Obstetric Gynecologic Radiology
MRI Virtual Hysterosalpingography: How to do it?

All Day Room: OB Community, Learning Center

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TEACHING POINTS
To describe a novel radiation free imaging modality for integral the evaluation of the female pelvis. To be familiar with the advantages, disadvantages, normal anatomy, pathological findings and pitfalls of MRI virtual hysterosalpingography.

TABLE OF CONTENTS/OUTLINE
Common and Uncommon Imaging Presentations of Ectopic Pregnancy

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TEACHING POINTS
Illustrate the imaging features of various locations and appearances of ectopic pregnancies Highlight classic features, features which portend a poor prognosis, and unique locations of ectopic pregnancies Brief review of the management options

TABLE OF CONTENTS/OUTLINE
Common and Uncommon Imaging Presentations of Ectopic PregnancyTeaching Points Illustrate the imaging features of various locations and appearances of ectopic pregnancy Highlight classic features, features which portend a poor prognosis, and unique locations of ectopic pregnancies Brief review of the management optionsOutline1. A review of the imaging features of various ectopic pregnancies Tubal ectopic Interstitial ectopic Cervical ectopic C-section scar ectopic Heterotopic ectopic Unicornuate uterus with an ectopic (cornual) pregnancy in a non-communicating rudimentary uterine horn2. Highlight the classic features as well as features which portend a poor prognosis3. Brief review of the typical management options including surgical, medical therapy, sac injection, and uterine artery embolization which may be combined with medical or surgical therapy to decrease bleeding
Gestational trophoblastic disease (GTD) represents a spectrum of trophoblastic tissue proliferative disorders comprising relatively benign expressions such as hydatidiform mole and more malignant variants such as invasive mole, placental site trophoblastic tumor, and choriocarcinoma. These tumors affect roughly 1:1000 pregnancies with the incidence of hydatidiform mole estimated at 0.57-1.1 per 1000 pregnancies. Frequently, the time course of the disease is followed with serial quantitative levels of human chorionic gonadotropin (HCG), but a complete imaging evaluation is critically important for patient management. This exhibit details Magnetic Resonance Imaging (MRI) features in the diagnosis of GTD while offering a review of the associated ultrasonic (US) and computed tomography (CT) findings.

TABLE OF CONTENTS/OUTLINE

- Pathology of GTD
- Clinical Course of GTD
- Ultrasound features of GTD
- CT features of GTD
- MRI safety for a pregnant patient
The purpose of this educational exhibit is to: Identify the role of MR in evaluating the placenta. Describe the MRI protocol/technique used for evaluating the placenta. Review the normal appearance of the placenta and its variants. Describe the clinical features and imaging findings of major placental abnormalities related to position and depth of implantation, placental hemorrhage, and gestational trophoblastic disease. Discuss the added value of MRI in the management and preoperative planning of such abnormalities.

TABLE OF CONTENTS/OUTLINE

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TEACHING POINTS
To review signs in fetal MR imaging for the diagnosis of various congenital abnormalities, which are correlated with imaging findings of ultrasonography and postnatal study To demonstrate illustrative cases To understand how useful the imaging signs to prenatal diagnosis

TABLE OF CONTENTS/OUTLINE
Category of the signs CNS Gastrointestinal Urogenital Liver and biliary tract Chest Multifetal
Multimodality Imaging of Endometrial Ablation

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TEACHING POINTS

1. To obtain a basic understanding of endometrial ablation indications and procedures.
2. To learn to recognize the normal appearance of the post-endometrial ablation uterus on multiple imaging modalities.
3. To demonstrate common and uncommon complications seen on imaging post endometrial ablation.

TABLE OF CONTENTS/OUTLINE

Endometrial ablation indications and methods
Normal post-procedural appearance on ultrasound, CT, MRI, HSG
Possible complications as imaged with ultrasound, CT, MRI
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TEACHING POINTS
1. Because mucinous ovarian tumors have lower response to chemotherapy and aggressive cytoreductive surgery is required to improve the prognosis, correct preoperative diagnosis based on imaging is important. To distinguish primary and secondary mucinous tumors is necessary for the adequate treatment strategy.
2. We demonstrate various clinical and imaging manifestations of primary and secondary ovarian mucinous tumors according to WHO 2014 classification, and describe the technical challenges and advantages of advanced MR techniques (DWI, computed DWI, reduced FOV DWI, SWI, DCE-MRI, MRS) for the diagnosis.
3. Mucin origin high N-acetyl mucinous compounds peak on MRS is specific for mucinous tumors.

TABLE OF CONTENTS/OUTLINE
- Etiology, clinical features and therapeutic strategy
- Primary: Mucinous tumors; Seromucinous tumors
- Secondary: Gastric cancer (Krukenberg tumor); Colon cancer; Others
- Characteristic imaging features with pathologic correlation: Stained-glass appearance (cystadenoma); Aggregated tiny loculi (borderline malignancy); Black sponge-like appearance (adenofibroma); Organic scalloping (pseudomyxoma)
- Co-existing tumors: Teratoma; Brenner tumor; Carcinoid
- Complications and Paraneoplastic syndrome: Pseudomyxoma peritonei; Estrogenic symptom; Pseudo-Meigs’ syndrome
- Mimickers and clues for the differential diagnosis
Diagnostic Impact of Susceptibility-weighted MR Sequences in the Female Pelvis

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TEACHING POINTS
1. Susceptibility-weighted (SW) MR sequences have exquisite sensitivity to the blood products within various gynecologic pathologies, and may provide helpful information for the differential diagnosis.
2. We demonstrate the role of SW sequences in diagnosing various pathologies in the female pelvis such as hemorrhagic cysts (endometriotic vs non-endometriotic cyst; clots vs malignant transformation), deep/extra-ovarian endometriosis and adenomyotic lesions (vs myometrial contraction or leiomyoma), thrombus imaging (red degeneration of uterine leiomyoma and ovarian torsion with thrombus within the vascular pedicle), gestation-associated lesions (ectopic pregnancy and retained products of conception), and uterine sarcomas with hemorrhagic necrosis.
3. On SW images both hemorrhage and calcification appear as signal voids. Phase image can assess iron/hemorrhage (paramagnetic) and calcium deposits (diamagnetic) in tissue.

TABLE OF CONTENTS/OUTLINE
Principles and methodology of SW sequences (SWI/SWAN)
Clinical applications:
- Endometriosis-associated lesions
- Adenomyotic lesions
- Thrombus imaging (Red degeneration of leiomyoma; Thrombus associated with adnexal torsion)
- Hemorrhage /hematoma: Menstruation-related; Gestation-related; Intra-tumoral hemorrhage
Pitfalls: Calcification; Intestinal gas; Abscess
Cystic Uterine Lesions: Wide Spectrum of Clinical and Imaging Manifestations, Pitfalls, and Problem-Solving MR Techniques

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TEACHING POINTS
1. Totally or partially cystic uterine lesion may cause potential challenges for differential diagnosis. Cystic lesions comprise a large number of physiologic, congenital, infectious, pathologic, gestational or iatrogenic cysts.
2. We review the wide spectrum of cystic uterine lesions, and describe the added value of advanced MR techniques in distinguishing benign and malignant lesions, determining specific histological diagnosis, and for the planning of adequate treatment.
3. By using advanced MR techniques, the characterization of