalDyne, Inc; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; ; ; ;
Juan A. Esparza, Laurel, MD (*Abstract Co-Author*) Nothing to Disclose
David L. Woods Jr, MS,BA, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Ivane Bakhutashvili, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Elliot B. Levy, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Venkatesh P. Krishnasamy, MD, Delaware, OH (*Abstract Co-Author*) Nothing to Disclose
John W. Karanian, PhD, Laurel, MD (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the accuracy of novel virtual injection and perfusion planning software based on arterial CBCT angiograms in predicting regions of subsequent selective actual perfusion and embolization in the liver

METHOD AND MATERIALS

Nonselective dual phase CBCT angiography of the liver (XperCT, Allura Xper FD20, Philips, Best, Netherlands) was performed in 3 domestic swine. Virtual perfusion maps of 9 target hepatic arteries were extracted using novel software added on the framework of a 3D vessel-tracking and fluoroscopy guidance platform for tumor embolization (Emboguide, Philips). Target arteries were selectively catheterized and dual phase CBCT performed without reflux for retrospective comparison to the virtual perfusion maps. The virtual catheter site was selected based on actual catheter location. The software identified all downstream arterial branches supplied and generated a map of adjacent tissue perfused. One target artery in each animal was embolized to stasis using radiopaque beads (LC Bead LUMI, Biocompatibles UK, Farnham, UK) followed by CBCT. Anonymized imaging data from a patient with hypervascular liver tumors undergoing DEB/TACE were retrospectively analyzed with the same virtual perfusion software to assess its potential for prediction of subselective perfusion and embolization.

RESULTS

In all injections, the manually selected virtual injection and virtual perfusion maps corresponded to actual target vessels and contrast-perfused tissue in swine. The imageable beads co-localized in the expected distribution of the virtual injection. The software successfully correlated virtual and actual perfusion in a patient undergoing DEB TACE.

CONCLUSION

Virtual injection and perfusion maps derived from CBCT using novel software corresponded to actual target vessels and embolized tissue in a swine model.

CLINICAL RELEVANCE/APPLICATION

This virtual injection and perfusion software may provide a useful tool for procedural definition of partitions of the tumor in planning and predicting DEB/TACE delivery and facilitate sequential subselective embolization.

VSIO41-19 Tailoring MR for IO

Wednesday, Nov. 30 5:20PM - 5:35PM Room: S405AB

Participants
Philippe L. Pereira, MD, Heilbronn, Germany (*Presenter*) Research Consultant, Terumo Corporation; Speaker, AngioDynamics, Inc; Speaker, Terumo Corporation; Advisory Board, Siemens AG; Advisory Board, Terumo Corporation; Board, Bayer AG; Advisory Board, Medtronic, Inc; Support, Bracco Group; Support, PharmaCept GmbH; Support, Terumo Corporation; Support, Siemens AG; Support, Novartis AG; Support, Cook Group Incorporated; Research Grant, Biocompatibles International plc; Research Grant, Siemens AG; Research Grant, Terumo Corporation; Research Grant, BTG International Ltd

LEARNING OBJECTIVES

View learning objectives under main course title.

ABSTRACT

MR imaging is now used for guidance of biopsy and for therapy with thermal ablation. During the last 15 years, field of interventional MRI has switched from experimental studies to clinical application in patients presented with cancer. The major role of image guidance for biopsy and thermal ablation is to ensure a safe and precise intervention with a percutaneous approach, i.e. biopsy of viable tumor tissue or for thermal ablation a complete coagulative necrosis of targeted tumor tissue including a safety margin without injury of critical structures. Therefore, image guidance during the intervention should allow a 3D-planning and provide an exact targeting, a reliable monitoring in case of therapy, and a controlling after ablation therapy. A precise targeting for the placement of the instrument is a precondition for a safe and effective intervention. New MR-scanners offer the unique possibility to combine the advantages of MR imaging such as excellent soft-tissue contrast, multiplanar capabilities, ultra-fast imaging, and sensitivity to thermal effects, during the entire ablation procedure with a good access to the patients. The development of fast acquisition techniques with adequate temporal and spatial resolution necessary to perform thermal therapies as well as the advance of different configured MR-Scanners e.g. open-bore contributed mostly to the development of interventional MR imaging over the last years. Finally, more sophisticated features available in high-field MR-Scanners such as assessment of different physiological information with diffusion weighted imaging (DWI) and near on-line temperature monitoring, which represents an essential feature in MR imaging-guided percutaneous ablation for the control of heat distribution. Regarding the clear advantages by using MR imaging in interventional oncology, it is somewhat surprising that the use of MR guided for intervention remains after almost 20 years of clinical evaluation still limited to some centers worldwide. Limited availability of open bore MR scanners is probably the main reason for its reduced use in interventional oncology. The feasibility of MR guided intervention specially thermal ablation has been evaluated in several clinical studies, showing its effectivity, its safety and even its time-efficacy in skilled hands.

VSIO41-20 Volumetric Changes in the Enhancing Tumor Burden Can Be Used to Evaluate Tumor Response and Predict Survival Early in Patients with Infiltrative/Multifocal Hepatocellular Carcinoma (HCC) after the First Transcatheter Arterial Chemoembolization (TACE)

Wednesday, Nov. 30 5:35PM - 5:45PM Room: S405AB

Participants
Cuihong Liu, Jinan, China (*Presenter*) Nothing to Disclose
Susanne Smolka, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Duc Do Minh, BSc, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
John Treilhard, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Qiang Huang, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Julius Chapiro, MD, New Haven, CT (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV
Ming De Lin, PhD, Cambridge, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC

PURPOSE

Imaging based response assessment after transcatheter arterial chemoembolization (TACE) is important. A new 3D enhancement based approach (quantitative European Association for the Study of the Liver [qEASL]) has been shown to be more accurate than traditional methods (RECIST, mRECIST, WHO, EASL). Previous qEASL works were done on a lesion basis with ≤3 hepatocellular carcinoma (HCC) tumors per patient and the lesions had well-defined tumor borders. In this work, we evaluated patients with either multi-focal or infiltrative (ambiguous tumor border) HCC on a whole liver basis. This study investigates whether the whole liver enhancement pattern (enhancing tumor burden [ETB]) can be used to measure treatment response and predict survival.

METHOD AND MATERIALS

Retrospective study of 53 patients with infiltrative or multifocal HCC treated by TACE from 2001-14. Semi-automated 3D quantification software was used to segment the whole liver and calculate the ETB on multi-phasic contrast-enhanced MRI before and 1 month after TACE. The whole liver was segmented, then pre-contrast MR was registered to and subtracted from arterial phase MR. To calculate ETB, amount of voxels with greater enhancement than healthy liver (user indicated in 10x10x10 ROI) was measured. ETB change before and after TACE was used to assess response. Survival analysis included Kaplan-Meier curves with log-rank test and Cox regression. Cutoffs distinguishing responders from non-responders were 20,25,30,35,40,45 and 50% reduction in ETB. Akaike information criterion (AIC) was used to determine optimal cutoff to predict survival.

RESULTS

Mean age 59.9 years, 73.6% male, 30.2% presented with >50% tumor burden, 43.4% portal venous invasion, and none had extrahepatic metastasis. Mean ETB decreased significantly after TACE: 997.9 to 629.4cm3 ($p<0.01$). There was significant survival difference between responders (2.1-85.1months) and non-responders (15.8-44months); all cutoffs $p<0.01$. Based on AIC, 45% response cutoff was best predictive model (HR:0.06, 95%CI: 0.13-0.267, $p<0.01$)

CONCLUSION

Volumetric ETB can be used to evaluate the tumor response and predict survival in patients with infiltrative, multifocal HCC after first TACE.

CLINICAL RELEVANCE/APPLICATION

Response assessment after TACE for infiltrative and multifocal HCC by whole liver volumetric enhancement quantification is feasible and can predict survival.

VSIO41-21 The Role of PET/CT

Wednesday, Nov. 30 5:45PM - 6:00PM Room: S405AB

Participants
Paul B. Shyn, MD, Boston, MA, (pshyn@bwh.harvard.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

ABSTRACT

LEARNING OBJECTIVES

1) Compare advantages of PET/CT with other imaging modalities in guiding interventional radiology procedures. 2) Describe strategies to improve lesion targeting during PET/CT interventional procedures. 3) Apply various PET/CT imaging techniques for the intraprocedural assessment of tumor ablation margins.

ABSTRACT

Positron Emission Tomography/Computed Tomography (PET/CT) enhances our capabilities in image-guided interventions in multiple ways. PET/CT enables targeting of disease foci not visible using other imaging modalities, provides uninterrupted visibility of targets despite intraprocedural changes in surrounding tissues or thermal effects of ablation, and facilitates unique intraprocedural strategies for assessing tumor ablation results. Many case examples will be shown that highlight rationales, strategies and emerging techniques for successful PET/CT-guided interventions.

SSM19

Science Session with Keynote: Pediatrics (Interventional Radiology)

Wednesday, Nov. 30 3:00PM - 4:00PM Room: S102AB

IR PD

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

Participants
John M. Racadio, MD, Cincinnati, OH (*Moderator*) Nothing to Disclose
C. Matthew Hawkins, MD, Decatur, GA (*Moderator*) Nothing to Disclose

Sub-Events

SSM19-01 Pediatrics Keynote Speaker: Central Venous Access in Pediatric Patients

Wednesday, Nov. 30 3:00PM - 3:10PM Room: S102AB

Participants
David J. Lord, MD, Sydney, Australia (*Presenter*) Nothing to Disclose

SSM19-02 Large Single Center Experience of Pediatric PICC and Tunneled Central Lines: Risk Factors for Complications

Wednesday, Nov. 30 3:10PM - 3:20PM Room: S102AB

Awards
Student Travel Stipend Award

Participants
Conrad C. Gibby, MD, Houston, (*Presenter*) Nothing to Disclose
Daniel J. Ashton, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Sheena Pimpalwar, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
J. Alberto Hernandez, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Gregory C. Gardner, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose
Kamlesh Kukreja, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Peripherally inserted central venous catheters (PICCs) and Tunneled Central Venous Catheters (TCVCs) are frequently used in infants and children. Studies to assess infectious, thrombotic, and malfunction complication rates suffer from low sample sizes. The aim of this study is to define the incidence of PICC complications and identify associated patient specific characteristics associated with them in a large, single center hospital system.

METHOD AND MATERIALS

A retrospective surveillance study was conducted at a large children's hospital of the EMR and PACS. 2282 line insertions (age 0-18 years, average 6.5 years) were identified of patients undergoing image-guided PICC or TCVC placement from January 2014 through December 2015. Age of patient, weight, indication for line placement, line days, whether sedation was used, site of access, catheter size and number of lumens were recorded. Complication endpoints were infection, thrombosis, malposition, and line malfunction. Fisher's exact test was used to determine which characteristics were independent factors for complications.

RESULTS

Complication rate total was 16.5%. We stratified by age, 0-1 year (581), 1-3 years (371), 3-8 years (467), and 8-18 years (867). Complication rate increased in 0-1 year compared to 1-3 year ($p=0.006$), 1-3 year compared to >8 years ($p=0.000$), and 3-8 compared to >8 years ($p=0.000$). Catheter diameters included 1.9 Fr single lumen (SL) (8), 2.6 Fr double lumen (DL) (113), 3 Fr SL (1423), 4 Fr DL (551), 5 Fr DL (179), and 6 Fr DL (5), for a total of 1447 SL and 835 DL. A higher complication rate ($p=0.000$) was seen in DL catheters (212/835, 25%) compared to SL catheters (165/1447, 11%). There were also more infections ($p=0.000$) in DL (75/835, 9%) versus SL (36/1447, 2.5%) catheters.

CONCLUSION

Overall complication risk is increased with younger patient age. There is also an overall increase in all complication endpoints with increased lumens, specifically an increased risk for infections. Understanding this can help in decision making to promote patient safety in pediatric populations.

CLINICAL RELEVANCE/APPLICATION

Despite relatively low complication rates of PICC lines in children overall, there are multiple independent patient characteristics to consider when evaluating clinical need for long term vascular access.

SSM19-03 Pediatric Central Venous Catheters In Patients Less Than Two Years Of Age: Do Complication Rates Differ Between Tunneled IJ, Tunneled Femoral, and PICCs?

Wednesday, Nov. 30 3:20PM - 3:30PM Room: S102AB

Participants
Jessica A. Brown, Houston, TX (*Presenter*) Nothing to Disclose
Daniel J. Ashton, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Shireen Hayatghaibi, MA, MPH, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of the study was to evaluate central venous catheters (CVC) in children less than two years of age and determine if the vascular access location affected complication rates when comparing tunneled internal jugular (IJ) vein, tunneled femoral vein, and peripherally inserted central catheters (PICC).

METHOD AND MATERIALS

A total of 798 CVCs were performed by IR during the time frame. A retrospective cohort study was conducted on children less than two years of age who underwent CVC placement by Interventional Radiology (IR) from 01/01/2014 to 12/31/2015. The data was collected from EMR and PACS imaging system, then entered into REDCap database and analyzed with a Fisher's exact test. Information was gathered regarding patient demographics, technical details of the procedure, complications, and follow-up to catheter removal.

RESULTS

198 of the CVCs were placed via IJ with a greater rate of complications, 56(28%), compared to the 322 PICCs with 59(18%) complications (p=0.006). 278 CVCs were femoral with 37(13%) complications, which was not statistically difference compared to PICCs (p=0.118). Of the complications, infections in the IJs accounted for 16(8.1%), femoral 10(3.6%), and PICCs 17(5.3%), with no statistically significant difference between the groups.116(58.6%) of the IJs were lumen size 3 French or less, compared to 245(88.1%) for femoral, and 273(85%) for PICCs. 82(41.4%) of IJs were 4 or 5 French, compared to 33(11.9%) femoral, and 48(15%) in PICCs. Oncology patients accounted for 51(25.6%) IJs, compared to 5(1.8%) femoral, and 40(12.5%) in PICCs.

CONCLUSION

In a cohort of pediatric patients less than two years of age, the CVC access site does affect complication rates. IJ CVCs had a greater overall complication rate when compared to PICCs. It is important to note that with an increased complication rate the IJ group also had a greater proportion of 4 and 5 French catheter lumens and Oncology patients, but without a significant difference in infection rates compared to PICCs. As an increasing number of IJs are being performed on this patient population by IR, it is important to understand the increased risk of complications when compared to PICCs.

CLINICAL RELEVANCE/APPLICATION

PICCs demonstrated a lower complication rate compared to tunneled IJ central catheters and are recommended as first-line, when appropriate, for central venous access in children less than two years of age.

SSM19-04 Timing of First Arteriovenous Fistula Cannulation in Children on Hemodialysis

Wednesday, Nov. 30 3:30PM - 3:40PM Room: S102AB

Participants
Susanne Regus, Erlangen, Germany (*Presenter*) Nothing to Disclose
Werner Lang, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Due to reduced complication rates in comparison to central venous (CVC) or peritoneal catheters (PC), nowadays arteriovenous fistulas (AVFs) are the preferred hemodialysis access. Recommendations for the first access cannulation range from 6 to 12 weeks, which could lead to temporary or even permanent preference for CVC while awaiting the maturation of the newly created AVF. The aim of this study was to evaluate the influence of first cannulation of AVFs on primary (PP) and secondary (SP) patency rates in children on hemodialysis.

METHOD AND MATERIALS

This was a retrospective cohort study of 42 pediatric patients (21 endstage renal disease and 21 pre-emptive) with a median age of 14 years (7-17). All of them received an AVF between February 1993 and May 2014. The creation of all AVFs was performed at a single center by exclusively one vascular surgeon with many years of professional experience.

RESULTS

Primary failure was observed in 6 (14.3%) of 42 AVFs (all radiocephalic fistulas) at a mean time of 4.7 days (0-10) after creation. Excluding primary failures, the PP/SP at 1, 3 ,6 ,12 ,18 and 24 month were 100%/100%, 91%/99%, 86%/98%, 76%/95%, 55%/85% and 44%/77%, respectively. There was a significant reduction in PP when first cannulation was performed within the first 30 days after creation compared to the first cannulation later than 30 days (p = 0.004). We observed no significant difference in the outcome of PP/SP comparing the first cannulations time dated within the first 45 days after creation to those beyond 45 days (p = 0.091/0.883).

CONCLUSION

Prolonged maturating times longer than 45 days seems to have no benefit on patency rates. Given these results CVC placement as bridging HD access while awaiting access usage of the AVF, does not seem necessary and should be avoided.

CLINICAL RELEVANCE/APPLICATION

is there a optimal maturating interval for arteriovenous forearm fistula in children?

SSM19-05 Lock, Stock and Coaxial: Effect of Needle Type on Complication Rates in Percutaneous Ultrasound-Guided Liver Biopsy

Wednesday, Nov. 30 3:40PM - 3:50PM Room: S102AB

Participants
Shireen Hayatghaibi, MA, MPH, Houston, TX (*Presenter*) Nothing to Disclose
Daniel J. Ashton, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Heather Cleveland, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Kamlesh Kukreja, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To measure the effect of needle type on the rate of complications after percutaneous ultrasound-guided liver biopsy in children.

METHOD AND MATERIALS

Pediatric patients who underwent a non-targeted percutaneous ultrasound-guided liver biopsy were retrospectively identified from the electronic medical record. Relevant demographic, procedure note, post-procedure note and follow-up information were entered into a REDCap database (Vanderbilt, TN). Complications were categorized according to Society of Interventional Radiology (SIR) complication criteria by a pediatric interventional radiologist. Complication rates for the needle type and size were compared using Fisher's exact test in Minitab.

RESULTS

The final study population comprised 755 biopsies who underwent a non-targeted percutaneous ultrasound-guided liver biopsy between 01/01/2013 and 12/31/2015 (age range: 0 – 18 years, mean: 7.9 years). 436 biopsies were performed using a 16 gauge or 18 gauge BioPince needle (Plano, TX). 319 biopsies were performed using a 16 gauge or 18 gauge Quick-Core needle (Bloomington, IN).Overall, 44 complications were detected (5.8% of all biopsies) in 44 patients. 19 (43.2%) complications were categorized as SIR A (minor), 18 complications (40.9%) as SIR B (minor) and 7 complications (15.9%) as SIR C (major). There was no statistically significant difference in complication rates among needle sizes, 16 gauge (5.5%) and 18 gauge (6.3%) groups (p=0.639). There were less complications (p=.004) according to needle type, 16 complications (3.7%) in the BioPince group and 28 complications (8.8%) in the Quick-Core group. This difference was further evident in the 16 gauge needle size group (p=0.002), there were 10 complications with the BioPince 16 gauge (3.2%) and 14 complications with the Quick-Core 16 gauge (11.4%). Median number of samples with BioPince was 2 samples per biopsy and 5 samples per biopsy with Quick-Core. Only one sample, taken with BioPince 16 gauge needle was categorized by pathology as insufficient for diagnostic yield.

CONCLUSION

In a cohort of pediatric patients undergoing percutaneous ultrasound-guided liver biopsy, needle type decreased the rate of complications due to a reduced number of samples taken per biopsy.

CLINICAL RELEVANCE/APPLICATION

Needle type is an important variable that can decrease the number of samples taken per biopsy, lessening complication rates for non-targeted percutaneous ultrasound-guided liver biopsies.

SSM19-06 Use of Alcohol As a Scolicidal and Sclorosing Agent In Percutaneous Treatment of Hydatid Liver Disease In Pediatric Patients: Mid-Long Term Results

Wednesday, Nov. 30 3:50PM - 4:00PM Room: S102AB

Participants
Fatih Oncu, MD, Konya, Turkey (*Presenter*) Nothing to Disclose
Serdar Arslan, MD, Konya, Turkey (*Abstract Co-Author*) Nothing to Disclose
Suleyman Bakd?k, Konya, Turkey (*Abstract Co-Author*) Nothing to Disclose
Ismet Tolu, KONYA, Turkey (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate safety and effectiveness of use of alcohol as a scolicidal and sclerosant agent and mid-term/long-term results of percutaneous treatment hydatid liver cysts in children

METHOD AND MATERIALS

Fourty-four patients (22 female and 22 male patients; age range, 4-16 years; mean age, 12 years) with 85 liver hydatid cysts underwent percutaneous treatment with albendazole prophylaxis. There were 73 (85.9%) type I, 7 (8.2%) type II and 5 (5.9%) type III lesions according to the Gharbi classification. The cysts were treated with %98 ethanol as the cytotoxic and sclerosing agent by PAIR or catheterization methods under sonographic and fluoroscopic guidance. Follow-up sonography were performed every 3 months in the first year, every 6 months in the second year and in the following years carried out once a year.

RESULTS

The percutaneous procedures were completed with 100% technic success in all patients. Percutaneous treatment of hepatic hydatid disease was successful in 41 patients (93.1%). Two patients were referred for surgical treatment and one patient underwent additional percutaneous treatment. There were no major complications during or after the procedure. Minor complications (hypersensitivity reaction, fever) occurred in two (4.5%) patients. Total hospital stay was between 1 and 3 days. Follow-up period was 6-60 months (mean, 17.3 months).

CONCLUSION

Percutaneous treatment of hydatid liver cysts is an effective, safe and minimal invasive method in children. Furthermore use of alcohol alone as a scolocidal and sclerosing agent in hydatid liver cyst treatment provides sufficient radiological outcome.

CLINICAL RELEVANCE/APPLICATION

Percutaneous treatment of hydatid liver cysts is the best treatment option versus surgical procedure in children. Because of lower mortality, complication, recurrence rates and short hospital stay.

SSM23

Vascular Interventional (Gastrointestinal Interventions)

Wednesday, Nov. 30 3:00PM - 4:00PM Room: E450B

GI IR

AMA PRA Category 1 Credit ™: 1.00
ARRT Category A+ Credit: 0

FDA Discussions may include off-label uses.

Participants
Hyeon Yu, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose
Naganathan B. Mani, MD, Chesterfield, MO (*Moderator*) Nothing to Disclose

Sub-Events

SSM23-01 Minimally Invasive Low Voltage Pulsed Electric Fields of the Fundus of the Stomach as a Weight-loss Intervention

Wednesday, Nov. 30 3:00PM - 3:10PM Room: E450B

Participants
Rahmi Oklu, MD, PhD, Scottsdale, AZ (*Presenter*) Nothing to Disclose
Hassan Albadawi, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of this study was to examine whether low voltage electric fields can ablate enteroendocrine cells--the cells that make ghrelin as well as other hormones in the fundus of the stomach that could be important in the regulation of body weight.

METHOD AND MATERIALS

16 week old diet-induced obese (DIO) C57BL/6J mice and their aged matched control mice were treated with 60, 90, 120 and 150 volts per mm delivered at 1 hertz for a total of 100 pulses with each pulse lasting 60-80 microseconds. In the treated group, a 10 mm tweezertrode was used to deliver the pulsed electric fields to the glandular part of the stomach. Animals in both groups were subsequently observed daily for weight and food-intake while on high fat diet. At 3 days and at 10 days, the stomach was removed and processed for histology, immunohistochemistry and Western blotting. Sequential five-micron sections were immunostained for ghrelin, myeloperoxidase and smooth muscle actin. Images of these immunostained slides were then analyzed to estimate proportion of ghrelin positive cells and myeloperoxidase positive cells in the treated segments compared to the untreated segments. Additionally, estimated volume of smooth muscle layer in the stomach wall was measured in both treated and untreated segments. Western blots were performed to quantitate ghrelin levels.

RESULTS

Electric field treatment with 120 volts per mm produced the best results in the sections examined. The ablated zone in these mice demonstrated nearly complete absence of ghrelin positive cells when compared to the sham and non-treated segments of the stomach ($P<0.05$); this was consistent with ghrelin Western blotting ($P<0.05$). The ablated zone revealed histologic signs of inflammation, however, there was preservation of the lamina propria and the longitudinal and circumferential smooth muscle cell layers remained intact. While on high-fat diet, the control groups gained 6±2.4gr, and the treated mice lost -2±1.1gr ($P<0.05$).

CONCLUSION

In this feasibility study, low voltage electric fields applied to the stomach are safe and can be used to selectively ablate enteroendocrine cells in the fundus of the stomach to cause weight loss.

CLINICAL RELEVANCE/APPLICATION

The obesity epidemic is one of the primary causes of morbidity and mortality. The need for a safe, cost-effective, and minimally invasive intervention is of paramount importance given the massive scope of this epidemic.

SSM23-02 Partially-Covered Stent Placement versus Surgical Gastrojejunostomy for the Palliation of Malignant Gastroduodenal Obstruction Secondary to Pancreatic Cancer

Wednesday, Nov. 30 3:10PM - 3:20PM Room: E450B

Participants
Jiaywei Tsauo, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ho-Young Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kun Yung Kim, MD, Jeonju-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung-Hoon Park, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Jung Jun, PhD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Min Tae Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the outcomes of partially-covered self-expandable metallic stent (SEMS) placement with surgical gastrojejunostomy (GJ) in patients with gastroduodenal obstruction caused by pancreatic cancer.

METHOD AND MATERIALS

The medical records of 107 patients with gastroduodenal obstruction caused by pancreatic cancer who underwent fluoroscopic partially-covered SEMS placement (n = 75) or surgical GJ (n = 32) at our institution were reviewed.

RESULTS

The technical (100% vs. 100%; P > 0.999) and clinical (98.7% vs. 96.9%; P = 0.511) success rates were similar between the SEMS and GJ group. The mean GOOSS score was higher in the SEMS group at 1 week after treatment (2.3 ± 0.5 vs. 1.2 ± 0.4; P < 0.001) but was similar between the two groups at 1 month (2.7 ± 0.5 vs. 2.8 ± 0.5; P = 0.242). The median hospital stay was shorter in the SEMS group than in the GJ group (7 days vs. 14 days; P < 0.001). The overall complication (22.7% vs. 28.1%; P = 0.547) and reintervention (21.3% vs. 25.0%; P = 0.677) rates were similar between the two groups. The median patency (99 days vs. 138 days; P = 0.102) and survival (106 days vs. 140 days; P = 0.245) were also similar between the two groups.

CONCLUSION

The outcomes of partially-covered SEMS placement seem to be more favorable than surgical GJ in patients with gastroduodenal obstruction caused by pancreatic cancer.

CLINICAL RELEVANCE/APPLICATION

Partially-covered SEMS placement has similar technical and clinical success, complication, and reintervention rates compared with surgical GJ Partially-covered SEMS placement is more advantageous than surgical GJ with regard to the time to restore oral intake and length of hospital stay. Partially-covered SEMS placement has similar patency and survival compared with surgical GJ

SSM23-03 Radiation-Induced Esophageal Strictures Treated with Fluoroscopic Balloon Dilation: Long-term Clinical Outcomes and Factors Influencing Recurrence in 62 Patients

Wednesday, Nov. 30 3:20PM - 3:30PM Room: E450B

Participants
Kun Yung Kim, MD, Jeonju-Si, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ho-Young Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung-Hoon Park, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Young Chul Cho, BS, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jiaywei Tsauo, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Jung Jun, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Min Tae Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the long-term outcomes of balloon dilation in patients with radiation-induced esophageal stricture (RIES) and to identify factors associated with its recurrence.

METHOD AND MATERIALS

A retrospective study was performed in a single, tertiary-referral, university hospital in 62 consecutive patients who had undergone fluoroscopic balloon dilation for RIES between December 1998 and December 2015. The outcomes were assessed with reference to the following variables: success rates; complications; procedural details, recurrence, patency; and survival. Univariate and multivariate Cox proportional hazards regression analyses was performed to identify independent predictors of recurrence.

RESULTS

120 balloon dilation sessions were performed in 62 patients (mean, 1.9 sessions per patient; range, 1 to 15 sessions). During the follow-up period (mean, 38.1 months; range, 2.2 to 156 months), clinical success was achieved in 53 (85.5%) patients after single (n = 37) or multiple (n = 16) dilation sessions. Complications occurred in 26.7% of the dilation sessions with 2 cases requiring invasive treatment. The primary patency rates at 1, 2, 3, and 5 years were 60%, 56%, 52%, and 52%, respectively. Secondary patency rates at 1, 2, 3, and 5 years were 87%, 85%, 85%, and 80%, respectively. Multivariate logistic regression analysis identified an interval from radiation therapy (RT) to stricture of ≥ 6 months (hazard ratio [HR], 0.205; P < 0.001), strictures located at the cervical esophagus (HR, 5.846; P < 0.001), and stricture length of ≥ 2 cm (HR, 2.923; P = 0.006) as significant predictors of recurrence.

CONCLUSION

Balloon dilation is safe and effective for treating RIES, with favorable long-term outcomes. An interval from RT to stricture of ≥ 6 months, strictures located at the cervical esophagus, and stricture length of ≥ 2 cm appear to be associated with recurrence.

CLINICAL RELEVANCE/APPLICATION

Fluoroscopic balloon dilation is valuable as an initial therapeutic option and relatively simple, safe, and easy procedure for patients with RIES.

SSM23-04 Fluoroscopic Removal of Retrievable Self-Expandable Metal Stents in Patients with Malignant Esophageal Strictures: Using Three Different Removal Techniques

Wednesday, Nov. 30 3:30PM - 3:40PM Room: E450B

Participants
Min Tae Kim, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ho-Young Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung-Hoon Park, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Pyeong Hwa Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kun Yung Kim, MD, Jeonju-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jiaywei Tsauo, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung-Hwan Yoon, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate clinical outcomes of fluoroscopic removal of retrievable self-expandable metal stents (SEMSs) for malignant esophageal strictures, to compare clinical outcomes of three different removal techniques, and to identify predictive factors of successful removal by standard technique (primary technical success).

METHOD AND MATERIALS

137 stents were removed in 128 patients with malignant esophageal strictures. Primary, overall technical success, removal-related complications were evaluated. Logistic regression models were constructed to identify predictive factors of primary technical success.

RESULTS

Primary technical success rate was 78.8% (108/137). Complications occurred in six (4.4%) cases. Stent location in the upper esophagus (P=0.004), stricture length over 8 cm (P=0.030), and the proximal granulation tissue (P<0.001) were negative predictive factors of primary technical success. If the proximal granulation tissue existed, eversion technique was more frequently used (P=0.002).

CONCLUSION

Fluoroscopic removal of retrievable SEMSs for malignant esophageal strictures using three different removal techniques appeared to be safe and easy. Standard technique is safe and effective in majority of patients. The proximal granulation tissue, stent location in the upper esophagus, and stricture length over 8 cm were negative predictive factors of primary technical success.

CLINICAL RELEVANCE/APPLICATION

Fluoroscopic removal of retrievable SEMSs using three different removal techniques is safe and easy in patients with malignant esophageal strictures.

SSM23-05 Efficacy and Safety of A Newly Designed, Externally Full Covered Self-expandable Metallic Stent with Anti-migration Feature for the Treatment of Malignant and Benign Esophageal Strictures

Wednesday, Nov. 30 3:40PM - 3:50PM Room: E450B

Participants
Kun Yung Kim, MD, Jeonju-Si, Korea, Republic Of (*Presenter*) Nothing to Disclose

PURPOSE

The purpose of this study was to investigate the efficacy and safety of the new self-expandable metallic stent (SEMS) for the treatment of malignant and benign esophageal strictures.

METHOD AND MATERIALS

With approval from our institutional review board, the records of 81 patients who underwent the new externally full covered SEMS placement in esophagus between October 2010 and June 2015 were retrospectively reviewed. The stent has a double step flange at each end to prevent stent migration and has a externally covered membrane to prevent membrane separation. Data were retrospectively reviewed for patient characteristics, technical and clinical success, stent dysfunction, survival, and complications were analyzed.

RESULTS

Technical and clinical success was achieved in all patients (100%). The dysphagia score improved from 3.3 ± 0.6 to 1.1 ± 0.7 after treatment (P < 0.001). In malignant strictures, stent dysfunction occurred in 14 patients (20.0%): migration in five (7.1%), tumor overgrowth in eight (11.4%), and food impaction in one (1.4%). In benign strictures, stents dysfunction occurred in 5 patients (45.5%): migration in four (36.4%), tissue granulation in 1 (9.1%). The major complication occurred in 6 patients (8.6%) with malignant strictures and 1 patient (9.1%) with benign strictures, including aspiration pneumonia (n=4), tracheoesophageal fistula (n=2), intractable vomiting (n=1). There was no membrane separation in both groups. The median survival was 135 days in malignant strictures, and was 670 days in benign strictures. Patients within benign group had a longer survival, but had higher stent migration rate than those on malignant group (P < 0.05).

CONCLUSION

The new stent was safe and effective for the palliation of malignant esophageal strictures, and resulted in relatively low migration and tumor overgrowth rates compared to those reported previously. Also, it could be a treatment option in refractory benign stricture, but stent migration rate was relatively high.

CLINICAL RELEVANCE/APPLICATION

Double step flange and externally covered membrane design in new stent could contribute solving problems what the current stent has.

SSM23-06 Fluoroscopic Balloon Dilation for the Treatment of Adhesive Small Bowel Obstruction: A 15-Year Single Institution Experience

Wednesday, Nov. 30 3:50PM - 4:00PM Room: E450B

Participants
Jiaywei Tsauo, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Ho-Young Song, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kun Yung Kim, MD, Jeonju-Si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung-Hoon Park, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Jung Jun, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Min Tae Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the safety and effectiveness of fluoroscopic balloon dilation (FBD) for the treatment of adhesive small bowel obstruction (ASBO).

METHOD AND MATERIALS

Data of 44 patients (Sex, 26 males and 18 females; mean age, 53.7 ± 13.0 years) treated for ASBO with FBD at our institution

Data of 44 patients (Sex, 26 males and 18 females; mean age, 55.7 ± 13.0 years) treated for ASBO with FBD at our institution between January 2000 and February 2016 were obtained from a prospectively maintained electronic database.

RESULTS

Technical success was achieved in 39 (88.6%) patients. Thirty-five (79.5%) patients had partial obstruction and nine (20.5%) had complete obstruction. The mean length of the stricture was 3.0 ± 1.8 cm. The median procedure time was 32.0 minutes (interquartile range [IQR], 21-47 minutes). Technical failure due to inability to negotiate the guidewire through the stricture occurred in five (13.6%) patients. Clinical success was achieved in 34 (87.2%) patients after one (n = 32) or two (n=2) sessions of FBD. There were no major complications directly related to FSP. The median hospital stay was 11 days (IQR, 4-19 days). The median follow-up period was 1406 days (IQR, 594-2236 days). Recurrence occurred in nine (26.5%) patients in a median time of 47 days (IQR, 20-212 days). Eight (23.5%) patients died of comorbid conditions in a median time of 346 days (IQR, 202-703 days).

CONCLUSION

FBD appears to be safe and effective for the treatment of ASBO. However, recurrence seems to be a major drawback of FBD in ASBO treatment. Future prospective studies are warranted to determine the role of FBD in the management of ASBO.

CLINICAL RELEVANCE/APPLICATION

FBD appears to be safe and effective for the treatment of ASBO. Recurrence seems to be a major drawback of FBD in ASBO treatment. Future prospective studies are warranted to determine the role of FBD in the management of ASBO.

ED007-TH

Interventional Radiology Thursday Case of the Day

Thursday, Dec. 1 7:00AM - 11:59PM Room: Case of Day, Learning Center

IR

AMA PRA Category 1 Credit ™: .50

Participants

Anne M. Covey, MD, New York, NY (*Presenter*) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose
Bradley B. Pua, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
John A. Kaufman, MD, Portland, OR (*Abstract Co-Author*) Advisory Board, Bio2 Technologies, Inc; Consultant, Cook Group Incorporated; Consultant, Guerbet SA; Stockholder, Hatch Medical LLC; Stockholder, VuMedi, Inc; Stockholder, Veniti, Inc; Royalties, Reed Elsevier; Advisory Board, Delcath Systems, Inc; Researcher, W. L. Gore & Associates, Inc; Researcher, EKOS Corporation; Stockholder, EndoShape, Inc; Advisory Board, AV Medical Technologies Ltd; Advisory Board, Javelin Medical

TEACHING POINTS

1) The objective of the Interventional Radiology Case of the Day at RSNA 2016 is to provide participants the opportunity to review challenging cases and synthesize cogent a differential diagnosis based on limited history and images.

RC614

Interventional Series: Embolotherapy

Thursday, Dec. 1 8:30AM - 12:00PM Room: N226

IR

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

FDA Discussions may include off-label uses.

Participants
Robert A. Morgan, MD, London, United Kingdom, (Robert.morgan@stgeorges.nhs.uk) (*Moderator*) Proctor, Medtronic, Inc
Matthew S. Johnson, MD, Indianapolis, IN (*Moderator*) Research Consultant, Boston Scientific Corporation; Research Consultant, Cook Group Incorporated; Research Consultant, CeloNova BioSciences, Inc; Research Consultant, BTG International Ltd; Research support, BTG International Ltd; ;

LEARNING OBJECTIVES

1) Describe rationale of bariatric embolization. 2) Explain the rationale and treatment of high flow malformations. 3) Describe the preparation of cyanoacrylates for embolization. 4) List two complications related to embolization. 5) Recognize the significance of Type III endoleaks. 6) Describe approach to treatment of visceral aneurysms.

ABSTRACT

Sub-Events

RC614-01 Iatrogenic Injuries: I Can Fix That!

Thursday, Dec. 1 8:30AM - 8:45AM Room: N226

Participants
Robert A. Morgan, MD, London, United Kingdom, (Robert.morgan@stgeorges.nhs.uk) (*Presenter*) Proctor, Medtronic, Inc

LEARNING OBJECTIVES

View Learning Objectives under the Main Course Title.

LEARNING OBJECTIVES

View learning objectives under the main course title.

ABSTRACT

RC614-02 Advanced Endoleak Treatment

Thursday, Dec. 1 8:45AM - 9:00AM Room: N226

Participants
William S. Rilling, MD, Milwaukee, WI (*Presenter*) Research support, B. Braun Melsungen AG; Research support, Sirtex Medical Ltd; Research support, Siemens AG; Consultant, B. Braun Melsungen AG; Consultant, Cook Group Incorporated ; Consultant, Terumo Corporation; Advisory Board, Terumo Corporation

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC614-03 AVM Embolization

Thursday, Dec. 1 9:00AM - 9:15AM Room: N226

Participants
Brian S. Funaki, MD, Riverside, IL (*Presenter*) Data Safety Monitoring Board, Novate Medical Ltd

LEARNING OBJECTIVES

1) Describe the rationale for treating arteriovenous malformatoins from a venous approach.

ABSTRACT

This short lecture will review treatment of AVMs

RC614-04 Bariatric Embolization

Thursday, Dec. 1 9:15AM - 9:30AM Room: N226

Participants
Jafar Golzarian, MD, Minneapolis, MN (*Presenter*) Chief Medical Officer, EmboMedics Inc

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC614-06 Efficacy, Predictive Factors, and Time Course of Partial Splenic Artery Embolization for Cancer Patients with Thrombocytopenia

Thursday, Dec. 1 9:40AM - 9:50AM Room: N226

Participants
Ashley R. Hill, Houston, TX (*Presenter*) Nothing to Disclose
Ahmed Elakkad, MBBCh,MSc, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Joshua D. Kuban, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Sanjay Gupta, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Rahul A. Sheth, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate demographic, volumetric, and procedural risk factors for long term treatment failure following partial splenic artery embolization for thrombocytopenia in cancer patients.

METHOD AND MATERIALS

A single institution, IRB-approved retrospective review of all partial splenic artery embolizations for thrombocytopenia between 2008 – 2015 was performed. Treatment success was defined as platelet count > 100 thou/uL at 180 days post-procedure. Splenic volumes were measured at multiple time points prior to and following embolization. Univariate, multivariate, and linear mixed model analysis was performed.

RESULTS

A total of 164 patients underwent partial splenic embolization, most commonly with Gelfoam mixed with gentamicin 80mg. The most common risk factor for thrombocytopenia was chemotherapy (93%); cirrhosis was present in 9.5% of patients. Treatment success rate was 81%, with a median follow up duration of 394 days. Major complication rate was 4%. Greater baseline splenic volume (p=0.006) and lower baseline platelet levels (p=0.03) were associated with treatment failure, while age (p=0.64), gender (p=1.0), follow-up duration (p=0.13), immediate post-treatment splenic volume (p=0.1), cancer type (p=0.76), distal vs proximal embolization (p=0.28), and percent change in splenic volume (p=0.4) were not. On longitudinal analysis, treatment responders demonstrated persistently elevated platelet counts, while non-responders demonstrated, on aggregate, an initial increase followed by a decrease in platelet count, with the point of inflection at approximately 180 days. Treatment responders exhibited persistently decreased splenic volumes, while non-responders exhibited regrowth of splenic parenchyma, also beginning at approximately 180 days.

CONCLUSION

Partial splenic artery embolization exhibits a high success rate, with sustained effects, for cancer patients with thrombocytopenia. Elevated baseline splenic volumes and severe thrombocytopenia increase the risk for treatment failure.

CLINICAL RELEVANCE/APPLICATION

In cancer patients with thrombocytopenia, partial splenic artery embolization is a safe technique with long-term efficacy for improving platelet counts.

RC614-07 Splenic Artery Embolization in Blunt Splenic Injury: Outcomes of Temporary versus Permanent Embolization

Thursday, Dec. 1 9:50AM - 10:00AM Room: N226

Awards
Student Travel Stipend Award

Participants
Bardia Moosavi, MD, Ottawa, ON (*Presenter*) Nothing to Disclose
William Petrcich, MSc, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose
Pasteur Rasuli, MD, FRCPC, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the efficacy, complication rates, procedure time and splenic volume changes following temporary versus permanent splenic artery embolization (SAE).

METHOD AND MATERIALS

This retrospective study compared the results of SAE with Gelfoam (30 [torpedoes 15, slurry 15]) versus metallic coils (33 [proximal 13, distal 12, combined 8]) in 63 consecutive patients who underwent SAE for blunt splenic injury between 2005 and 2014 in a tertiary care hospital. All patients had contrast-enhanced CT before embolization and 19 patients (temporary 9, permanent 10) had median CT follow up of 150 days (range 21-1825) after embolization. Failure rates, defined as requiring repeat embolization or splenectomy, and rates of major and minor complications were compared. Procedure times and pre- and post-embolization volumes, calculated by using a volume-rendering software, were also compared.

RESULTS

There was no significant difference in age, sex, injury severity score, splenic injury score (AAST grade) and mean time to embolization between the groups (P >0.05 in every category). Eight patients died of other injuries and were excluded. There was no significant difference in failure rates between the two groups (4.3% for temporary vs 6.2% for permanent; P=1.0 [95% CI, -13.73–9.92%]). Major complication rates were comparable (26.1% vs 18.7%; P=0.52 [95% CI, -29.81%–15.13%]). Minor complication rates were also comparable (13% vs 21.9%; P=0.49 [95% CI, -11.03%–28.7%]). Procedure time was shorter in the temporary group (33 vs 53 minutes; P= 0.02, [95% CI, -34 – -2]). Pre-embolization splenic volumes were not significantly different between the two groups (P=0.72; [95% CI, -108– 102]). There was no significant difference in post-embolization splenic volume expansion in the two groups with the temporary group showing an increase in size from 171.5 cm3 to 179 cm3 (P=0.41, [95% CI, -9– 85.2]) and the permanent group showing an increase from 174 cm3 to 243 cm3 (P=0.92, [95% CI, -74– 70.9]).

CONCLUSION

Temporary SAE had similar efficacy and complication rates compared to permanent embolization but was achieved with a

significantly shorter procedure time.

CLINICAL RELEVANCE/APPLICATION

Temporary splenic artery embolization with Gelfoam is as effective and safe as permanent embolization with coils, but can be achieved quicker which is critical in hypotensive patients.

RC614-08 Splenic Artery Embolization

Thursday, Dec. 1 10:00AM - 10:15AM Room: N226

Participants
Andrew J. Lipnik, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define splenic artery anatomy and collateral pathways. 2) Describe how the clinical indication influences the choice of embolic material. 3) Explain the rationale of proximal vs. distal embolization for splenic trauma. 4) Identify and manage complications after splenic artery embolization.

RC614-09 Prophylactic Embolization Pre-Y90

Thursday, Dec. 1 10:30AM - 10:45AM Room: N226

Participants
Matthew S. Johnson, MD, Indianapolis, IN (*Presenter*) Research Consultant, Boston Scientific Corporation; Research Consultant, Cook Group Incorporated; Research Consultant, CeloNova BioSciences, Inc; Research Consultant, BTG International Ltd; Research support, BTG International Ltd; ;

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC614-10 Prostate Embolization: Lessons Learned

Thursday, Dec. 1 10:45AM - 11:00AM Room: N226

Participants
James B. Spies, MD, Washington, DC (*Presenter*) Advisory Board, Boston Scientific Corporation;

LEARNING OBJECTIVES

1) To understand the rationale for prostate artery embolization (PAE) for benign prostatic hypertrophy. 2) To understand how PAE is performed, including understanding the vascular anatomy of the prostate and adjacent structures. 3) To understand current outcomes from PAE.

ABSTRACT

RC614-11 Prostate Artery Embolization for the Treatment of Benign Prostatic Hyperplasia: A Prospective Single-center Study

Thursday, Dec. 1 11:00AM - 11:10AM Room: N226

Awards
Student Travel Stipend Award

Participants
Marco Salsano, MD, Rome, Italy (*Presenter*) Nothing to Disclose
Vincent G. Helyar, MBBS, MSc, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Narayanan Thulasidasan, MRCS, FRCR, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Shahzad Ilyas, MBBS, MRCS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Rick Popert, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Tarun Sabharwal, MBBS, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the clinical efficacy and safety of prostatic artery embolization (PAE) in patients with acute urinary retention caused by benign prostatic hyperplasia (BPH).

METHOD AND MATERIALS

Between January 2014 and November 2015, PAE was performed in 106 consecutive patients affected by BPH using 100 and 200 polyvinyl alcohol particles. Inclusion criteria were moderate to severe lower urinary tract symptoms refractory to ≥ 6 months of medical therapy; prostate volume ≥40cc; International Prostate Symptom Score ≥ 19 or quality of life (QoL) score ≥ 3 or peak urinary flow rate (Q max) < 12ml/sec or acute urinary retention. Patients with bladder diverticula or calculi, urethral stenosis, neurogenic bladder, eGFR < 40 ml/min, Prostatic malignancy were excluded. Mean patient age was 69 years (range 49-98 y). Magnetic resonance imaging, uroflowmetry, and the international prostate symptom score (IPSS) were used to assess clinical and functional outcomes.

RESULTS

Defined as reduction in IPSS of ≥4 points, clinical success was of 81.3% at 3 months and of 78.6% at 12 months. Twelve patients underwent further treatment due to inadequate clinical response to PAE (11 patients) and technical failure (1 patient). Mean IPSS reduced from 21.67 to 10.13 at 3 months and 9.79 at 12 months ($p<0.0001$); mean QoL decreased from 4.45 to 1.775 at 3 months and 1.556 at 12 months ($p<0.0001$). The international index of erectile function did not show significant change over the whole study period. Mean prostate volume (PV) reduced from 142.5cc to 106.1cc (25% average loss of volume; $p=0.04$). Mean post-void

residual (PVR) reduced from 187.4 ml to 149.7 ml at 3 months (p=0.22), rebounding to 159.8 ml at 12 months (p=0.54). Mean peak of urine flow rate increased from 15.7 ml/sec to 19 ml at 3 months (p=0.25), rebounding to 15.9 ml/sec at 12 months (p=0.96).

CONCLUSION

PAE is an effective, safe and feasible procedure, with preliminary results and short-term follow-up suggesting good symptom control without sexual dysfunction, associated with prostate volume reduction. PAE improves urinary flow and QoL reducing IPSS, PVR and PV.

CLINICAL RELEVANCE/APPLICATION

PAE is suitable for the treatment of BPH and may play an important role in patients with unsuccessful medical therapy, high anesthetic/surgical risk or who refuse standard invasive treatments.

RC614-12 Evaluation of Cerebrovascular Embolism after Catheter Embolization of Pulmonary AVMs in HHT Patients (Hereditary Hemorrhagic Telangiectasia / Osler disease) by Pre- and Post Interventional MRI

Thursday, Dec. 1 11:10AM - 11:20AM Room: N226

Participants
Guenther K. Schneider, MD, PhD, Homburg, Germany (*Presenter*) Research Grant, Siemens AG; Speakers Bureau, Siemens AG; Speakers Bureau, Bracco Group; Research Grant, Bracco Group;
Paul S. Raczeck, MD, Homburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Philippe Jagoda, MD, Homburg/Saar, Germany (*Abstract Co-Author*) Nothing to Disclose
Arno Buecker, MD, Homburg, Germany (*Abstract Co-Author*) Research Grant, Siemens AG; Consultant, Bracco Group; Speaker, Bracco Group; Consultant, Medtronic plc; Speaker, Medtronic plc; Research Grant, Novartis AG; Research Grant, GlaxoSmithKline plc; Research Grant, Biotest AG; Research Grant, OncoGenex Pharmaceuticals, Inc; Research Grant, Bristol-Myers Squibb Company; Research Grant, Eli Lilly & Company ; Research Grant, Pfizer Inc; Research Grant, F. Hoffmann-La Roche Ltd; Research Grant, sanofi-aventis Group; Research Grant, Merrimack Pharmaceuticals, Inc; Research Grant, Sirtex Medical Ltd; Research Grant, Concordia Healthcare Corp; Research Grant, AbbVie Inc; Research Grant, Takeda Pharmaceutical Company Limited ; Research Grant, Merck & Co, Inc; Research Grant, Affimed NV; Research Grant, Bayer AG; Research Grant, Johnson & Johnson; Research Grant, Seattle Genetics, Inc; Research Grant, Onyx Pharmaceuticals, Inc; Research Grant, Synta Pharmaceuticals Corp; Research Grant, Siemens AG; Research Grant, iSYMED GmbH; Research Grant, St. Jude Medical, Inc; Co-founder, Aachen Resonance GmbH;
Lisa Fenzl, MD, Homburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Alexander Massmann, MD, Homburg/Saar, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The recommended treatment of PAVMs in HHT patients is catheter embolization either with coils or by the use of vascular plugs. Until now no prospective MRI based studies to detect perinterventional brain emboli in a larger patient cohort that underwent embolization of PAVM were performed. We prospectively evaluated patients undergoing embolization therapy of pulmonary AVMs by MRI for detection of clinically silent cerebral infarctions, like they have been shown previously after carotid artery stent placement.

METHOD AND MATERIALS

94 HHT patients (male/female=40/54; mean age 45.7+/-16.7 (range 5-86)) with pre-diagnosed PAVMs on CE-MRA underwent embolization therapy (1 to 8 PAVMs/patient/session). Depending on the size of feeding vessels and morphology either Nester-Embolization Coils (Cook Medical) or Amplatzer vascular plugs (St. Jude Medical) were used for embolization therapy. During the procedure, each patient received iv injection of 2500 units heparin. MRI was performed immediately before, 4 hours and 3 month post embolization. To detect peri-interventional cerebral emboli a T2w-sequence, a FLAIR-sequence and DWI using 3 different B-values and calculation of ADC maps was performed.

RESULTS

DWI post interventional therapy only showed small, diffuse acute emboli in one patient (1%). This patient underwent re-embolization of a vessel that was previously treated with tungsten coils. These corroded over time leading to a reperfused PAVM. This patient had had several episodes of brain emboli before our treatment. Due to anatomical reasons re-embolization had to be performed by placing additional platinum coils within the already placed tungsten coils. During this procedure most likely small particles of the corroded tungsten coils or preexisting thrombotic material embolized. After successful re-embolization the patient did not experience any further brain emboli over a follow-up period of 8 years. No other patient, showed any post interventional newly developed ischemic lesion in the brain at any time point of follow up; obviously independent of the use of coils or vascular plugs.

CONCLUSION

This prospective study in 94 patients undergoing interventional treatment of PAVMs shows that catheter embolization is safe and does not even result in clinical inconspicuous cerebral ischemia.

CLINICAL RELEVANCE/APPLICATION

Catheter embolization of PAVMs is safe and does not even result in clinical inconspicuous cerebral ischemia.

RC614-13 Embolotherapy for Bleeding Gestational Trophoblastic Neoplasia is Effective and Safe and Does not Adversely Impact Chemotherapeutic Clinical Outcomes

Thursday, Dec. 1 11:20AM - 11:30AM Room: N226

Participants
Zhiwei Wang, MD, Beijing, China (*Presenter*) Nothing to Disclose
Zheng Yu Jin, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To retrospectively evaluate the impact of selective arterial embolization (SAE) on the prognosis of patients with gestational trophoblastic neoplasias (GTN).

METHOD AND MATERIALS

A retrospective analysis of the records of all patients with GTN between January 2005 and January 2014 was performed. 41 patients (mean age, 28.9±7.6 years) with massive vaginal hemorrhage from GTN (including 27 cases of choriocarcinoma and 14 cases of invasive mole) were treated with SAE. The complications, control of hemorrhage and outcome of chemotherapy were retrospectively reviewed.

RESULTS

Based on the FIGO staging system, 3 patients (7.3%) were diagnosed as FIGO stage I, 6 (14.6%) stage II, 22 (53.7%) stage III, and 10 (24.4%) stage IV. Angiography showed arteriovenous communication in the tumor nidus in 31 patients and contrast extravasation in the uterine cavities in 8 patients. All patients underwent bilateral uterine arteries embolizations. Tumors were supplied by branches of internal iliac artery other than uterine artery in nine patients and these arteries were underwent embolization. The technical success rate of embolization was 100%. SAE successfully controlled the hemorrhage for 38 patients (92.7%). No major complications occurred. All patients with successful SAE received systemic chemotherapy. The average number of post-embolization chemotherapy cycles was 9.8 for every patient. The embolization controlled bleeding for 38 patients without recurrent massive bleeding during the period of chemotherapy. The complete remission (CR) was achieved in 34 patients (89.5%), whereas 2 patients had partial remission (PR) and transferred to other hospital for further therapy. 2 died due to cerebral hemorrhage and lung infection respectively. The median follow-up time was 45 months (range 7–114 months) for 32 patients, and two cases had recurrence. Two patients with CR required repeated embolizations for recurrence of massive bleeding 30 and 47 months after the first embolization procedure due to uterine arteriovenous malformation.

CONCLUSION

Our experience shows that SAE can effectively control the hemorrhage from GTN and the response rate of GTN with massive vaginal hemorrhage is high when systemic chemotherapy is applied following successful SAE. The uterine bleeding may recur due to uterine AVMs, even following complete embolization and CR of GTN.

CLINICAL RELEVANCE/APPLICATION

SAE should be the first line therapy for bleeding GTN.

RC614-14 Embolization: New Tools and Techniques

Thursday, Dec. 1 11:30AM - 11:45AM Room: N226

Participants
Thorsten R. Johnson, MD, Munich, Germany (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC614-15 5 Most Important Embolization Papers, 2015-2016

Thursday, Dec. 1 11:45AM - 12:00PM Room: N226

Participants
Robert J. Abraham, MD, Halifax, NS (*Presenter*) Co-founder, ABK Biomedical Inc; Director, ABK Biomedical Inc; Stockholder, ABK Biomedical Inc; Spouse, Stockholder, ABK Biomedical Inc; CEO, ABK Biomedical Inc; Officer, ABK Biomedical Inc; Researcher, BTG International Ltd; Co-founder, Covina Biomedical Inc; Stockholder, Covina Biomedical Inc; Officer, Covina Biomedical Inc

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC617

Emerging Technology: High Intensity Focused Ultrasound - Opportunities and Challenges

Thursday, Dec. 1 8:30AM - 10:00AM Room: S504CD

IR US

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

FDA Discussions may include off-label uses.

Participants
Alessandro Napoli, MD, Rome, Italy (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To become familiar with high intensity focused ultrasound principles, different image guidance and clinical applications. 2) To understand clinical applications of different HIFU systems with both US and MRI guidance. 3) To integrate essential knowledge for radiologists facing new opportunities with a totally non-invasive IR tool.

ABSTRACT

The concept of ideal tumor surgery is toremove the neoplastic tissue without damaging adjacentnormal structures. High-intensity focused ultrasound(HIFU) was developed in the 1940s as a viable thermaltissue ablation approach. In clinical practice, HIFU hasbeen applied to treat a variety of solid benign and malignantlesions, including pancreas, liver, prostate, and breastcarcinomas, soft tissue sarcomas, and uterine fibroids.More recently, magnetic resonance guidance has beenapplied for treatment monitoring during focused ultrasoundprocedures (magnetic resonance–guided focused ultrasound,MRgFUS). Intraoperative magnetic resonanceimaging provides the best possible tumor extension anddynamic control of energy deposition using real-timemagnetic resonance imaging thermometry. This course will introducethe fundamental principles and the most attractive clinical indications of high intensity focused ultrasoundtechnique in practice.

Sub-Events

RC617A From Technology to HIFU Clinic

Participants
Pejman Ghanouni, MD, PhD, Stanford, CA, (ghanouni@stanford.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Technical aspects of focused ultrasound, including introduction to the physics of the technology, and to MR thermometry. 2) Advantages of MR guidance during focused ultrasound therapy. 3) Keys to successful clinical utilization of the technology.

ABSTRACT

Focused ultrasound can be used to non-invasively treat structures deep within the body, using ultrasound or magnetic resonance imaging for guidance. A large area ultrasound transducer array is focused geometrically and electronically, with energy focused to achieve high intensity deep within the body, while sparing intervening tissues. With MR guided focused ultrasound (MRgFUS), treatment can be precisely monitored intra-operatively using proton resonant shift thermometry, and results can be evaluated with immediate post-operative imaging. MRgFUS is used clinically in the United States for the treatment of uterine fibroids, benign and malignant bone tumors, soft tissue tumors, and movement disorders. Translating this technology to a robust clinical service involves close collaboration between radiologists and the clinicians that directly manage these patients, with centralized, dispersed, and center of excellence options as models for these clinical relationships.

RC617B High Intensity Focused Ultrasound - Uterine Fibroid

Participants
Young-Sun Kim, MD, Seoul, Korea, Republic Of, (jeants.kim@gmail.com) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain pros and cons of HIFU (high-intensity focused ultrasound) ablation in the treatment of uterine fibroids as compared to other therapeutic modalities. 2) Assess important factors in screening MR exams for HIFU therapy of uterine fibroids. 3) Explain treatment strategy of HIFU ablation for uterine fibroids to improve therapeutic outcomes. 4) Describe the current limitations of HIFU of uterine fibroids and explain how to overcome them including a hormone pretreatment.

ABSTRACT

Uterine fibroid is the most popular clinical applications of HIFU (high-intensity focused ultrasound) therapy. As a totally non-invasive interventional therapeutic modality using small foci of hyperthermia (65-70°C), HIFU has pros and cons as compared to other therapeutic modalities. However, owing to its greatest merit of complete non-invasiveness, its clinical adoptions are increasing worldwide.HIFU therapy has certain inborn limitations, therefore, appropriate screening for uterine fibroids is extremely important to improve overall therapeutic outcomes. In order to do so, the cases which will be benefited from this therapy should be chosen well, and then, the properties of the target fibroids, safe pathway of sonications, complication-related factors should be well analyzed in screening MR exams. Furthermore, the symptom-relevant fibroid or the portion of fibroid should be recognized and completely ablated.As accumulations of clinical experiences of HIFU therapy, the evidences of therapeutic efficacy and safety of HIFU ablation of uterine fibroids are incrreasing and there have been several techniques or strategies developed to overcome the limitations or to improve therapeutic efficacy, which will be covered in this presentation.

RC617C High Intensity Focused Ultrasound - Bone

Participants
Alessandro Napoli, MD, Rome, Italy, (alessandro.napoli@uniroma1.it) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Patient selection for MR guided focused ultrasound palliation of painful bone metastases and benign bone lesions. 2) Results of MR guided focused ultrasound for palliation of painful bone metastases and Osteoid Osteoma. 3) Technical aspects of successful patient treatment. 4) Immediate post-treatment imaging-based assessment of results.

ABSTRACT

Magnetic resonance imaging-guided focused ultrasound (MRgFUS) is an alternative noninvasive method for reducing pain in skeletal metastases. The concentration of acoustic energy on the intact surface of the cortical bone produces a rapid temperature increase that mediates critical thermal damage to the adjacent periosteum—the most innervated component of mature bone tissue. Such thermal ablation has been shown to be an extremely effective approach for pain management. This technique has also a potential role in achieving local tumor control, allowing de-novo mineralization of trabecular bone or reduction in lesion size. In our department, we are evaluating the safety and efficacy of MRgFUS treatment for pain palliation in patients with malignant (bone metastases) as well as benign (osteoid osteoma) lesions. Local tumor control was demonstrated by a reduction of lesion viability following MRgFUS procedure and by remineralization of spongy bone. Regarding the ablation of osteoid osteoma, MRgFUS was proposed as an alternative treatment option among other consolidated modalities, including radiofrequency ablation. At present, radiofrequency ablation is the most popular percutaneous technique, but it requires some degree of intervention. Our preliminary study demonstrates that MRgFUS for osteoid osteoma seems to be safe with good success and without treatment-related morbidity. Unlike other ablative techniques, MRgFUS is totally noninvasive and can be performed relatively fast in a single session with limited amount of energy deposition. In conclusion, MRgFUS is a completely noninvasive modality that allows effective and durable pain palliation in a single session even if a specific anesthesia protocol is needed. In bone metastasis, focused ultrasound energy may also detect metastasis necrosis, thus having potential future role for local tumor control. Furthermore, MRgFUS can be performed safely and effectively in patients with symptomatic osteoid osteoma. Describe patient selection for MR guided focused ultrasound palliation of painful bone metastases.

RC617D High Intensity Focused Ultrasound - Brain

Participants
Elias R. Melhem, MD, PhD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC617E Clinician Perspective in the Management of Prostate Cancer

Participants
Mark Emberton, London, United Kingdom (*Presenter*) Stockholder, NUADA Group Ltd; Research Consultant, SonaCare Medical, LLC; Research Consultant, Sophiris Bio Inc; Research Consultant, TROD Medical ; Research Grant, SonaCare Medical, LLC; Research Grant, Sophiris Bio Inc; Research Grant, TROD Medical ; Speakers Bureau, GlaxoSmithKline plc

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC650

Vertebral Augmentation (Hands-on)

Thursday, Dec. 1 8:30AM - 10:00AM Room: E260

MK IR

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

Participants
A. Orlando Ortiz, MD, MBA, Mineola, NY (*Presenter*) Nothing to Disclose
Bassem A. Georgy, MD, MSc, San Diego, CA (*Presenter*) Consultant, Johnson & Johnson; Consultant, DFINE, Inc; Stockholder, DFINE, Inc ; Stockholder, Spine Solutions, Inc; ;
Allan L. Brook, MD, Bronx, NY (*Presenter*) Nothing to Disclose
Todd S. Miller, MD, Bronx, NY, (tmiller@montfiore.org) (*Presenter*) Nothing to Disclose
Afshin Gangi, MD, PhD, Strasbourg, France (*Presenter*) Proctor, Galil Medical Ltd

LEARNING OBJECTIVES

1) Discuss appropriate algorithms for patient selection. 2) Review anatomic and technical considerations for vertebral augmentation. 3) Present an update of the recent advances in vertebral augmentation including sacroplasty. 4) Emphasize safety issues and how to avoid complications. 5) Understand the applications of vertebral augmentation in osteoporotic and neoplastic spine pathology. 6) Update participants with respect to advances in equipment and biomaterials.

ABSTRACT

1. Patient selection for vertebral augmentation Indications and Contraindications 2. New devices and techniques in vertebral augmentation 3. Vertebral augmentation for osteoporotic and pathologic vertebral compression fractures 4. Sacroplasty (sacral augmentation) 5. Complications avoidance 6. Efficacy Vertebral augmentation is an image-guided (fluoroscopy or CT) percutaneous procedure in which a bone needle is inserted into a painful osteoporotic or pathologic fracture within the spinal axis. Biopsy, cavity creation or lesion ablation may then be performed under imaging guidance depending on the nature of the pathology that is being treated. Subsequently a radioopaque implant, usually an acrylic bone cement, is carefully injected into the vertebra or sacral ala under imagining guidance, These procedures have been shown to provide pain relief by stabilizing the fractured vertebra or sacrum. As with any other invasive procedure, they carry a small risk (<<1%) of complication including bleeding, infection, neurovacular injury, or cement embolus. Appropriate patient seleciton and a detailed understanding of the technical aspects of the procedure along with active clinical patient follow-up are paramount to a successful outcome. This workshop will utilize short lectures, case examples and interactive audience participation in order to further explore critical topics in vertebral augmentation.

RC652

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

Thursday, Dec. 1 8:30AM - 10:00AM Room: E264

US IR

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

FDA Discussions may include off-label uses.

Participants

Patrick Warren, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Stephen C. O'Connor, MD, Boston, MA (*Presenter*) Nothing to Disclose
Veronica J. Rooks, MD, Honolulu, HI (*Presenter*) Nothing to Disclose
Corrie M. Yablon, MD, Ann Arbor, MI, (cyablon@med.umich.edu) (*Presenter*) Nothing to Disclose
Kristin M. Dittmar, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Kal Dulaimy, MD, Springfield, MA, (Kal.dulaimy@bhs.org) (*Presenter*) Nothing to Disclose
Mahesh M. Thapa, MD, Seattle, WA (*Presenter*) Nothing to Disclose
John M. Racadio, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
Andrew J. Rabe, DO, Columbus, 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, (lwarren@vancouverbreastcentre.com) (*Presenter*) Shareholder, Hologic, Inc
Andrada R. Popescu, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Kal Dulaimy, MD, Springfield, MA, (Kal.dulaimy@bhs.org) (*Presenter*) Nothing to Disclose
Christopher A. Molvar, MD, Chicago, IL, (cmolvar@lumc.edu) (*Presenter*) Nothing to Disclose
Yassine Kanaan, MD, Dallas, TX, (yassine.kanaan@tsrh.org) (*Presenter*) Nothing to Disclose
Allison S. Aguado, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose

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.

ABSTRACT

Ultrasound Guided Foreign Body Removal: Simulation Training and Clinical implementation Outcomes ; Purpose: USFBR can be taught to radiologists to generate competency, and radiologists can apply the technique in the patient setting to remove foreign bodies. ; Materials and Methods: Proof of concept was performed by a radiologist and surgeon removing nine 1-cm foreign bodies using the USFBR method (P) and traditional surgery (S) with and without wire guidance (W) on the cadaver model. ; Next, USFBR was taught to 48 radiologists at 4 hospitals. Training included didactic and hands-on instruction covering 7 components: instrument alignment, hand/transducer position, forceps use, foreign body definition, forceps grasp, recognition of volume averaging, and oblique cross cut artifact. Pre-training testing assessed single toothpick removal from turkey breast in 15 minutes.; Post-training evaluation consisted of 5 toothpick removals. ; Ongoing clinical implementation data of USFBR by trained radiologists are being collected. Parameters including age of patient, which radiologist, removal success, type and size of foreign body, incision size, foreign body retention time, reason for removal, symptoms, modalities used in detection, wound closure, and sedation are recorded. Data analyzed using chi-squared and Fisher#39;s exact tests for categorical outcomes and analysis of variance for continuous outcomes. ; Results: USFBR technique shows a higher success rate and smaller incision size in comparison to surgical technique alone in the cadaver. Removal success: P 100%, S 78%, and W 89%. ; With USFBR training, radiologists; scores improved from 21-52% pre-training to 90-100% post-training (p;0.001 for each component). In the clinical setting to date, USFBR has been 100% successful in 7 (of 25 expected) patients, ages 9-73 years, by four radiologists. Parameters included; length 4 to 30 mm, retention 2 to 864 days, incision, 2 to 8 mm. 1 suture closure. 1 sedation. ;

SSQ20

Vascular Interventional (Radiation Safety/Topics of Interest)

Thursday, Dec. 1 10:30AM - 12:00PM Room: N227B

SQ IR

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

Participants
Sarah B. White, MD,MS, Philadelphia, PA (*Moderator*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, IO Rad
Charles T. Burke, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose

Sub-Events

SSQ20-01 Prevalence of Musculoskeletal Injuries in Interventional Radiologists

Thursday, Dec. 1 10:30AM - 10:40AM Room: N227B

Awards
Student Travel Stipend Award

Participants
James J. Morrison, MD, Portland, OR (*Presenter*) Nothing to Disclose
Younes Jahangiri Noudeh, Portland, OR (*Abstract Co-Author*) Nothing to Disclose
Sean Robinson, Portland, OR (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Interventional radiologists are exposed to a variety of work-related risk factors for musculoskeletal injuries. The purpose of this study was to investigate the prevalence of musculoskeletal injuries and identify associated risk factors in the IR physician population.

METHOD AND MATERIALS

A survey of the Society of Interventional Radiology (SIR) members was conducted utilizing the Nordic Musculoskeletal Questionnaire, a validated tool for examining symptom prevalence, along with demographic, practice, radio-protective equipment usage, and exercise information. Surveys were sent and collected between November-December 2015.

RESULTS

Surveys were sent to 4096 SIR members with 666 responses (16.3% response rate). A total of 640 participants (96%) completed the survey in entirety: 69 females (10.8%) and 571 males (89.2%) with a mean age of 47.5 years (+/-10.2), practice length of 17.1 years (+/-9.8), and body mass index of 25.5 kg/m2 (+/-3.9). Prevalence of musculoskeletal injury was 87.5% in the 12 months preceding the survey. For those reporting injuries, 57.9% attributed the symptoms to work-related activities. Lower back (61.4%), neck (55.5%), and shoulder (45.5%) complaints were the most common. Symptoms prevented 21.2% of respondents with injuries from being able to work over the same time period. In addition, 76.2% or respondents reported symptoms within the 7 days preceding completion of the survey. Negative effects upon ability to perform IR duties was reported by 26.1% of respondents while negative effects on life outside of IR was reported by 64.8%. On multivariate regression analysis higher body mass index (odds ratio: 2.24, P=0.002) and female gender (odds ratio: 3.37, P=0.026) were significantly associated with musculoskeletal injuries.

CONCLUSION

There is a high prevalence of musculoskeletal injuries in practicing interventional radiologists, the majority of which are attributed to work-related activities. The prevalence of neck and shoulder complaints is double that reported in the general physician population contrasted with a similar prevalence of lower back issues. Better understanding of the risk factors associated with these injuries can inform future preventative strategies and practices.

CLINICAL RELEVANCE/APPLICATION

This study establishes the prevalence of work related musculoskeletal injuries and associated risk factors in Interventional Radiologists with the goal of producing strategies for injury prevention.

SSQ20-02 Personalized Feedback on Staff and Patient Dose in Image Guided Interventions - A New Era in Radiation Dose Monitoring

Thursday, Dec. 1 10:40AM - 10:50AM Room: N227B

Awards
Student Travel Stipend Award

Participants
Anna M. Sailer, MD, MBA, Maastricht, Netherlands (*Presenter*) Nothing to Disclose
Leonie Paulis, PhD, MSc, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Laura W. Vergoossen, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Joachim E. Wildberger, MD, PhD, Maastricht, Netherlands (*Abstract Co-Author*) Institutional Grant, Agfa-Gevaert Group; Institutional Grant, Bayer AG; Institutional Grant, Koninklijke Philips NV; Institutional Grant, Siemens AG; Speakers Bureau, Bayer AG; Speakers Bureau, Siemens AG
Marco Das, MD, Maastricht, Netherlands (*Abstract Co-Author*) Research Consultant, Bayer AG Research Grant, Siemens AG Speakers Bureau, Siemens AG Research Grant, Koninklijke Philips NV
Cecile R. Jeukens, PhD, Utrecht, Netherlands (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Staff and patient dose monitoring is of high interest for legal and personal purposes. Dedicated individual feedback of procedural patient and staff doses is not yet available. Aim of this study was to design and implement a personalized feedback of procedural and personal doses for employees involved in image guided interventions.

METHOD AND MATERIALS

All team members (radiologists, endovascular surgeons and technicians, n= 27) involved in image guided interventions were equipped with personal dose meters (PDMs, Philips DoseAware). A reference PDM was mounted on the C-arm. Comprehensive procedural dose data including the dose area product (DAP) and effective doses from PDMs were prospectively monitored for each procedure for 6 months (n= 804) using an automated patient and staff dose tracking system (Philips DoseWise portal). A personalized feedback form was designed displaying for each employee individually the DAP and personal dose per procedure they were involved in, as well as the relative procedural dose ratios (staff PDM dose / reference PDM * 100%) and the cumulative dose. This study consisted of two phases: 1) team members did not receive dose feedback (first 5 months), 2) team members weekly received individual dose feedback. After the first month of implementation of personalized feedback, the dose feedback was evaluated through questionnaires.

RESULTS

In phase 2 (with dose feedback), the use of PDMs by employees increased by 13% to 88% compared to phase 1 (without feedback). The individual dose feedback was scored as valuable by 78% of the employees; there was no difference in scoring between physicians and technicians (p> 0.05). 83% of the team members scored that the feedback increased their personal radiation dose awareness and 67% answered that the feedback increased their feeling of occupational safety or had changed their behavior (56%).

CONCLUSION

Personalized feedback of staff and patient dose to employees involved in image guided interventions proofed feasible and valuable.

CLINICAL RELEVANCE/APPLICATION

Personalized feedback increases occupational radiation dose awareness and may be able to improve radiation safety and individual protection.

SSQ20-03 Lockblock Central Venous Occlusion Intervention/EP Simulation Study: Baseline Radiation Exposure Versus a Disposable Radiation Attenuation Shield, A Disposable Radiation Attenuation Drape and A Combination of Both on Operator Exposure

Thursday, Dec. 1 10:50AM - 11:00AM Room: N227B

Participants
Gregory I. Gordon, MD, Omaha, NE (*Presenter*) Founder, Radux Devices LLC; Stockholder, Radux Devices LLC; Consultant, HealthTronics, Inc; ; ;
Frank J. Rutar, MS, Omaha, NE (*Abstract Co-Author*) Nothing to Disclose
Irikles I. Piponos, MD, Omaha, NE (*Abstract Co-Author*) Nothing to Disclose
Arvin Bagherpour, MD, Houston, TX (*Abstract Co-Author*) CEO, GMED, LLC
Michael S. Salomon, MD, Omaha, NE (*Abstract Co-Author*) Stockholder, Radux Devices LLC
Sara Myers, PhD, Omaha, NE (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Evaluation of 2 separate, but similar, scatter radiation attenuation strategies; an absorbent, disposable radiation pad and an adhesive, portable radiation shield. Medical devices were evaluated independently, and in combination compared with baseline radiation dose to the hands and eyes of mannequin model.

METHOD AND MATERIALS

Articulating mannequin model was positioned in standard right-handed position for treatment of left central venous occlusive disease endovascular intervention during 10-second intervals for 10 separate measurements of operator hand (closest to field) and eyes (closest to field). Testing performed at 80KeV, mAs 36-60 (automatic dosing) on an anthropomorphic phantom. Study was performed at baseline and then repeated with the RadPad 5110A-O (Orange) disposable Radiation Pad, with the LockBlock disposable, articulating, radiation shield and with simultaneous use of both products. Mean attenuation values and modified mean attenuation values were measured. Modified mean measures excluded the high and low values of each study.

RESULTS

Modified mean, and (mean) dose reduction to hand was 64.60% (31.70%) for LockBlock, 36.30% (27.40%) for RadPad and 87.80% (88%) reduction for both. Modified mean (mean) attenuation to the eyes was 30.70% (32%) for the LockBlock, 27.70% / (27.20%) for the Radpad and 46.20% / (43.00%) for both.

CONCLUSION

Both RadPad Orange and LockBlock demonstrate significant reduction to operator hands and eyes independently, but demonstrate additive protection due to their differing but complimentary attenuation strategies.

CLINICAL RELEVANCE/APPLICATION

Occupational health risks, including the effects from long-term low dose radiation exposure and the musculoskeletal stress from wearing heavy personal protective equipment is a growing threat that requires increased attention and low cost solutions. This study addresses and analyzes additional radiation reduction strategies beyond the ALARA principles.

SSQ20-04 Towards a Benchmark in Radiation Reduction-Optimizing Staff Dose in Image Guided Interventions by Comparing Phantom Experiments with Real-Life Staff Doses

Thursday, Dec. 1 11:00AM - 11:10AM Room: N227B

Participants
Cecile R. Jeukens, PhD, Utrecht, Netherlands (*Presenter*) Nothing to Disclose
Leonie Paulis, PhD, MSc, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Laura W. Vergoossen, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Marco Das, MD, Maastricht, Netherlands (*Abstract Co-Author*) Research Consultant, Bayer AG Research Grant, Siemens AG Speakers Bureau, Siemens AG Research Grant, Koninklijke Philips NV
Joachim E. Wildberger, MD, PhD, Maastricht, Netherlands (*Abstract Co-Author*) Institutional Grant, Agfa-Gevaert Group; Institutional Grant, Bayer AG; Institutional Grant, Koninklijke Philips NV; Institutional Grant, Siemens AG; Speakers Bureau, Bayer AG; Speakers Bureau, Siemens AG
Anna M. Sailer, MD, MBA, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Interventional radiologists are exposed to scattered radiation during fluoroscopy guided interventions. The amount of scattered radiation depends on various factors such as the total X-ray dose, patient anatomy and location of the intervention, the position of the radiologist relative to the patient and the use of additional shielding. Aim of this study was to evaluate the conditions for minimal staff doses as a benchmark for radiation reduction and compare these to real-life radiation doses.

METHOD AND MATERIALS

Comprehensive experiments with an Alderson antropomorphic phantom were performed on a state of the art angiosuite (Philips Allura Clarity). The effect of several parameters on radiologist dose was evaluated namely: patient anatomy (head, thorax, abdomen), radiologist height (5'5" and 6'7") and position (angle and distance), and radiation protection tools (table curtain, table-side shield, ceiling shield). Phantom data were compared to clinical procedural and staff dose data (n= 609) acquired on the same system using personal dose meters (PDM, Philips DoseAware) and automatic dose tracking system (Philips DoseWise portal). A reference PDM was mounted on the C-arm.

RESULTS

In clinical procedures, the staff dose to C-arm reference dose ratios ranged from 6% to 48% for cerebral and biliary procedures, respectively, indicating an effect of type of intervention and staff position on staff dose. This was confirmed by phantom studies, which showed that the staff dose decreased by 84% from head to abdomen interventions. In addition, staff dose depended on the distance to the irradiated area (63% decrease from 1'8"to 2'7") and the staff torso rotation towards the patient (90% difference over a 90 degree range). Radiation protection tools decreased the staff dose by maximal 97%. Combining these phantom studies, staff dose can be reduced by at most 97% when using proper working habits.

CONCLUSION

Staff doses ranged widely between procedures depending on interventional site and staff position. Real-life staff doses were substantially higher than in phantom experiments with optimal shielding conditions, indicating room for possible improvements in radiation protection in clinical practices.

CLINICAL RELEVANCE/APPLICATION

Staff dose to reference PDM ratios provide a benchmark for radiation protection and optimal shielding reduction factors possible during image guided interventions.

SSQ20-05 Influence of Different Types of Acquisition Techniques on Procedural and Staff Dose in Image Guided Interventions

Thursday, Dec. 1 11:10AM - 11:20AM Room: N227B

Participants
Anna M. Sailer, MD, MBA, Maastricht, Netherlands (*Presenter*) Nothing to Disclose
Leonie Paulis, PhD, MSc, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Laura W. Vergoossen, Maastricht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Marco Das, MD, Maastricht, Netherlands (*Abstract Co-Author*) Research Consultant, Bayer AG Research Grant, Siemens AG Speakers Bureau, Siemens AG Research Grant, Koninklijke Philips NV
Joachim E. Wildberger, MD, PhD, Maastricht, Netherlands (*Abstract Co-Author*) Institutional Grant, Agfa-Gevaert Group; Institutional Grant, Bayer AG; Institutional Grant, Koninklijke Philips NV; Institutional Grant, Siemens AG; Speakers Bureau, Bayer AG; Speakers Bureau, Siemens AG
Cecile R. Jeukens, PhD, Utrecht, Netherlands (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Patient and staff dose monitoring during image guided interventions is of increasing interest. Various types of acquisitions can be used such as fluoroscopy, digital subtraction angiography (DSA), roadmap and 3D imaging. Aim of this study was to gain insight in the procedural and occupational dose during interventional radiology procedures and evaluate the individual contribution of different acquisition techniques.

METHOD AND MATERIALS

All staff members (n= 27) were equipped with personal dose meters (PDMs, Philips DoseAware). Comprehensive procedural parameters, including the dose area product (DAP) per acquisition technique and effective staff dose from PDMs were prospectively monitored for each procedure using an automated dose tracking system (Philips DoseWise portal). Procedures (n= 609) performed between 10/2015 and 03/2016 were analyzed and grouped by procedure type; these included among others superficial femoral artery and infragenual interventions (n= 95), venous iliac and caval recanalization (n= 91), cerebral interventions (n= 77), visceral and renal artery interventions (n= 57), AV fistula maintenance (n= 48), biliary interventions (n= 44), aortic repair procedures (n= 41) and percutaneous gastrostomy (n= 26).

RESULTS

Procedural DAP doses were highest for aortic repair procedures (126.5 ±157.8 mGy*cm2) followed by visceral and renal artery interventions (96.3 ±83.3mGy*cm2) and venous recanalization procedures (65.2 ±73.2 mGy*cm2) and were lowest for percutaneous gastrostomy (2.7 ±2.8 mGy*cm2). Radiologists dose was highest for visceral and renal artery interventions

procedures (0.11 ±0.18 mSv) followed by aortic repair (0.09 ±0.09 mSv) and venous procedures (0.05 ±0.14 mSv). Mean procedural DAP was composed of fluoroscopy (51%), DSA (42%), roadmap (5%) and 3D acquisitions (2%). Radiologist dose was mostly driven by fluoroscopy (60%), followed by in-room acquired DSA (36%), roadmap (3%) and 3D (1%). Radiologist dose per in-room acquired DSA (3.5 µSv) was three times higher than per roadmap (1.1 µSv).

CONCLUSION

Fluoroscopy was the dominant contributor to procedural DAP and radiologist dose, followed by DSA. These insights in dose contribution of various imaging techniques might aid to minimize staff exposure.

CLINICAL RELEVANCE/APPLICATION

Occupational doses could be substantially reduced by acquiring DSA consistently from the control room whenever possible. Use of roadmap may be dose-efficient over DSA.

SSQ20-06 Evaluating Current and Recent Fellows' Perceptions on the Interventional Radiology Residency: Results of a 2015 Survey

Thursday, Dec. 1 11:20AM - 11:30AM Room: N227B

Participants
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Jeffrey F. Chick, MD, MPH, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Ayushi Singh, DO, Old Bethpage, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate current and recent interventional radiology (IR) fellows' perceptions on the planned IR residency.

METHOD AND MATERIALS

An anonymous, web-based survey was distributed to 82 current and recent IR fellows (completed training within the past 4 years) across the United States (U.S.). The survey contained 15 questions, most of which were based on a five-point Likert scale, while others contained free text responses. The survey was open for a three-week period in September 2015. Email addresses were obtained from program directors at two IR fellowship programs in the U.S.. An initial email with the survey link was sent out at the beginning of the survey period, with a follow-up email sent 10 days later. The results were analyzed by two trainees and three IR attending physicians.

RESULTS

Sixty-four current or former IR fellows completed the survey (response rate 78%). 17% decided to pursue a career in IR by the end of their third year of medical school. When asked if the IR residency will be an improved IR training pathway, 24% strongly agreed, 38% agreed, 20% were neutral, 8% disagreed, and 10% strongly disagreed. Based on current medical school curricula, 6% agreed that IR residency applicants will be ready to select such a pathway by the end of their third year of medical school, while 20% were neutral, 44% disagreed, and 30% strongly disagreed. When asked if sub-specialty IR fellowships with an emphasis on topics such as peripheral vascular disease, neuro-interventions, oncology, and/or pediatrics should be developed in the future, 15% strongly agreed, 36% agreed, 25% were neutral, 19% disagreed, and 5% strongly disagreed.

CONCLUSION

A majority of current and recent IR fellows surveyed believe that the IR residency will be an improved IR training pathway. However, most chose IR during their final year of medical school or during residency, and most believe that current medical school curriculum do not prepare students to decide upon a career in IR by the end of their third year of medical school. Thus, immediate and longer-term curriculum changes are necessary to ensure that medical students know enough about IR to make an appropriate career decision by the end of their third year of medical school.

CLINICAL RELEVANCE/APPLICATION

Immediate curriculum changes are necessary so that medical students receive enough exposure to IR to make an appropriate career choice by the end of their third year of medical school.

SSQ20-07 Monitoring Disease Activity and Therapy Response in Patients with Aortitis and Chronic Periaortitis Undergoing Immunosuppressive Therapy by Volume Perfusion CT

Thursday, Dec. 1 11:30AM - 11:40AM Room: N227B

Participants
Georg Bier, MD, Tubingen, Germany (*Presenter*) Nothing to Disclose
Mustafa Kurucay, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Joerg Henes, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Theodoros Xenitidis, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Heike Preibsch, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Konstantin Nikolaou, MD, Tuebingen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG; Speakers Bureau, Bracco Group; Speakers Bureau, Bayer AG
Marius Horger, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the role of perfusion-based CT for monitoring inflammatory activity in patients with aortitis and chronic periaortitis

undergoing immunosuppressive therapy.

METHOD AND MATERIALS

Volume perfusion CT (VPCT) was performed in 17 patients (median age 68.5 years) with aortitis or chronic periaortitis before and after immunosuppressive therapy. VPCT parameters (Blood flow & blood volume) as well as vessel wall and perivascular connective tissue thickness were measured and correlated with the course of the acute phase inflammatory parameters CRP and erythrocyte sedimentation rate (ESR).

RESULTS

In all patients under therapy, blood flow and blood volume values dropped at follow up ($p<.05$). In aortitis patients, CRP dropped from 3.86 ± 5.31 mg/dl to 0.9 ± 1.37 mg/dl and in periaortitis patients from 1.78 ± 2.25 mg/dl to 0.79 ± 1.55 mg/dl, whereas the ESR dropped from 45.71 ± 37.59 s to 8.57 ± 3.1 s and 36.78 ± 34.67 s to 17.22 ± 21.82 s, in aortitis and in periaortitis, respectively. Clinical symptoms were resolved in 12 patients at follow up. Moreover, at follow-up, the mean thickness of aortic wall thickness and/or perivascular tissue formation decreased by 41.7 ± 25.63 % (range, 0 - 87.5 %). The response was more vigorous in periaortitis patients (47.7 ± 27.0 %; range: 9 - 87.5 %) than in aortitis patients (35.4 ± 23.88 %; range: 0 - 62.5 %; $p<.001$).

CONCLUSION

The course of perfusion-CT parameters in aortitis and periaortitis undergoing immunosuppressive therapy differs significantly after therapy. In cases with bland serological data ("serologically occult vasculitis"), perfusion-CT was the sole reliable monitoring parameter.

CLINICAL RELEVANCE/APPLICATION

Serologically "occult" aortitis/periaortitis and great vessel vasculitis under therapy represent a disease entity, which is normally difficult to monitor under therapy with established methods (e.g. serology or PET). In these cases volume perfusion CT represents a reliable tool for disease activity assessment.

SSQ20-08 Using Time-Driven Activity Based Costing (TDABC) to Characterize Cost Variability in Interventional Radiology Procedures

Thursday, Dec. 1 11:40AM - 11:50AM Room: N227B

Participants
William Hsu, PhD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Cleo K. Maehara, MD, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose
Lewellyn Andrada, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Katrina R. Beckett, MD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Justin P. McWilliams, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
John M. Moriarty, MD, Los Angeles, CA (*Abstract Co-Author*) Speaker, AngioDynamics, Inc Consultant, AngioDynamics, Inc Speaker, Sequent Medical, Inc Consultant, Sequent Medical, Inc Speaker, Argon Medical Devices, Inc Consultant, Argon Medical Devices, Inc
Dieter R. Enzmann, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

In a value-based healthcare environment, understanding the true cost of care delivery is necessary to improve efficiency and demonstrate cost savings, particularly in procedures that involve multiple providers and steps. Our department has adopted a data-driven TDABC approach that incorporates process modeling, time motion studies, and analysis of data from electronic hospital information systems to obtain per minute costs for labor, equipment, space, and supplies that can then be used to assess cost of each step.

METHOD AND MATERIALS

The initial process model (enumerating tasks and estimated timings) was developed in collaboration with an IR attending, nurse, and technologist. The model was further refined and validated through a time motion study of a hospital based IR port placement procedure. Following an IRB-approved protocol, timestamps from a total of 117 procedures (performed on 116 patients) were extracted from the electronic medical record. Departmental business systems were used to estimate current personnel, equipment, space, and supply cost rates.

RESULTS

Average times for tasks included: 50 min (patient prep), 38 min (IR suite prep), 80±33 min (procedure), 15 min (clean-up), and 120 min (patient recovery). Personnel capacity costs were: $6.00/min (IR attending), $1.50/min (nurse), $1.15/min (technologist), and $0.65/min (IR fellow). Equipment cost rate for fluoroscope and ultrasound are $0.94/min and $0.12/min, respectively. Inpatient procedures took significantly longer (112 min versus 72 min, $p=0.004$), resulting in a cost difference of $413 (equivalent to approximately 25% of the total cost). Among the seven IR attendings who performed at least one of the 117 port placement procedures, variation in average procedure times were insignificant (68 to 87 min), contributing a difference of $100 (less than 10% of the total cost).

CONCLUSION

TDABC is capable of elucidating differences in cost for a given procedure based on factors such as patient type, providers, equipment, and environment. We are conducting further analysis to compare cost with surgical port insertion and to better understand cost variability in different hospital settings.

CLINICAL RELEVANCE/APPLICATION

TDABC provides a more granular approach to investigating where further efficiencies can be achieved and ultimately, provide a basis for a more grounded cost-benefit analysis when comparing an exam to alternatives.

SSQ20-09 Development of a New Image Display System with use of an Electroencephalogram Sensor on Operator's Head

Thursday, Dec. 1 11:50AM - 12:00PM Room: N227B

Participants
Mitsuru Sato, Maebashi, Japan (*Abstract Co-Author*) Nothing to Disclose
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Sakuya Yamanouchi, Maebashi, Japan (*Abstract Co-Author*) Nothing to Disclose
Kosuke Yoshikawa, Gunma, Japan (*Presenter*) Nothing to Disclose
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Kunio Doi, PhD, Chicago, IL (*Abstract Co-Author*) Shareholder, Hologic, Inc License agreement, Hologic, Inc License agreement, Deus Technologies, LLC License agreement, Riverain Technologies, LLC License agreement, Mitsubishi Corporation License agreement, MEDIAN Technologies License agreement, General Electric Company License agreement, Toshiba Corporation Research support, Deus Technologies, LLC Research support, E. I. du Pont de Nemours & Company Research support, Elcint Medical Imaging Ltd Research support, FUJIFILM Holdings Corporation Research support, General Electric Company Research support, Hitachi, Ltd Research support, Eastman Kodak Company Research support, Konica Minolta Group Research support, Mitaya Manufacturing Co, Ltd Research support, Mitsubishi Corporation Research support, Koninklijke Philips NV Research support, Hologic, Inc Research support, Riverain Technologies, LLC Research support, Seiko Corporation Research support, Siemens AG Research support, 3M Company Research support, Toshiba Corporation
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Natsumi Miki, Takasaki, Japan (*Abstract Co-Author*) Nothing to Disclose
Misaki Tobe, Agatsuma, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

During IVR examination, physicians need to view images with a proper display system by use of a console within arm's reach. However, they may not be able to manipulate it because their hands may be tied up frequently. We developed an image display system by using an electroencephalogram (EEG) sensor on his/her head. This image display system can be used based on various data detected by this device, and the output can be converted to commands for various instructions such as paging which can be controlled by operator's eye blink, and zooming of a region indicated by the cursor which can be controlled by operator's concentration on his/her mind. In this study, we report that physicians could operate image display system by their EEG signal.

METHOD AND MATERIALS

In this study, we used a Mindwave MOBILE (Neurosky Ltd., CA, USA) as EEG sensor, which is applied to measure the potential difference between the electrodes attached to the left forehead and left earlobe. With this device, we can obtain raw data and attention meter levels, meditation meter levels, and eye blink strength on an eSense scale of 1 to 100, which is based on analysis of alpha wave and beta wave. We can use the output from the device by programming proper algorithms, and provide the suitable commands for various purposes. As an image display system, we employed an AZEWIN (AZE. Ltd., Tokyo, Japan). Thirtyone observers participated as operators with EEG device in this study. We investigated the average response time required for detection of eye-blink and the average detection rate. We also investigated the average response time required for zooming and the correct zooming rate.

RESULTS

The average response time required for detection of eye-blink was 0.43±0.02 s . The correct detection rate of 100% was achieved by 28 observers, whereas three observers provided 80%. The average response time required for zooming was 5.85±0.56 s. The correct zooming rate of 100% was achieved by 27 observers and 90% by three observers, and 80% by one observer.

CONCLUSION

During IVR examinations, image readings on an image display system may be made by radiologists by use of EEG signals for processing images properly without touching the console.

CLINICAL RELEVANCE/APPLICATION

We can operate with paging and zooming based on the use of electroencephalogram. We would develop a suitable image display system by combining multiple signals including EEG signal.

VIS-THA

Vascular Interventional Thursday Poster Discussions

Thursday, Dec. 1 12:15PM - 12:45PM Room: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

Participants
Charles T. Burke, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose

Sub-Events

VI270-SD-THA1 Evaluation of Efficacy and Safety of Arterial Embolization with Amplatzer Vascular Plug II using "Compressing Method": Experimental Study in Swine

Station #1

Participants
Mika Kodani, Yonago, Japan (*Presenter*) Nothing to Disclose
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Shinsaku Yata, MD, Yonago, Japan (*Abstract Co-Author*) Nothing to Disclose
Toshihide Ogawa, MD, Yonago, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The purpose of this study was to evaluate efficacy and safety of arterial embolization with Amplatzer Vascular Plug II (AVP II) using “compressing method” in animal model.

METHOD AND MATERIALS

In seven swine, 14 internal iliac arteries (IIA) were embolized with AVP II in two ways: seven left IIAs with compressing method (Group A) and seven right IIAs with conventional method (Group B). Aortography was performed just after AVP II placement and then every 30 seconds until cessation of arterial inflow. Long-axis length of AVPII and recanalization were evaluated after embolization. An arterial blood pressure of both the aorta (Pa) and the distal of the IIA (Pd) were also continuously recorded. We analyzed the arterial blood pressure gradient (BPG) between Pa and Pd, and calculated the inclination of straight line on BPG. Arterial damage was assessed by intravascular ultrasound (IVUS) and pathologically.

RESULTS

The procedure was successfully performed without arterial damage in both groups with IVUS. There was no histological difference in the intimal damage between both groups. The mean AVP II length in Group A / in Group B ratio was smaller than 0.5. The mean complete occlusion time was 34.3s (range, 30-60s) in Group A, 132.9s (range, 30-300s) in Group B (p-values=0.019). The mean BPG inclination of Group A (4.1×10-2) was larger than Group B (1.0×10-2) (p-values=0.016). Recanalization was not observed in both groups.

CONCLUSION

AVPII embolization using “compressing method” is effective and can be performed without pathological damage.

CLINICAL RELEVANCE/APPLICATION

Arterial embolization with AVPII using compressing method is useful to perform short segment arterial embolization.

VI276-SD-THA2 1H NMR Based Metabolic Signatures to Predict Early Response to Transarterial Chemoembolization for Patients with Hepatocellular Carcinoma

Station #2

Participants
Zhihui Chang, BMedSc, MMed, Shenyang, China (*Presenter*) Nothing to Disclose
Jiahe Zheng, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Zhaoyu Liu, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Qiyong Guo, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

We used proton nuclear magnetic resonance (1H NMR) to profile the serum metabolome in patients with hepatocellular carcinoma (HCC) and determine whether a disease signature may exist that is strong enough tc

METHOD AND MATERIALS

Metabolic profiling of blood serum was analysised in 100 patients with HCC before TACE and 3 days after TACE and compared with 100 healthy control subjects. The correlations between Metabolic signatures and sl
term tumor imaging response were analyzed. Imaging follow-
up was performed one to three months after TACE. Response to treatment was grouped according to RECIST (Response Evaluation Criteria in Solid Tumors). Statistical analysis used paired t test and Fisher exact te

RESULTS

1H NMR metabolomic profiling could discriminate patients with HCC from healthy subjects with a cross validated accuracy of 100%.100 patients with HCCs had follow up imaging at mean 39 days post TACE. Accordir
responders. Where as no significant change was observed in responders (P<0.001).

CONCLUSION

Both pre- and post treatment blood serum levels of choline compounds have potential to predict response to TACE for Patients with HCC.

CLINICAL RELEVANCE/APPLICATION

Metabolomic profiling is a promising approach to predict early response to TACE for patients with HCC and is recommended for early estimation of the efficacy of TACE in HCC patients.

VI272-SD-THA3 Renal Cryoablation: Patterns and Chronology of Late Local Recurrence - Implications for Post-Treatment Surveillance

Station #3

Awards
Student Travel Stipend Award

Participants
Nirav Patel, MBBS,FRCR, Southampton, United Kingdom (*Presenter*) Nothing to Disclose
Alexander King, Southampton, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
David J. Breen, MD, Southampton, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Percutaneous cryoablation is an increasingly utilised treatment for small renal masses and an accepted alternative to nephron-sparing surgery. There are however as yet no agreed or evidence-based post-treatment imaging protocols. Imaging is directed towards identifying subtotal treatment (STT) on the initial post-treatment study and late local recurrence (LLR) on later studies. We have evaluated our large single centre experience, identifying the pattern and chronology of LLR, and seek to determine whether this has implications for oncologically appropriate imaging follow-up.

METHOD AND MATERIALS

All percutaneous cryoablation cases from May 2007 to March 2016 at a single teaching hospital were analysed for LLR. Our standard local practice has adapted to an intravenous contrast enhanced CT at 1 month, 1, 3 and 5 years post-cryoablation, although intervening CT may be performed if any suspicious appearances. The time (months) between cryoablation procedure and recurrence was noted as was time to any subsequent intervention.

RESULTS

427 tumours were treated in 379 patients. 12 LLR cases (3.0%) were present out of 404 tumours with post-treatment CT. This is a supra-regional service and as such some remote patients were lost to imaging follow-up. The mean time to LLR was 36.7 months (range 5-76 months) with 2 tumours presenting <1 year, 4 tumours from 1-3 years and 6 tumours >3 years. 6 tumours had a repeat ablation within 2-6 months of LLR with remaining undergoing surveillance. LLR is usually seen as an enhancing nodule on late arterial phase CT at the margin of the ablation zone whilst primary residual disease (STT) is seen as an enhancing crescentic margin.

CONCLUSION

In the setting of primary treatment for 'curable' RCC primary, residual (STT) and locally recurrent (LLR) disease are separate entities occurring at different phases post-treatment. LLR is uncommon at 3% and often occurs at 3-5 years post-treatment when it is eminently amenable to secondary treatment. As such our experience suggests that post-treatment surveillance could be considereably curtailed to 1, 3 and 5 years and this would permit the straightforward and oncologically appropriate treatment by delayed ablation where necessary.

CLINICAL RELEVANCE/APPLICATION

Percutaneous cryoablation is an alternative treatment modality of small renal masses and strict imaging follow-up will help identify a recognised complication of late local recurrence.

VI269-SD-THA4 Radiologic Evidence of Short-term Response of Neuroendocrine Tumor Hepatic Metastasis to 90YRadioembolization

Station #4

Awards
Student Travel Stipend Award

Participants
Haiying Yu, MD,PhD, Detroit, MI (*Presenter*) Nothing to Disclose
Shahida M. Danier, MD, Grosse Pointe Shores, MI (*Abstract Co-Author*) Nothing to Disclose
Jasmine Koo, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Vistasp J. Daruwalla, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Hamza M. Beano, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Karan N. Patel, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Mark Le, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose

Hiren Rangunwala, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Robert Wlodarski, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Monte L. Harvill, MD, Franklin, MI (*Abstract Co-Author*) Nothing to Disclose
Roger Kakos, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Jeffrey J. Critchfield, MD, Royal Oak, MI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Yttrium-90 (90Y) radioembolization (RE) is a promising approach to treat the liver metastatic neuroendocrine tumor (mNET). However the radiological measurement of RE effectiveness is inconstant, especially at the short duration. We propose to find the optimal radiologic criterion to evaluate the early mNET response to 90Y RE by comparing the correlations of biochemical maker and different radiologic criteria.

METHOD AND MATERIALS

This is a single-center retrospective study of patients with liver mNET treated with 90Y TheraSphere® between 2008 and 2015. The Chromogranin A (CgA), a biological marker with high sensitivity and specificity for NET burden, was obtained. The change of imaging tumor size was calculated according to Response Evaluation Criteria In Solid Tumors (RECIST) and Modified RECIST (mRECIST) respectively (Fig. 1). Correlation of change of CgA and tumor size at post- to pre-treatment were analyzed.

RESULTS

17 patients were recruited in the study with follow-up duration of 3 - 4 months. The median change in CgA was -48.32%. According to RECIST and mRECIST respectively, the complete response, partial response, stable disease and progressive disease were found in 0 vs. 0, 3 vs. 10, 11 vs. 7 and 3 vs. 0 patients. The correlation coefficient between the change in CgA level and tumor size was 0.117 (p=0.446) vs 0.397 (p=0.026) (RECIST vs. mRECIST) (Fig. 2).RE induces the intra-tumor necrosis. Measuring the shrinkage of tumor by RECIST neglects the distinction of necrotic and viable portion. Only the viable portion is corresponding to tumor metabolism and biological marker. The positive correlation between the changes of CgA and mRECIST-assessed mNET response indicates that mRECIST accurately reflects the tumor burden.

CONCLUSION

The radiologic measurements such as mRECIST are optimal imaging criteria to assess the early mNET response to 90Y RE since they can distinguish the intra-tumor necrosis and residual viable tumor.

CLINICAL RELEVANCE/APPLICATION

The combination of mRECIST and CgA may reflect the early therapeutic effectiveness of 90Y RE which will help physician promptly adjust the treatment regimen and improve prognostication of liver mNET.

VI273-SD-THA5 **The Evaluation of Interventionalists Exposure Doses to the Eye Lens Measured with Small Dosimeters on Radiation Protection Glasses**

Station #5

Participants
Yukichi Tanahashi, MD, Tokyo, Japan (*Presenter*) Nothing to Disclose
Hiroshi Kondo, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Masayoshi Yamamoto, MD, Tokorozawa, Japan (*Abstract Co-Author*) Nothing to Disclose
Takahiro Yamamoto, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Marie Osawa, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Junichi Kotoku, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Ikuo Kobayashi, Ibaraki, Japan (*Abstract Co-Author*) Nothing to Disclose
Shigeru Furui, MD, Itabashi-Ku, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To measure interventionalists' exposure doses to the eye lens during procedures and identify the monitoring value easily assessable on a routine basis.

METHOD AND MATERIALS

From October 2012 to Jan 2016, 5 radiologists and 3 neurosurgeons conducted interventional procedures wearing 2 optically stimulated luminescence dosimeters (nanoDotTM, Landauer, IL), square-shaped with one side measuring 1cm, on the outside and inside surfaces at the exterior part of the left lens of radiation protection glasses. Dosimetry was performed once a month. The monthly dose equivalents (H3mm) on the outside surface (Do) were compared to those on the inside surface (Di), total fluoroscopy times (FT), total patient's skin dose (PSD), total dose-area-products (DAP), and monthly dose equivalents (H70μm) measured with a personal dosimeter worn outside and above the radiation protection apron at the neck (Dn).

RESULTS

The monthly Do, Di, FT, DP, DAP, and Dn ranged from 0.03 to 3.33mSv (mean, 0.71mSv ± 0.60), 0.01 to 1.39mSv (mean, 0.33mSv ± 0.28), 110 to 1,184 minutes (mean, 470 minutes ± 206), 1.68 to 47.27 Gy (mean, 12.19 Gy ± 9.50), 20.17 to 4036.67 Gy· cm2 (mean, 267.46 Gy· cm2 ± 473.33), and 0 to 5.0 mSv (mean, 0.60 mSv ± 0.72), respectively. Linear regression equations obtained were Di = 0.418 x Do + 0.031 (R2, 0.85), Do = 2.0 x 10-3 x FT − 0.157 (R2, 0.41), Do = 4.20 x 10-5 x PSD + 0.20 (R2, 0.44), Do = 5.21 x 10-7 x DAP + 0.57 (R2, 0.17), and Do= 0.57 x Dn + 0.364 (R2, 0.45).

CONCLUSION

The interventionalist's dose to the eye lens can exceed the equivalent dose limit (20mSv in a year, averaged over periods of 5 years, with no single year exceeding 50mSv) recommended by the International Commission on Radiological Protection 2011, particularly when radiation protection glasses. Dn and PSD are useful value to estimate the interventionalist's dose to the eye lens.

CLINICAL RELEVANCE/APPLICATION

Our result showed interventionalist's dose to the eye may exceed the recommended dose by ICRP 2011. Understanding radiation-induced cataract and the appropriate personal monitoring are crucial.

VIS-THB

Vascular Interventional Thursday Poster Discussions

Thursday, Dec. 1 12:45PM - 1:15PM Room: VI Community, Learning Center

VA IR

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
Charles T. Burke, MD, Chapel Hill, NC (*Moderator*) Nothing to Disclose

Sub-Events

VI275-SD-THB1 A Clinical Trial of Radiation Dose Reduction during Transarterial Chemoembolization(TACE) with Drug-eluting bead(DEB) for Hepatocellular Carcinoma

Station #1

Participants
Masakazu Hirakawa, MD, Beppu, Japan (*Presenter*) Nothing to Disclose
Yoshiki Asayama, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Kousei Ishigami, MD, Iowa City, IA (*Abstract Co-Author*) Nothing to Disclose
Yasuhiro Ushijima, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Akihiro Nishie, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroshi Honda, MD, Fukuoka, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

This study aimed to evaluate patient radiation dose reduction, during transarterial chemoembolization (TACE) with drug-eluting bead (DEB) for hepatocellular carcinoma (HCC) while maintaining treatment effect (TE), adverse events(AE) and the image quality (IQ), using a new our clinical trial of radiation dose reduction.

METHOD AND MATERIALS

Fifty eight HCC cases treated with DEB-TACE were included in this study. Forty five patients (30 men, 15 women; mean age, 71.6 years) were treated under normal mode(the normal group), and 17 patients (10 men, 7 women; mean age, 69.6 years) were treated under radiation reduction mode using reduction filter, lower frame rate and etc (the reduction group). Dose area product (DAP), air kerma (AK) and radiation time of each digital fluoroscopy (DF) were compared between the two groups. IQ of digital subtraction angiography (DSA) and digital angiography (DA) during infusion of DEB was assessed by two blinded and independent readers on a four-rank scale.

RESULTS

There were no significant differences in patient's characteristics and tumor burden between the groups. The overall adverse events relating DEB-TACE did not significantly differ between the groups. Fluoroscopy time were equivalent between the groups. Compared to the normal group, in the reduction group, AK and DAP could be significantly reduced by 64.2% (2.63 Gy vs. 1.64 Gy, $p<0.05$) and 67.4% (483 mGy cm2 vs. 328 mGy cm2, $p<0.05$), respectively. TE, AEs and IQ were rated comparable between the groups.

CONCLUSION

Our simple trial of radiation dose reduction during DEB-TACE for HCC could reduce to almost 60% level recorded in the normal mode without negative impact on treatment effect, image quality and severe adverse events.

CLINICAL RELEVANCE/APPLICATION

Simple clinical trial of radiation dose reduction, radiation dose during DEB-TACE could be reduced significantly without negative impact on treatment effect, image quality and severe adverse events.
Significant radiation reduction might be especially important in patients being treated repeatedly with DEB-TACE and also important for the in-room medical staff.

VI271-SD-THB2 Comparison of Contrast Enhancement on CT Angiograms of the Lower Extremity of Dialysis and Non-dialysis Patients

Station #2

Participants
Takanori Masuda, Hiroshima, Japan (*Presenter*) Nothing to Disclose
Yoshinori Funama, PhD, Kumamoto, Japan (*Abstract Co-Author*) Nothing to Disclose
Naoyuki Imada, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Tomoyasu Satou, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Takayuki Oku, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuo Awai, MD, Hiroshima, Japan (*Abstract Co-Author*) Research Grant, Toshiba Corporation; Research Grant, Hitachi, Ltd; Research Grant, Bayer AG; Research Grant, Eisai Co, Ltd; Medical Advisor, General Electric Company; ; ; ; ;

PURPOSE

Patients with peripheral artery disease (PAD) often present with chronic renal insufficiency (CRI). On CT angiograms of the extremities (e-CTA), PAD patients undergoing dialysis due to CRI show volume overload of the extracellular fluid and arterial contrast enhancement may be impaired. We compared arterial enhancement on lower e-CTA of patients who did and did not undergo dialysis.

METHOD AND MATERIALS

Between January 2014 and December 2015, 340 patients with PAD underwent lower e-CTA. Group A (n=177) did not undergo dialysis; their mean body weight (BW) was 56.8±12.5 kg (SD). Group B-1 (n=81, mean BW 56.3±11.5 kg) underwent e-CTA just before dialysis. Group B-2 (n=82, mean BW 54.1±11.1 kg) underwent e-CTA just after dialysis. Helical scans of the arteries of the lower extremities were performed on a 64-detector CT scanner (VCT, GE, tube voltage 100 kVp, tube current 200-700 mA, detector configuration 32 x 1.25 mm, rotation time 0.4s/r, helical pitch 0.516). The contrast medium (85.0 mL, Omnipaque-300; Daiichi-Sankyo, Tokyo, Japan) was intravenously administered at an injection rate of 3.0 mL/sec; this was followed by 20.0 mL of saline solution delivered at the same injection rate. We compared contrast enhancement at the patella level in all patients using Steel-Dwass multiple comparison analysis.

RESULTS

The median CT number and the range for the popliteal artery at the patella level were 421.5 HU (range 210.6-658.1 HU) in group A, 358.7 HU (range 191.4-588.3 HU) in group B-1, and 422.2 HU (range 283.2-617.6 HU) in group B-2. The CT number was statistically lower in group B-1 than group A ($p<0.01$) and group B-2 ($p<0.01$). There was no significant difference between group A and B-2 ($p=0.99$).

CONCLUSION

Contrast enhancement was significantly lower in patients who underwent e-CTA just before dialysis than in patients without dialysis and patients who were scanned just after dialysis.

CLINICAL RELEVANCE/APPLICATION

In patients with PAD undergoing dialysis, e-CTA should be performed just after dialysis to obtain a sufficient CT number of the arteries.

VI274-SD-THB4 Tips for Optimal Use and Imaging of Radiopaque Embolization Microspheres

Station #4

Participants
Elliot B. Levy, MD, Bethesda, MD (*Presenter*) Nothing to Disclose
Venkatesh P. Krishnasamy, MD, Delaware, OH (*Abstract Co-Author*) Nothing to Disclose
Andrew Lewis, PhD, Camberley, United Kingdom (*Abstract Co-Author*) Employee, BTG International Ltd
Sean Willis, PhD, Camberley, United Kingdom (*Abstract Co-Author*) Employee, BTG International Ltd
Chelsea Macfarlane, PhD, Camberley, United Kingdom (*Abstract Co-Author*) Employee, BTG International Ltd
Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, W. L. Gore & Associates, Inc ; Researcher, Cook Group Incorporated; Patent agreement, VitalDyne, Inc; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; ; ; ;
Victoria L. Anderson, MS, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Imramsjah M. van der Bom, Andover, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Alessandro G. Radaelli, PHD, MS, Best, Netherlands (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Karun V. Sharma, MD, PhD, Mc Lean, VA (*Abstract Co-Author*) Nothing to Disclose
Elizabeth C. Jones, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Ayele Negussie, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Andrew Mikhail, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
William F. Pritchard Jr, MD, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC
Govindarajan Narayanan, MD, Miami, FL (*Abstract Co-Author*) Consultant, BTG International Ltd; Consultant, AngioDynamics, Inc; Consultant, Medtronic plc; Consultant, Guerbet SA
Riccardo A. Lencioni, MD, Pisa, Italy (*Abstract Co-Author*) Research Consultant, BTG International Ltd; Research Consultant, Guerbet SA; Research Consultant, Bayer AG

PURPOSE

To describe procedural and post-procedural technical and imaging tips for optimal delivery and follow up of a novel commercial radiopaque image-able microsphere for hepatic embolization.

METHOD AND MATERIALS

20 patients with primary or metastatic liver neoplasms (hepatocellular carcinoma, carcinoid, neuroendocrine, GIST, or adrenocortical carcinoma) underwent transarterial embolization with 1-2ml (sedimented volume) 70-150 µm and/or 100-300 um LC Bead LUMI microspheres. Embolization was slow and selective, with a near-complete flow stasis endpoint. Intra-procedural imaging included fluoroscopy, digital single shot radiographs, conventional CBCT, and custom dual phase CBCT (Oncoblue, Philips, Best, The Netherlands). Tumor segmentation, registration, fusion, and 3D roadmap navigation planning software with feeder detection was used in specific cases both during the procedure and at follow up. Imaging follow up included immediate post-embolization CBCT, 10 min delay CBCT, 48 hr CT, and up to 3 month CT.

RESULTS

Optimal bead suspension and handling was achieved with Visipaque 320 non-ionic contrast injected horizontally through ≥ 2.4Fr microcatheters. Microspheres were seen on all modalities at all time points with conspicuity varying among the modalities but not over the short term follow up. Thick slab maximum intensity projection (MIP) optimally showed the microsphere distribution. Intra-procedural fusion of non-enhanced post procedural CBCT with either pre procedural or post-procedural enhanced CBCT demonstrated patent vessels without microspheres and tumor with fewer microspheres presumed to be at risk for under-treatment. Fusion imaging altered treatment plans in 3 of the initial 5 patients at one center (added phrenic embolization or microwave ablation). CT at 1 and 2 months demonstrated microspheres in the expected location with slight alterations related to involution of treated tumors.

CONCLUSION

Intra-procedural CBCT and digital single shot radiography can visualize and localize radiopaque microsphere delivery. Navigation, treatment planning, and fusion platforms may be integrated with the imageable microsphere embolization procedure. Microsphere location and conspicuity on CT is relatively constant out to 3 months post embolization.

CLINICAL RELEVANCE/APPLICATION

Embolization with imageable radiopaque beads permits intra-procedural visualization of embolic distribution and identification of potentially under-treated tumor.

VI278-SD-THB5 Significant Patient Radiation Exposure Reduction during Complex Liver Interventional Radiology Procedures Using a New Generation Angiography Imaging Room

Station #5

Participants
Charles Martin III, MD, Pepper Pike, OH (*Presenter*) Nothing to Disclose

PURPOSE

To evaluate patient radiation exposure levels during complex liver interventional radiology (IR) procedures performed with recent angiography equipment & image processing tools.

METHOD AND MATERIALS

An IRB approved retrospective study of all TIPS and liver embolization procedures performed in our new angiography suite (Discovery IGS740, GE Healthcare, Chalfont St Giles, UK) was conducted.
For each case, dedicated imaging protocols were used with the following tools: Cone Beam CT, automated vessel identification software, preoperative CT and CBCT 3D roadmapping, multimodality image fusion, digital magnification. Dose Area Product (DAP), Air Kerma (AK) and Fluoroscopy time (FT) were recorded and compared with historical data and published SIR reference levels. Results are expressed as median (interquartile range Q3-Q1).

RESULTS

From February 2015 to March 2016, 117 complex liver IR cases were performed in the new room, as follows: 12 TIPS, 55 Hepatic Arterial Embolization(HAE), 23 Y90 mappings (Y90m) and 27 radioembolizations (Y90). Operators were the same in the new and historical cohort, and BMI were equivalent (mean 28.5 vs 28.6 kg/m2, p=0.87). DAP (Gy.cm2) were as follows: TIPS 215.6 (351.6-66.5), HAE 147.3 (221.8-83.3), Y90m 133.6 (195-88.1), Y90 75.3 (161.5-41.8). AK (Gy) were as follows: TIPS 0.65 (1.11-0.26), HAE 0.96 (1.33-0.62), Y90m 0.48 (0.8-0.21), Y90 0.35 (0.98-0.18).AK levels were significantly lower in the new room vs. historical data (54% p=0.027 for TIPS, 43% p=0.037 for HAE, 68% p=0.022 for Y90m and 57% p=0.037 for Y90) and vs. published data (62% p<.05 for TIPS, 25% p<.05 for HAE).No significant difference in DAP for TIPS was observedwith historical or published data. HAE DAP was significantly lower in the new room when compared to published data (41% p<.05)

CONCLUSION

Using the latest angiography technology and available image processing tools enables to significantly reduce the radiation dose exposure to patient, thus to medical staff, during complex liver interventional radiology procedures.

CLINICAL RELEVANCE/APPLICATION

Through our demonstration of these acquisition metrics, future users can modify their respective dose parameters to minimize patient operator radiation dose during complex interventional procedures.

VI018-EB-THB Review of Budd-Chiari Syndrome Including the Pathophysiology, Clinical Presentation, and Management Focusing on Interventional Treatment Options

Hardcopy Backboard

Participants
Alex F. Munoz, MD, MS, Lexington, KY (*Presenter*) Nothing to Disclose
Steven J. Krohmer, MD, Lexington, KY (*Abstract Co-Author*) Speaker, Medtronic plc

TEACHING POINTS

Budd-Chiari Syndrome (BCS) is a rare condition characterized by hepatic venous outflow tract obstruction, which can occur at any level between the small hepatic veins and the junction of the inferior vena cava and the right atrium. The complex pathophysiology of BCS gives rise to multiple etiologies with various clinical presentations. Treatment options include medical management, endovascular interventions and surgery, with transplant as the last option. The purpose of this exhibit is:1. To review the pathophysiology and various clinical presentations of BCS.2. To explain the different treatment options of BCS including medical mangement, interventional and surgical treatments.3. To outline the different endovascular interventional treatment options including pre-procedural, procedural and post-procedural imaging.

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IntroductionPathophysiologyClinical PresentationDiagnostic ImagingMedical ManagementEndovascular Interventions and SurgeryConclusion

VSIO51

Interventional Oncology Series: Management of Hepatic Metastases from Colorectal Cancer, Neuroendocrine Tumors and more

Thursday, Dec. 1 1:30PM - 6:00PM Room: S405AB

GI IR

AMA PRA Category 1 Credits ™: 4.50
ARRT Category A+ Credit: 0

FDA Discussions may include off-label uses.

Participants
Sarah B. White, MD,MS, Philadelphia, PA, (sbwhite@mcw.edu) (*Moderator*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, IO Rad

LEARNING OBJECTIVES

The overall objective of this session is to get a better understanding of multimodality, multidisciplinary treatment hepatic dominant metastatic disease. We will accomplish this by:1.) Defining the alphabet soup of the cancer treatments2.) Highlighting the general algorithm for the treatment of mCRC and mNETs3.) Briefly discuss the evidence basis behind medical, surgical, radiation and liver directed therapies4.) Exploring the clinical outcomes and adverse events with the different treatment modalities5.) Demonstrate the necessity of multidisciplinary tumor boards for the treatment of patients with dominant hepatic metastases

Sub-Events

VSIO51-01 Setting the Stage: NCCN/ESMO Guidelines for mCRC

Thursday, Dec. 1 1:30PM - 1:45PM Room: S405AB

Participants
Emily Bergsland, MD, San Francisco, CA (*Presenter*) Institutional research support, Lexicon Pharmaceuticals, Inc; Institutional research support, Merck & Co, Inc; Institutional research support, Novartis AG; Consultant, Ipsen SA; Consultant, Lexicon Pharmaceuticals, Inc;

LEARNING OBJECTIVES

1) Review the general approach to the treatment of metastatic colorectal cancer (mCRC). 2) Summarize the current systemic treatment options for mCRC. 3) Identify the clinical and molecular subgroups of patients with mCRC which have implications in terms of choice of therapy. 4) Examine the differences between published guidelines for the care of patients with mCRC.

ABSTRACT

VSIO51-02 Role of PVE in the Surgical Management of Colorectal Liver Metastases

Thursday, Dec. 1 1:45PM - 2:00PM Room: S405AB

Participants
David C. Madoff, MD, New York, NY (*Presenter*) Advisory Board, RenovoRx

VSIO51-03 Advances in the Surgical Toolbox for Colorectal Liver Metastases

Thursday, Dec. 1 2:00PM - 2:15PM Room: S405AB

Participants
T. Clark Gamblin, MD, MS, Milwaukee, WI (*Presenter*) Nothing to Disclose

VSIO51-04 SBRT for Isolated Hepatic Metastases

Thursday, Dec. 1 2:15PM - 2:30PM Room: S405AB

Participants
Mary U. Feng, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

VSIO51-05 Radiation Map Fusion Guided Combination of External Radiation with Thermal Ablation for up to 5 Liver Tumors and Up to 10cm in Diameter

Thursday, Dec. 1 2:30PM - 2:40PM Room: S405AB

Participants
Hayet Amalou, MD, Bethesda, MD (*Presenter*) Nothing to Disclose
Deborah Citrin, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Sheng Xu, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Holly Ning, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Robert W. Miller, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NV; Researcher, Celsion Corporation; Researcher, BTG International Ltd; Researcher, W. L. Gore & Associates, Inc ; Researcher, Cook Group Incorporated; Patent agreement, VitalDyne, Inc; Intellectual property, Koninklijke Philips NV; Intellectual property, BTG International Ltd; ; ; ;
Victoria L. Anderson, MS, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

External beam radiation therapy (XRT) and thermal ablation (RFA or microwave ablation) have complementary risk profiles and

synergistic mechanisms. XRT works better with blood flow, but ablation is impaired by perfusion due to convection. XRT is safer in the porta hepatis, but ablation with hydrodissection is safer adjacent to bowel. XRT is typically not given for liver lesions larger than 6 cm due to integral radiation dose toxicities, and ablation is less effective for > 3cm tumors.

METHOD AND MATERIALS

Inclusion criteria included up to 5 liver tumors, each up to 10 cm in diameter. Patients were treated with 5 total fractions (50 Gy total) of XRT over 2 weeks, and RFA or microwave ablation was between fractions 3 and 4. A navigation system for ablation was developed fusing radiation dose map, multiple imaging modalities, and probe locations. Following multi-modality liver registration, the software populated a planned ablation treatment volume by overlapping the expected ablation zone of each probe to define tumor coverage. 3 patients were enrolled.

RESULTS

Fusion software guidance combines XRT with ablation for synergistic treatment of large and/or multiple liver tumors. This combination allows respecting the limitations, while taking advantage of the strengths, of each modality. Multi-modality registration overlays CT images, radiation dose map, planned ablation probe insertion paths, and expected overlapping ablation treatment volumes from multiple probes. Two patients received spatially synergistic treatment, using XRT and ablation to achieve an overall larger lesion coverage compared to what each modality might achieve alone. One patient received temporally synergistic treatment (RFA and radiation to same volume), which resulted in an ablation volume of 59 cm3 after 12 minutes of RFA, (nearly 3 times greater than the expected volume of 20.5 cm3 seen in porcine studies). On most recent follow-up, one of three patients (1 of 5 tumors) had local recurrence and one hepatocellular carcinoma patient remains disease-free over two years after treatment for a 10 cm tumor.

CONCLUSION

Fusion navigation guided by radiation dose map input may facilitate combination of complementary therapies of XRT and thermal ablation, Both spatial and temporal synergy are feasible but speculative..

CLINICAL RELEVANCE/APPLICATION

Complementary combination therapy with XRT + RFA allows treatment of larger liver lesions in otherwise risky locations.

VSIO51-06 New Angles on Ablating Colorectal Liver Metastases

Thursday, Dec. 1 2:40PM - 2:55PM Room: S405AB

Participants
Paul B. Shyn, MD, Boston, MA, (pshyn@bwh.harvard.edu) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

ABSTRACT

LEARNING OBJECTIVES

1) Assess the indications for and efficacy of image-guided ablation of liver metastases in patients with colorectal cancer. 2) Examine the spectrum of ancillary techniques and ablation technologies that expand eligibility for liver tumor ablation. 3) Assess the capabilities of current liver ablation strategies through case examples.

ABSTRACT

VSIO51-07 Prospective MonoIstitutional Study on Safety and Efficacy of dRug-eluting Microspheres Loaded with Irinotecan in Patients with Colorectal Liver mEtastases (Miracle III Trial)

Thursday, Dec. 1 2:55PM - 3:05PM Room: S405AB

Participants
Giovanni Mauri, MD, Milan, Italy (*Presenter*) Consultant, Esaote SpA
Gianluca M. Varano, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose
Riccardo Foa, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Maria Zampino, Milan, Japan (*Abstract Co-Author*) Nothing to Disclose
Paola Ravenda, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Paolo Della Vigna, MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Lorenzo Monfardini, Brescia, Italy (*Abstract Co-Author*) Nothing to Disclose
Guido Bonomo, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Franco Orsi, MD, Rome, Italy (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Primary endpoints of the study were the evaluation of the safety of the drug-eluting microspheres loaded with Irinotecan and the liver control rate at three months in patients with colorectal liver metastases. Secondary endpoints were the liver control rate at 6 and 12 months, time to progression and overall survival.

METHOD AND MATERIALS

18 patients with colorectal liver or liver-dominant disease (11 M, 7 F, mean age 62 years, range 47-79) were prospectively enrolled between November 2013 and February 2015. Main characteristics: all patients received > 2 prior lines of systemic therapy (containing Fluoropyrimidines/Oxaliplatin and Irinotecan), 13 were treated with liver surgery or ablation, 14 had extra-hepatic spread at the time of first embolization, 11 had liver bilobar involvement disease with a mean of 9 (range 1-30) hepatic metastases and with mean diameter of 47.6 mm (range 12-161 mm). The study procedure was performed by using 40mm microparticles loaded with 100 mg of Irinotecan and recycled every 4 weeks, at least twice per each lobe and repeated up to disease progression. Adverse events (AEs) were evaluated according to the NIH-CTC V 4.0 criteria. Response to treatment was evaluated according to RECIST 1.1criteria. Estimated median for time to local tumor progression was calculated using Kaplan-Meyer analysis

RESULTS

Overall, 69 treatments were performed (mean of 3.8/patient, range 2-9);G1/G2 AEs occurred in 42/69 (60.8) procedures while G3, G4 or G5 complications did not occurred.Liver tumor control was achieved in 14/18 (77.8%) patients at 3 months and in 10/18 (55.6%) patients at 6 months. Median time to liver progression was 7 months.

CONCLUSION

Drug-eluting microspheres loaded with Irinotecan are safe and effective in treatment of patients affected by colorectal cancer with predominant hepatic involvement unresponsive to standard therapies.

CLINICAL RELEVANCE/APPLICATION

drug-eluting microspheres loaded with Irinotecan represent a safe and effective option for treating patients with colorectal liver metastases that could be tested in a larger series and early clinical setting.

VSIO51-08 Embolotherapy for CRLM

Thursday, Dec. 1 3:05PM - 3:20PM Room: S405AB

Participants
Michael C. Soulen, MD, Philadelphia, PA, (michael.soulen@uphs.upenn.edu) (*Presenter*) Royalties, Cambridge University Press; Consultant, Guerbet SA; Research support, Guerbet SA; Consultant, BTG International Ltd; Research support, BTG International Ltd; Consultant, Merit Medical Systems, Inc; Speaker, Sirtex Medical Ltd; Consultant, Terumo Corporation; Consultant, Bayer AG

LEARNING OBJECTIVES

1) Learn to select appropriate patients with metastatic colorectal cancer for liver directed therapies. 2) Understand the data for conventional and drug-eluting chemoembolization for treatment of mCRC.

ABSTRACT

VSIO51-09 Detectability of Liver Metastases by Dual Phase Cone-Beam Computed Tomography during Liver-directed Liver Interventions: Comparison with Conventional Contrast-enhanced Computed Tomography

Thursday, Dec. 1 3:20PM - 3:30PM Room: S405AB

Participants
Geert Maleux, MD, PhD, Leuven, Belgium (*Presenter*) Nothing to Disclose
Maria-Louisa Izamis, Best, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Cedric Werbrouck, Leuven, Belgium (*Abstract Co-Author*) Nothing to Disclose
Alessandro G. Radaelli, PHD, MS, Best, Netherlands (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Vincent R. Vandecaveye, MD, Leuven, Belgium (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare the diagnostic performance of intra-arterial dual phase cone-beam computed tomography (DP-CBCT) and contrast-enhanced computed tomography (CE-CT) in accurately characterizing tumor burden in patients with metastatic liver cancer.

METHOD AND MATERIALS

This retrospective study included patients with liver metastases, referred for catheter-directed liver intervention. Demographic and radiological data were gathered, including type of tumor, number, maximum size, type and degree of contrast enhancement of liver metastases.

RESULTS

29 patients with colorectal (n=10), breast (n=9) and neuroendocrine (n=10) liver metastases were included. DP-CBCT and CE-CT were in agreement on number and distribution of liver metastases in 18 out of 29 patients (62%). In 9 out of 11 patients DP-CBCT and CE-CT identified a mean of 7.2 and 10 metastases, respectively (P=0.025). In 2 out of 11 patients DP-CBCT identified less (n=1) or more (n=1) metastases than CE-CT. Metastases were larger in diameter on DP-CBCT than on CE-CT regardless of origin: colorectal: 57 +/- 9.5 mm vs 43 +/- 8.3 mm, P=0.02; breast: 57 +/- 10 mm vs 43 +/- 8.5 mm, P=0.03 and neuroendocrine: 56 +/- 6.3 mm vs 51 +/- 5.8 mm, P= 0.01. In colorectal metastases, rim enhancement appeared in 100% of cases on DP-CBCT, but was variable on CE-CT. In breast metastases, DP-CBCT displayed thick, hyper-dense rims while CE-CT did not, or had rims of variable thickness and density. Neuroendocrine tumors had variable rim enhancement within the same patient and differed between DP-CBCT and CE-CT in 40% of patients.

CONCLUSION

DP-CBCT appears to identify the vast majority of liver metastases, demonstrates a larger diameter and a peripherally enhancing tumoral rim compared to CE-CT; in more than 30% of patients, DP-CBCT identified more tumors than CE-CT. DP-CBCT provides additional information to CE-CT that may impact treatment decisions and dosimetry for catheter-directed liver interventions.

CLINICAL RELEVANCE/APPLICATION

DP-CBCT provides additional information, including number, diameter and pattern of contrast enhancement of liver metastases, to CE-CT which may impact treatment decisions for catheter-directed liver interventions.

VSIO51-10 Y-90 for CRLM

Thursday, Dec. 1 3:30PM - 3:45PM Room: S405AB

Participants
Robert J. Lewandowski, MD, Chicago, IL, (r-lewandowski@northwestern.edu) (*Presenter*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc

LEARNING OBJECTIVES

1) Learn the evidence for radioembolization in patients with mCRC (salvage setting). 2) Learn the evidence for radioembolization in patients with mCRC (combined with systemic therapy). 3) Discuss optimal timing of radioembolization in patients with mCRC.

VSIO51-11 Differences between Hepatic Distribution of Tc99m MAA and Y-90 Microspheres Could Complicate 3D Image Based Dosimetry

Thursday, Dec. 1 3:45PM - 3:55PM Room: S405AB

Participants
Julien S. Wonderlick, MD, Burlington, VT (*Presenter*) Nothing to Disclose
Christopher A. Ford, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose
Sean Reynolds, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose
Joseph T. Shields, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose
Anant D. Bhave, MD, Richmond, VT (*Abstract Co-Author*) Nothing to Disclose
Marleen Moore, MS, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose
Janusz K. Kikut, MD, Burlington, VT (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Selective internal radiation therapy is radioembolization of malignant tumors in the liver with microspheres carrying Y90. 2 products (SIR-Spheres and TheraSpheres) are approved for use in the USA. Prior to injection of either product, treatment planning scintigraphy is performed by selective arterial injection of Tc99m MAA. MAA distribution is taken into account for dose calculations with a goal of delivering a minimum of 100 Gy to the tumor. There is extensive literature on predictive dosimetry based on the pre-treatment scan. However, such calculations are only valid if the MAA scan is highly predictive of the distribution of SIRT particles post-embolization. A semi-quantitative scale was used to compare the pre-treatment MAA scan to the post-treatment Bremsstrahlung scan in 30 SIRT cases to determine how well the MAA-planned target volume approximated the Treated Liver Volume on Bremsstrahlung SPECT.

METHOD AND MATERIALS

Consecutive 17 SIRsphere (1 HCC,12 colon, 4 carcinoid) and 13 TheraSphere treatments (12 HCC, 1 neuroendocrine) were reviewed from 2012 to present. Comparison of MAA distribution in the liver vs.Y90 TheraSphere and Y90 SIRSphere was done based on the following score:0: TLV-Y90 matches PTV-MAA and are isogenous
1: TLV-Y90 matches PTV-MAA with varying pattern of internal heterogeneity
2: TLV-Y90 smaller than PTV-MAA
3: TLV-Y90 larger than PTV-MAA

RESULTS

MAA and Y90 microsphere distribution matched in 7 (53%) Theraspheres and 2 (12.5%) SIRspheres treatments. In 6 (47%) Theraspheres and 10 (62.5%) SIRspheres treatments the treated volume matched MAA but the implanted Y90 microspheres demonstrated a different pattern of distribution within the volume. In 4 (25%) SIRspheres treatments the treated volume was different from the pretreatment MAA scan.

CONCLUSION

Differences in particle number and injection technique are likely culprits for hepatic distribution of implanted Y90 Theraspheres and SIRspheres inconsistently matching the pretreatment MAA scan. This study supports recommendations for post-treatment imaging with both products and calls into question routine use of MAA Quantitative SPECT scans for voxel by voxel based dosimetry, particularly for SIRspheres.

CLINICAL RELEVANCE/APPLICATION

Significant disagreement between pretreatment MAA and post-treatment Bremsstrahlung scan can lead to less than optimal Y-90 dose for radioembolization.

VSIO51-12 Question and Answer

Thursday, Dec. 1 3:55PM - 4:10PM Room: S405AB

Participants
William S. Rilling, MD, Milwaukee, WI (*Presenter*) Research support, B. Braun Melsungen AG; Research support, Sirtex Medical Ltd; Research support, Siemens AG; Consultant, B. Braun Melsungen AG; Consultant, Cook Group Incorporated ; Consultant, Terumo Corporation; Advisory Board, Terumo Corporation
Sarah B. White, MD,MS, Philadelphia, PA, (sbwhite@mcw.edu) (*Presenter*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, IO Rad
Emily Bergsland, MD, San Francisco, CA (*Presenter*) Institutional research support, Lexicon Pharmaceuticals, Inc; Institutional research support, Merck & Co, Inc; Institutional research support, Novartis AG; Consultant, Ipsen SA; Consultant, Lexicon Pharmaceuticals, Inc;
David C. Madoff, MD, New York, NY (*Presenter*) Advisory Board, RenovoRx
T. Clark Gamblin, MD, MS, Milwaukee, WI (*Presenter*) Nothing to Disclose
Mary U. Feng, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Paul B. Shyn, MD, Boston, MA (*Presenter*) Nothing to Disclose
Michael C. Soulen, MD, Philadelphia, PA, (michael.soulen@uphs.upenn.edu) (*Presenter*) Royalties, Cambridge University Press; Consultant, Guerbet SA; Research support, Guerbet SA; Consultant, BTG International Ltd; Research support, BTG International Ltd; Consultant, Merit Medical Systems, Inc; Speaker, Sirtex Medical Ltd; Consultant, Terumo Corporation; Consultant, Bayer AG
Robert J. Lewandowski, MD, Chicago, IL, (r-lewandowski@northwestern.edu) (*Presenter*) Advisory Board, BTG International Ltd; Advisory Board, Boston Scientific Corporation; Consultant, Cook Group Incorporated; Consultant, ABK Medical Inc

LEARNING OBJECTIVES

1) Discuss real-word cases as part of a multi-discipline team. 2) Understand importance of a multi-discipline approach to cancer care.

VSIO51-13 Setting the Stage mNET

Thursday, Dec. 1 4:10PM - 4:25PM Room: S405AB

Participants
Emily Bergsland, MD, San Francisco, CA (*Presenter*) Institutional research support, Lexicon Pharmaceuticals, Inc; Institutional research support, Merck & Co, Inc; Institutional research support, Novartis AG; Consultant, Ipsen SA; Consultant, Lexicon Pharmaceuticals, Inc;

LEARNING OBJECTIVES

1) Review the epidemiology and classification of gastroenteropancreatic neuroendocrine tumors (GEPNETS). 2) Discuss the role of somatostatin analogs for the treatment of GEPNETS. 3) Summarize the current systemic treatment options for metastatic GEPNETs. 4) Examine commonly applied treatment algorithms/guidelines for advanced GEPNETS.

ABSTRACT

VSIO51-14 Aggressive Surgical Management in mNET

Thursday, Dec. 1 4:25PM - 4:40PM Room: S405AB

Participants
T. Clark Gamblin, MD, MS, Milwaukee, WI (*Presenter*) Nothing to Disclose

VSIO51-15 Intra-arterial Therapies of GEP-NET

Thursday, Dec. 1 4:40PM - 4:55PM Room: S405AB

Participants
William S. Rilling, MD, Milwaukee, WI (*Presenter*) Research support, B. Braun Melsungen AG; Research support, Sirtex Medical Ltd; Research support, Siemens AG; Consultant, B. Braun Melsungen AG; Consultant, Cook Group Incorporated ; Consultant, Terumo Corporation; Advisory Board, Terumo Corporation

VSIO51-16 Comparing cTACE, DEB-TACE and 90Yttrium Radioembolization as Treatment Options for Patients with Neuroendocrine Tumor Liver Metastases

Thursday, Dec. 1 4:55PM - 5:05PM Room: S405AB

Participants
Duc Do Minh, BSc, Berlin, Germany (*Presenter*) Nothing to Disclose
Julius Chapiro, MD, New Haven, CT (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV
Boris Gorodetski, MD, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Susanne Smolka, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Qiang Huang, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Cuihong Liu, Jinan, China (*Abstract Co-Author*) Nothing to Disclose
David Wainstejn, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Ming De Lin, PhD, Cambridge, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Lynn J. Savic, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Todd Schlachter, MD, Farmington, CT (*Abstract Co-Author*) Nothing to Disclose
Bernhard Gebauer, MD, Berlin, Germany (*Abstract Co-Author*) Research Consultant, C. R. Bard, Inc ; Research Consultant, Sirtex Medical Ltd; Research Grant, C. R. Bard, Inc; Research Consultant, PAREXEL International Corporation; Travel support, AngioDynamics , Inc
Jean-Francois H. Geschwind, MD, Westport, CT (*Abstract Co-Author*) Consultant, BTG International Ltd; Consultant, Bayer AG; Consultant, Guerbet SA; Consultant, Sterigenics International LLC; Consultant, Koninklijke Philips NV; Consultant, Jennerex Biotherapeutics, Inc; Grant, BTG International Ltd; Grant, Bayer AG; Grant, Koninklijke Philips NV; Grant, Sterigenics International LLC; Grant, Threshold Pharmaceuticals, Inc; Grant, Guerbet SA; Founder and CEO, PreScience Labs, LLC

PURPOSE

To compare efficacy, survival outcomes and identify prognostic factors of conventional transarterial chemoembolization (cTACE), drug-eluting beads TACE (DEB-TACE), and 90Yttrium-radioembolization (Y90) for the treatment of gastro-entero-pancreatic (GEP) neuroendocrine tumor liver metastases (NELMs).

METHOD AND MATERIALS

This retrospective single center-study included 192 patients (58.6 years mean age, 56% men) with NELM of known GEP origin treated with cTACE (N=122), DEB-TACE (N=26), or Y90 (N=44) between 2000 and 2014. Follow-up imaging studies were compared with baseline imaging to determine the radiologic response. Median overall survival (OS) and hepatic progression-free survival (HPFS) were evaluated. Propensity score analysis (PSA) was performed to minimize selection bias. Survival analysis was calculated using the PS-adjusted Kaplan-Meier method with the PS-adjusted log-rank test and the uni- and multivariate (MVA) Cox proportional hazards model.

RESULTS

Median OS and HPFS were 28.8 and 18.1 months for entire study group, 34.0 and 20.1 months after cTACE, 23.6 and 12.4 months after Y90, 21.7 and 13.3 months after DEB-TACE treatment, respectively. In PSA, cTACE demonstrated significant prolonged median OS compared to Y90 ($p=0.035$) but not compared to DEB-TACE ($p=0.198$). Five-year survival time after first intra-arterial treatment (IAT) for cTACE, DEB-TACE and Y90 were 28.2%, 10.3% and 18.5%, respectively. No significant differences in HPFS were seen among evaluated IAT. MVA of the entire study cohort identified extra-hepatic metastasis (HR, 1.63, $p<0.01$) and tumor burden >50% (HR, 1.93, $p<0.01$) as predictive for reduced OS whereas 3≥ embolization sessions were related to prolonged OS (HR, 0.59, $p<0.05$). Among all IAT options the response rates (RR) and the incidence of adverse effects were not significantly different. In MVA, DEB-TACE corresponded with improved RR compared to cTACE (OR, 1.2, $p=0.04$).

CONCLUSION

Due to significantly improved OS cTACE revealed to be the preferable IAT option compared to Y90. DEB-TACE vs. cTACE and DEB-

Due to significantly improved OS cTACE revealed to be the preferable IAT option compared to Y90. DEB-TACE vs. cTACE and DEB-TACE vs. Y90 appeared equally effective according to OS. Prospective studies are warranted to determined the optimal IAT option for patients with unresectable NELM.

CLINICAL RELEVANCE/APPLICATION

NELM decreases OS dramatically. IAT appealed as an indispensable mainstay in palliative treatment of unresectable NELM to increase OS. Thus, choice of IAT with greatest improved OS still needs to be investigated.

VSIO51-17 Theranostic Approaches to the Management of Neuroendocrine Tumors

Thursday, Dec. 1 5:05PM - 5:20PM Room: S405AB

Participants
Chaitanya Divgi, MD, New York, NY (*Presenter*) Nothing to Disclose

VSIO51-18 Impact of Experience on Oncologic and Quality Outcomes of Hepatic Artery Embolization for Metastatic Neuroendocrine Tumors

Thursday, Dec. 1 5:20PM - 5:30PM Room: S405AB

Participants
Adrian J. Gonzalez, MD, New York, NY (*Presenter*) Nothing to Disclose
Hooman Yarmohammadi, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Franz E. Boas, MD,PhD, New York, NY (*Abstract Co-Author*) Co-founder, ClariPACS
George I. Getrajdman, MD, New York, NY (*Abstract Co-Author*) Medical Advisory Board, CareFusion Corporation
Etay Ziv, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Joseph P. Erinjeri, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Stephen B. Solomon, MD, New York, NY (*Abstract Co-Author*) Research Grant, General Electric Company
Majid Maybody, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

The aim of this study was to evaluate the oncologic and quality outcomes of hepatic artery embolization (HAE) based on the years of experience (YOE) of the operator in patients with liver metastasis from neuroendocrine tumors (NET)

METHOD AND MATERIALS

We collected data on patients with metastatic NET to the liver that underwent HAE from 01/01/2012 to 01/31/2015. Only patients whose treatments were performed by a single operator were included.Demographics, tumor characteristics, % of liver involvement, presence of extrahepatic disease, non-locoregional treatment as well as technical aspects of embolization and complications were captured.YOE was measured in years after completion of IR Fellowship and date of first HAE for each patient. Patients were assigned to one of five groups depending on the years of operator's experience : G1) <5 YOE, G2) 5-10 YOE, G3) 10-15 YOE, G4) 15 to 20 YOE and G5) > 20 YOE.Means were compared using Students T. X2 was used for categorical variables. Kaplan Meier curves and Mantel-Cox statistics were used for TLTP and OS.

RESULTS

91 patients were included. G1, 14 patients; G2, 17 patients; G3, 27 patients; G4, 3 patients; G5, 30 patients.There were no significant differences between groups in terms of demographics, tumor grade, primary site, % of liver involvement, presence of extrahepatic disease and non-locoregional treatments. On technical aspects of embolization G5 used more vials (mean 3.7 vs. G1=2.9, G2=2.1, G3=2.2 and G4= 2.1) of embolization material than the rest (p=0.002). There were no differences on major post HAE complications.OS (days) grouped by YOE was 1786(95%CI: 1139 - 2432) for G1 , 1097(95%CI: 677 - 1516) for G2 , 1893(95%CI: 1534 - 2252) for G3 , 813 (95%CI: 670 - 955) for G4 and 1585 (95%CI: 1160 - 2010) for G5; p = 0.310.TLP(days) grouped by YOE was 372 (95%CI: 238 - 506) for G1, 625(95%CI: 411 - 839) for G2 , 557(95%CI: 354 - 760) for G3 , 440(95%CI: 269 - 968) for G4 and 605 (95%CI: 474 - 736) for G5; p = 0.226.

CONCLUSION

Based on analysis of this population composed of patients with metastatic NET efficiency of treatment, as measured by OS and TTLP was similar for all experience groups indicating no learning curve effect. Additionally, complication rates were similar between different experience groups.

CLINICAL RELEVANCE/APPLICATION

HAE can be performed safely and with similar oncologic and quality outcomes by all experience groups

VSIO51-19 Emerging Data for Embolotherapy of 'other' Metastases

Thursday, Dec. 1 5:30PM - 5:45PM Room: S405AB

Participants
Rajesh P. Shah, MD, Stanford, CA (*Presenter*) Research support, Merit Medical Systems, Inc

LEARNING OBJECTIVES

1.) Describe the different intra-arterial treatments options available for metastatic disease to the liver. 2) Develop an understanding of which intra-arterial treatment options are best for various different non-colorectal/neuroendocrine metastases to the liver based on available evidence.

VSIO51-20 Question and Answer

Thursday, Dec. 1 5:45PM - 6:00PM Room: S405AB

Participants
William S. Rilling, MD, Milwaukee, WI (*Presenter*) Research support, B. Braun Melsungen AG; Research support, Sirtex Medical Ltd;

Research support, Siemens AG; Consultant, B. Braun Melsungen AG; Consultant, Cook Group Incorporated ; Consultant, Terumo Corporation; Advisory Board, Terumo Corporation
Sarah B. White, MD,MS, Philadelphia, PA, (sbwhite@mcw.edu) (*Presenter*) Research support, Guerbet SA; Research support, Siemens AG; Consultant, Guerbet SA; Consultant, IO Rad
Emily Bergsland, MD, San Francisco, CA (*Presenter*) Institutional research support, Lexicon Pharmaceuticals, Inc; Institutional research support, Merck & Co, Inc; Institutional research support, Novartis AG; Consultant, Ipsen SA; Consultant, Lexicon Pharmaceuticals, Inc;
T. Clark Gamblin, MD, MS, Milwaukee, WI (*Presenter*) Nothing to Disclose
Chaitanya Divgi, MD, New York, NY (*Presenter*) Nothing to Disclose
Rajesh P. Shah, MD, Stanford, CA (*Presenter*) Research support, Merit Medical Systems, Inc

SPDL51

RSNA Diagnosis Live™: Peds, IR, Potpourri

Thursday, Dec. 1 3:00PM - 4:00PM Room: E451B

IR PD

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

Participants

Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Stentor/Koninklijke Philips NV; Researcher, Koninklijke Philips NV; Medical Advisory Board, lifeIMAGE Inc; Advisory Board, Bayer AG
Kate A. Feinstein, MD, Chicago, IL, (kfeinstein@radiology.bsd.uchicago.edu) (*Presenter*) Nothing to Disclose
Brian S. Funaki, MD, Riverside, IL (*Presenter*) Data Safety Monitoring Board, Novate Medical Ltd

LEARNING OBJECTIVES

1) The participant will be introduced to a series of radiology case studies via an interactive team game approach designed to encourage "active" consumption of educational content. 2) The participant will be able to use their mobile wireless device (tablet, phone, laptop) to electronically respond to various imaging case challenges; participants will be able to monitor their individual and team performance in real time. 3) The attendee will receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. This interactive session will use RSNA Diagnosis Live™. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

RC704

Musculoskeletal Pain Management Injections

Thursday, Dec. 1 4:30PM - 6:00PM Room: S406B

MK CT IR MR

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

FDA Discussions may include off-label uses.

Participants
William E. Palmer, MD, Boston, MA (*Director*) Nothing to Disclose

LEARNING OBJECTIVES

Sub-Events

RC704A Steroids and Anesthetics: Pick Your Poison

Participants
Peter J. MacMahon, MD, Dublin 7, Ireland, (pmacmahon@mater.ie) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the commonest corticosteroid preparations. 2) Examine the adverse effects associated with corticosteroids, highlighting severe neurological complications. 3) Appraise the various excipients (e.g. benzyl alcohol) used in corticosteroid formulations. 4) Assess the adverse effects associated with local anesthetics. 5) Explain the recent warnings and consensus statements relevant to spine injections.

ABSTRACT

RC704B Non-Spine Injections: Ultrasound Versus Fluoroscopy

Participants
Theodore T. Miller, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The learner will be able to describe the advantages and disadvantages of ultrasound guided and fluoroscopically guided injections.

RC704C MR Spine: Intervention Correlation

Participants
William E. Palmer, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Correlation of clincial symptoms with MR findings helps to differentiate active pain generators from nonpainful structural abnormalities. 2) Corticosteroid treatment success depends on whether symptoms result from inflammation, inflammation is reversible and drug reaches the inflamed tissue. 3) In the U.S., corticosteroid injection represents off-label usage because the FDA has not approved corticosteroids for epidural injection.

RC704D Spine Injections: Fluoroscopic Guidance

Participants
Humberto G. Rosas, MD, Madison, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the advantages and disadvantages of fluoroscopically versus CT guided spine injections. 2) Describe practices that minimize radiation dose in physicians and patients during imaging-guided interventions.

RC704E Spine Injections: CT Guidance

Participants
Nicolas Amoretti, MD, Nice, France, (amorettinicolas@yahoo.fr) (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Evaluate the usefulness of CT scan guidance, in applying existing infiltrations techniques to some innovative indications, allowed by the use of such an imaging guiding tool. 2) Evaluate the clinical effectiveness of these novel indications. 3) Emphasize on the importance of the clinical aspects of Interventional pain management. 4) Show that CT guidance is an added value to any procedures as it allows safe, precise , reproducible,accurate and effective needle placement in most procedures

ABSTRACT

RC704F Panel Discussion

Participants
William E. Palmer, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC714

Transplant Interventions

Thursday, Dec. 1 4:30PM - 6:00PM Room: S105AB

GI IR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Brian S. Funaki, MD, Riverside, IL (*Moderator*) Data Safety Monitoring Board, Novate Medical Ltd
Ron C. Gaba, MD, Chicago, IL (*Moderator*) Research Grant, Guerbet SA; Research Grant, NeuWave Medical, Inc

LEARNING OBJECTIVES

1) To familiarize interventional radiologists with patient selection for interventions related to liver, kidney, and pancreas transplantation. 2) To review procedural technique for transplant-related interventions, including tips, tricks, and pitfalls. 3) To describe clinical outcomes of interventional therapies in the setting of organ transplantation.

ABSTRACT

Not applicable.

Sub-Events

RC714A Islet Cell Transplant

Participants
Ron C. Gaba, MD, Chicago, IL (*Presenter*) Research Grant, Guerbet SA; Research Grant, NeuWave Medical, Inc

LEARNING OBJECTIVES

View learning objectives under the main course title.

ABSTRACT

Not applicable.

RC714B Liver: Vascular

Participants
Bulent Arslan, MD, Chicago, IL (*Presenter*) Advisory Board, Nordion, Inc Advisory Board, Angiotech Pharmaceuticals, Inc Speakers Bureau, Nordion, Inc Speakers Bureau, W. L. Gore & Associates, Inc Consultant, Bayer AG

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC714C Liver: Nonvascular

Participants
Nicholas Fidelman, MD, San Francisco, CA (*Presenter*) Research Grant, BTG International Ltd

LEARNING OBJECTIVES

1) To provide an overview of current approaches to diagnosis and treatment of common non-vascular complications following liver transplantation including 1) Biliary stricture; 2) Bile duct leak; 3) Biloma.

ABSTRACT

RC714D Renal

Participants
Ryan P. Lokken, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC721

Advances in CT: Technologies, Applications, Operations-Special Purpose CT

Thursday, Dec. 1 4:30PM - 6:00PM Room: S103CD

BR MK CT IR PH

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

Participants
Ehsan Samei, PhD, Durham, NC (*Coordinator*) Research Grant, General Electric Company; Research Grant, Siemens AG
Norbert J. Pelc, ScD, Stanford, CA (*Coordinator*) Research support, General Electric Company; Research support, Koninklijke Philips NV; Consultant, Varian Medical Systems, Inc; Consultant, NanoX; Scientific Advisory Board, RefleXion Medical Inc; Scientific Advisory Board, Prismatic Sensors AB; Medical Advisory Board, OurCrowd, LP ;

Sub-Events

RC721A Breast

Participants
John M. Boone, PhD, Sacramento, CA (*Presenter*) Research Grant, Siemens AG; Royalties, Wolters Kluwer nv;

RC721B MSK

Participants
Wojciech Zbijewski, PhD, Baltimore, MD, (wzbijewski@jhu.edu) (*Presenter*) Research Grant, Carestream Health, Inc

LEARNING OBJECTIVES

1) Describe the special prupose CT systems for musculoskeletal (MSK) imaging. 2) Compare the capabilities of special purpose MSK CT systems to conventional modalities. 3) Identify diagnostic applications enabled by special purpose MSK CT.

ABSTRACT

RC721C Interventional

Participants
Charles M. Strother, MD, Madison, WI (*Presenter*) Research Consultant, Siemens AG Research support, Siemens AG License agreement, Siemens AG

RC731

Common Spinal Injection Procedures for Diagnosis and Treatment of Back Pain (Hands-on)

Thursday, Dec. 1 4:30PM - 6:00PM Room: E263

MK NR IR

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

Participants
A. Orlando Ortiz, MD, MBA, Mineola, NY (*Presenter*) Nothing to Disclose
Bassem A. Georgy, MD, MSc, San Diego, CA (*Presenter*) Consultant, Johnson & Johnson; Consultant, DFINE, Inc; Stockholder, DFINE, Inc ; Stockholder, Spine Solutions, Inc; ;
Afshin Gangi, MD, PhD, Strasbourg, France, (gangi@unistra.fr) (*Presenter*) Proctor, Galil Medical Ltd
Todd S. Miller, MD, Bronx, NY, (tmiller@montefiore.org) (*Presenter*) Nothing to Disclose
Stanley Golovac, MD, Coral Gables, FL, (sgolovac@mac.com) (*Presenter*) Nothing to Disclose
Allan L. Brook, MD, Bronx, NY (*Presenter*) Nothing to Disclose
Michele H. Johnson, MD, New Haven, CT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe and demonstrate methods for patient selection, evaluation and technique for Image-guided injection procedures used in spine pain management. 2) These procedures will include epidural steroid injections, nerve root blocks, facet blocks, sacroiliac joint injections, lumbar synovial cyst therapy, radiofrequency ablations. 3) Review procedural complications and how to avoid them. 4) Discuss pertinent anatomy, instruments and pharmacology. 5) These objectives will be accomplished using didactic lectures complemented by procedure videos, supervised hands on lab work with training models and round table case discussions.k

ABSTRACT

Neck and back pain complaints are very common in the general population. Radiologists can contribute to the diagnosis and management in patients who are not responding to conservative management. Spine injection procedures can frequently be performed on an outpatient basis with a brief recovery phase. These procedures are performed with imaging guidance, such as a multi-directional fluoroscope or under CT guidance, in order to correctly localize the specifice anatomic sites in or about the spine for diagnostic and or therapecutic needle localization. An understanding of patient selection, indications and contraindications, are paramount to the safety and success of these procedures. The diagnostic and therapeutic potential of these procedures is also facilitated by a thorough evaluation of the spine, with respect to both anatomy and potential pathology, with cross sectional imaging techniques as well as other radiologic tests. Communication of these results between the Radiologist and the spine proceduralist will contribute to optimal patient outcomes.

RC814

Interventional Series: Peripheral and Visceral Occlusive Disease

Friday, Dec. 2 8:30AM - 12:00PM Room: E352

VA IR

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

FDA Discussions may include off-label uses.

Participants
Parag J. Patel, MD, Milwaukee, WI, (papatel@mcw.edu) (*Moderator*) Consultant, Abbott Vascular, Inc; Consultant, C. R. Bard, Inc; Consultant, Penumbra, Inc;
Sanjay Misra, MD, Rochester, MN (*Moderator*) Data Safety Monitoring Board, Flexible Stenting Solutions, Inc
James F. Benenati, MD, Miami, FL (*Moderator*) Consultant, Penumbra, Inc; Royalties, Penumbra, Inc; Advisory Board, Johnson & Johnson; Stockholder, Bridgewater; ; ;

LEARNING OBJECTIVES

1) Describe pros and cons of intervention for median arcuate ligament compression on the celiac axis. 2) Explain the use of radial artery access. 3) Outline 3 recommendations for endovascular treatment of peripheral vascular disease. 4) Describe current status of true percutaneous endovascular repair of abdominal aortic aneurysms. 5) Describe 2 vascular compression syndromes.

ABSTRACT

Sub-Events

RC814-01 Radial Artery Access. Why? When? How?

Friday, Dec. 2 8:30AM - 8:45AM Room: E352

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

LEARNING OBJECTIVES

1) Rationale to support transradial interventions. 2) Patient selection and work-up. 3) Equipment set-up and supplies. 4) Technical details. 5) How to avoid and manage complications. 6) Indications and results.

ABSTRACT

Radial Artery Access. Why? When? How?Marcelo Guimaraes, MD FSIRThe use of radial access by Vascular Interventional Radiologists in growing exponetially. The presentation will provide the rationale to support transradial interventions, patient selection and work-up, necessary equipment set-up and supplies to perform the transradial interventions safely. Also it will be discussed technical detaills, how to avoid and manage complications, indications and results.

RC814-02 Compressive Vascular Syndromes

Friday, Dec. 2 8:45AM - 9:00AM Room: E352

Participants
James F. Benenati, MD, Miami, FL (*Presenter*) Consultant, Penumbra, Inc; Royalties, Penumbra, Inc; Advisory Board, Johnson & Johnson; Stockholder, Bridgewater; ; ;

LEARNING OBJECTIVES

In addtion to learning objectives in main title: 1) learn the differnt types of compressvie syndromes and potential theraputic options; review diagnostic criteria for compressions, understand clinical maefestations of vascular compressvie syndromes.

RC814-03 Median Arcuate Ligament Syndrome

Friday, Dec. 2 9:00AM - 9:15AM Room: E352

Participants
Jonathan M. Lorenz, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objecitves under main course title.

RC814-04 Evaluation of a Novel 2D-perfusion Angiography Technique Independent of Pump Injections for Assessment of Interventional Treatment of Peripheral Vascular Disease

Friday, Dec. 2 9:15AM - 9:25AM Room: E352

Participants
Jan Hinrichs, MD, Hannover, Germany (*Presenter*) Nothing to Disclose
Tim Murray, Dublin, Ireland (*Abstract Co-Author*) Nothing to Disclose
Muharrem Akin, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose
Micheal U. Brehm, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose
Matthias Wilhelmi, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose

Frank K. Wacker, MD, Hannover, Germany (*Abstract Co-Author*) Research Grant, Siemens AG; Research Grant, Pro Medicus Limited; Research Grant, Delcath Systems, Inc;
Thomas Rodt, MD, Hannover, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate a novel 2D-perfusion angiography (2D-PA) technique allowing pro- and retrospective flow analysis based on a proximal reference region of interest (ROI) and distal target ROI in patients treated for peripheral arterial disease.

METHOD AND MATERIALS

2D-PA allows quantifying blood flow by post-processing of digital subtraction angiography (DSA). 2D-PA was performed pre- and post-interventional treatment of peripheral arterial disease (n=24; 13 PTAs, 11 stents) in 21 patients (17men, 72±9y) applying a proximal reference ROI (arterial inflow) and a target ROI distal to the treated lesion. Time-to-peak (TTP), peak density (PD) and area-under-the-curve (AUC) were calculated. Ratios of the reference and the target ROI (TTP_ROI/TTP_REF; PD_ROI/PD_REF; AUC_ROI/AUC_REF) were calculated and correlated to chances in the ankle-brachial-index (ABI).

RESULTS

2D-PA was technically feasible allowing quantitative flow analysis in all cases. A significant ABI increase was seen after interventional treatment (0.69±0.16 vs. 0.96±0.19 (39%), p<0.0001). ABI increase was accompanied by an increase of 36% of PD_ROI/PD_Ref (0.72±0.44 vs. 0.98±0.43; p<0.0001), a 52% decrease of TTP_ROI/TTP_REF (1.81±1.37 vs. 0.95±0.89; p=0.0007) and a 69% increase of AUC_ROI/AUC_REF (0.69±0.5 vs. 1.17±0.58; p<0.0001). The difference of TTP pre- and post-intervention showed a correlation with the difference in ABI (r=-0.53, p=0.0081). The other measured parameters missed significant correlation with improvement of ABI.

CONCLUSION

The presented 2D-PA technique allows quantitative assessment of arterial flow before, during and after interventional treatment. Furthermore, this technique has great potential for individual therapeutic optimisation and quantification of technical success for scientific purposes, respectively.

CLINICAL RELEVANCE/APPLICATION

Perfusion angiography bares the potential to monitor interventional treatment results directly in the interventional suite and to determine possible endpoints for revascularization to optimize patient care.

RC814-05 Creation of an Extraluminal Subcutaneous Arterial Bypass Graft Using Percutaneous Methods: Feasibility Study in a Porcine Model

Friday, Dec. 2 9:25AM - 9:35AM Room: E352

Awards
Student Travel Stipend Award

Participants
Jessica K. Stewart, MD, Durham, NC (*Presenter*) Nothing to Disclose
Scott S. Perkins, BS, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Charles Y. Kim, MD, Durham, NC (*Abstract Co-Author*) Consultant, Halyard Health, Inc; Consultant, Cryolife, Inc; Consultant, Merit Medical Systems, Inc

PURPOSE

Patients with severely calcified arterial occlusions of the SFA that are poor endovascular candidates often require surgical bypass; however, some patients may be poor candidates for the requisite general anesthesia due to comorbidities. The purpose of this study was to assess the feasibility of a totally percutaneous arterial bypass graft without a surgical anastomosis.

METHOD AND MATERIALS

Nine swine were utilized for this IACUC approved study using a carotid bypass model. Using sonographic guidance, percutaneous access was obtained to the proximal and distal common carotid artery. From a groin approach, a Viabahn stent graft (Gore, Flagstaff, AZ) was advanced through the proximal carotid access site, tunneled subcutaneously, then advanced through the distal carotid access site and deployed. The grafts were monitored weekly for patency using Doppler ultrasound. Angiography was performed at 4 weeks to assess graft patency and to evaluate for stenosis. Animals were euthanized and gross pathologic analysis was performed at the surgical site.

RESULTS

Technical success was achieved in 8 out of the 9 swine utilized (89%) with successful exclusion of the bypassed segment of carotid artery and preserved brisk flow to the carotid circulation. In one swine, the stent graft was maldeployed and unsalvageable. An additional swine died shortly after the procedure of a likely stroke or seizure. One swine served as practice for technical refinement. Of the remaining 6 swine, 4 grafts were patent at the 4 week end point. Both prematurely occluded stent grafts were due to extraluminal extrusion of one end of the stent graft related to neck movement and significant swine growth (doubling of weight over the 4 week period). Stent-graft associated fibrous intimal hyperplasia was identified in 75%.

CONCLUSION

The percutaneous arterial bypass technique had a high technical success rate and a graft patency rate of 66% at 4 weeks, with early occlusions likely related to limitations of this animal model.

CLINICAL RELEVANCE/APPLICATION

This technique could provide a novel method for treating PAD patients with severely calcified occlusive SFA disease who are poor endovascular and surgical candidates. The technical expertise required for this complex ultrasound-guided access make this technique well-suited for mastery by interventional radiologists.

RC814-06 Immediate Changes of Tissue Perfusion during Tibial Angioplasty- Measurements with Respect to

Angiosomes

Friday, Dec. 2 9:35AM - 9:45AM Room: E352

Participants
Ulrich Rother, Erlangen, Germany (*Presenter*) Nothing to Disclose
Werner Lang, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Raymund E. Horch, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Axel Schmid, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Marco Heinz, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Alexander Meyer, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Susanne Regus, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

In recent years a controversial discussion about the clinical relevance of the angiosome concept during tibial angioplasty has developed. Therefore, we conducted a prospective study to evaluate the angiosome concept on the level of microcirculation during tibial vascular interventions.

METHOD AND MATERIALS

30 patients with isolated tibial angioplasty were examined prospectively. Macrocirculation was evaluated by measurement of the ankle-brachial index. For the assessment of microcirculation a combined method of laser-doppler flowmetry and tissue spectrometry (O2C, LEA Medizintechnik GmbH, Giessen, Germany) was applied. Microcirculatory parameters were measured continuously during the procedures. Measuring points were located over different angiosomes of the index foot, while a control probe was placed on the contralateral leg.

RESULTS

Cumulated microcirculation parameters (sO2, Flow) as well as the ankle arm index showed a significant improvement postinterventionally. Assessment of the separate angiosomes of the index leg, and the comparison of the direct and indirect revascularized angiosomes showed no significant difference concerning the micro-perfusion postinterventionally as well as during angioplasty. Even a further subdivision of the collective in diabetics and renal-insufficient patients could not demonstrate a superiority of the direct revascularization at the level of microcirculation in these patients.

CONCLUSION

There is a significant overall improvement in tissue perfusion of the foot immediately after tibial angioplasty. The effect shown in this study however was found to be global and was not restricted to certain boarders, such as defined by angiosomes.

CLINICAL RELEVANCE/APPLICATION

Due to the findings in this study, an uncritical adaption of the angiosome concept as a model of decision making in tibial angioplasty can not be confirmed.

RC814-07 Advanced Arterial Revascularization

Friday, Dec. 2 9:45AM - 10:00AM Room: E352

Participants
Robert J. Abraham, MD, Halifax, NS (*Presenter*) Co-founder, ABK Biomedical Inc; Director, ABK Biomedical Inc; Stockholder, ABK Biomedical Inc; Spouse, Stockholder, ABK Biomedical Inc; CEO, ABK Biomedical Inc; Officer, ABK Biomedical Inc; Researcher, BTG International Ltd; Co-founder, Covina Biomedical Inc; Stockholder, Covina Biomedical Inc; Officer, Covina Biomedical Inc

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC814-08 The 5 Most Important PAD Papers, 2015-2016

Friday, Dec. 2 10:00AM - 10:15AM Room: E352

Participants
Robert A. Lookstein, MD, New York, NY (*Presenter*) Consultant, Boston Scientific Corporation;

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC814-09 Below-the-Knee Interventions

Friday, Dec. 2 10:30AM - 10:45AM Room: E352

Participants
Parag J. Patel, MD, Milwaukee, WI, (papatel@mcw.edu) (*Presenter*) Consultant, Abbott Vascular, Inc; Consultant, C. R. Bard, Inc; Consultant, Penumbra, Inc;

LEARNING OBJECTIVES

1) Describe techniques for revascularization of the tibial vessels. 2) Develop a strategy to target infrapopliteal revascularization utilizing the angisome concept. 3) Describe the technique for pedal access.

ABSTRACT

RC814-10 Mesenteric Ischemia

Friday, Dec. 2 10:45AM - 11:00AM Room: E352

Participants
James R. Stone, MD, Charlottesville, VA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

View learning objectives under the main course title.

RC814-11 Presepsin and Inflammatory Markers Correlate with Non-occlusive Mesenteric Ischemia after Cardiovascular Surgery

Friday, Dec. 2 11:00AM - 11:10AM Room: E352

Participants
Jonas Stroeder, MD, Homburg, Germany (*Presenter*) Nothing to Disclose
Heinrich Groesdonk, Homburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Hans-Joachim Schaefers, MD, Homburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Matthias Klingele, Homburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Stefan Wagenpfeil, Homburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Marcus Katoh, MD, Krefeld, Germany (*Abstract Co-Author*) Consultant, Straub Medical AG Consultant, Medtronic, Inc
Hagen Bomberg, Homburg, Germany (*Abstract Co-Author*) Nothing to Disclose
Arno Buecker, MD, Homburg, Germany (*Abstract Co-Author*) Research Grant, Siemens AG; Consultant, Bracco Group; Speaker, Bracco Group; Consultant, Medtronic plc; Speaker, Medtronic plc; Research Grant, Novartis AG; Research Grant, GlaxoSmithKline plc; Research Grant, Biotest AG; Research Grant, OncoGenex Pharmaceuticals, Inc; Research Grant, Bristol-Myers Squibb Company; Research Grant, Eli Lilly & Company ; Research Grant, Pfizer Inc; Research Grant, F. Hoffmann-La Roche Ltd; Research Grant, sanofi-aventis Group; Research Grant, Merrimack Pharmaceuticals, Inc; Research Grant, Sirtex Medical Ltd; Research Grant, Concordia Healthcare Corp; Research Grant, AbbVie Inc; Research Grant, Takeda Pharmaceutical Company Limited ; Research Grant, Merck & Co, Inc; Research Grant, Affimed NV; Research Grant, Bayer AG; Research Grant, Johnson & Johnson; Research Grant, Seattle Genetics, Inc; Research Grant, Onyx Pharmaceuticals, Inc; Research Grant, Synta Pharmaceuticals Corp; Research Grant, Siemens AG; Research Grant, iSYMED GmbH; Research Grant, St. Jude Medical, Inc; Co-founder, Aachen Resonance GmbH;
Peter Minko, MD, Homburg, Germany (*Abstract Co-Author*) Speaker, Straub Medical AG Consultant, Straub Medical AG

PURPOSE

The aim of our study was to prospectively evaluate the inflammatory response to the occurrence and severity of non-occlusive mesenteric ischemia (NOMI) using a standardized scoring system.

METHOD AND MATERIALS

Between 2/2011 and 3/2012 a total of 865 patients (median age: 67 years) underwent cardiovascular surgery during this ethics committee approved, prospective study. Patients with clinical suspicion of NOMI underwent catheter angiography of the superior mesenteric artery. Images were assessed by two experienced radiologists on consensus basis using a previously published standardized reporting system (Homburg-NOMI score: consisting of three categories namely vessel morphology, reflux of contrast medium into the aorta and time to portal vein filling). These data were correlated to inflammatory blood markers assessed pre- and postoperatively: C-reactive protein (CRP), leucocytes, procalcitonin (PCT) as well as presepsin and outcome data (death, acute renal failure) using linear and logistic regressions, as well as nonparametric tests and ROC-analysis.

RESULTS

Significant correlations were found between pre- and postoperative presepsin ($p<0.001$ / $p<0.001$) and the NOMI-Score as well as for pre- and postoperative CRP ($p<0.001$ / $p=0.001$) and the NOMI-Score.No significant correlation was found for preoperative leucocytes ($p=0.147$) and preoperative PCT ($p=0.599$), but the postoperative values significantly correlated with the score ($p=0.002$ and $p<0.001$).ROC-Analysis yielded an AUC of 0.837 for postoperative presepsin with a sensitivity and specificity of 74.6% and 83%, respectively.

CONCLUSION

Presepsin shows good sensitivity and specificity regarding the occurrence and severity of NOMI and could find use in postoperative lab workup.The established inflammatory blood markers significantly correlate with the development and severity of NOMI.

CLINICAL RELEVANCE/APPLICATION

Patients with elevated inflammatory blood markers (especially presepsin) before or after undergoing cardiovascular surgery should receive an early diagnostic angiogram if non-occlusive mesenteric ischemia is clinically suspected as the disease presents with more severity.An inflammatory genesis of NOMI should be always kept in mind and further research should be conducted to find the pathophysiological connection.

RC814-13 Anemia: A Risk Factors of Restenosis after Stenting of Femoropopliteal Artery Occlusive

Friday, Dec. 2 11:20AM - 11:30AM Room: E352

Participants
Hairui Wang, Shenyang, China (*Presenter*) Nothing to Disclose
Zhaoyu Liu, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To explore the relationship between anemia and the incidence of in-stent restenosis after intervention of arteriosclerosis obliterans(ASO).

METHOD AND MATERIALS

A retrospective collection in January 2012 - December 2013 at our departments, the clinical data and result of follow-up of patients after intervention of superficial femoral artery obliterans were analyzed. The cut-off point is the time of first in-stent restenosis after stenting, record its time.

RESULTS

The total of 201 patients enrolled in the study were followed up until December 2015, 66 cases of in-stent restenosis and 135 patients without restenosis. The percentage of anemia in the restenosis group was 54.5% (36 / 66),while 28.1% (38 / 135)in the non-restenosis group (x2 = 13.279, *P*<0.05), the baseline data of groups showed no statistical difference (*P*> 0.05). In restenosis group, the mean time ofrestenosis of anemia is earlier than the non-anemia, the difference was statistical significant (t = -4.898, *P*<0.05). The Logistic regression analysis showed that anemia is risk factors of restenosis (*P* <0.05).The cox proportional hazard model shows that a lower level of hemoglobin is associated with a higher risk of restenosis after stenting (HR1.142；0.95CI 1.059-1.230).

CONCLUSION

The incidence of anemia is higher in the restenosis patients,the time of restenosis is earlier. Anemia and its severity is a risk factor of in-stent restenosis after intervention of ASO.

CLINICAL RELEVANCE/APPLICATION

Anemia is associated with poorer outcome in coronary artery disease (CAD) and heart failure (HF),it was hypothesized that anemia is associated with in-stent restenosis after the intervention of ASO,and this relationship would be proportional to the severity of the anemia.

RC814-14 Biology of Vascular Disease

Friday, Dec. 2 11:30AM - 11:45AM Room: E352

Participants
Sanjay Misra, MD, Rochester, MN (*Presenter*) Data Safety Monitoring Board, Flexible Stenting Solutions, Inc

LEARNING OBJECTIVES

View learning objectives under the main course title.

ABSTRACT

RC814-15 Debate: What is Wrong with Femoral Arterial Access?

Friday, Dec. 2 11:45AM - 12:00PM Room: E352

Participants
Robert A. Morgan, MD, London, United Kingdom, (Robert.morgan@stgeorges.nhs.uk) (*Presenter*) Proctor, Medtronic, Inc
Marcelo Guimaraes, Charleston, SC, (guimarae@musc.edu) (*Presenter*) Consultant, Cook Group Incorporated ; Consultant, Baylis Medical Company; Consultant, Terumo Corporation; Patent holder, Cook Group Incorporated

LEARNING OBJECTIVES

View Learning Objectives under the Main Course Title.

ABSTRACT

LEARNING OBJECTIVES

1) Provide the rationale to support transradial interventions. 2) Radial access is not just an alternative access but is part of a patient care model that is alligned with best practices and is alligned with ongoing changes of the healthcare reform.

ABSTRACT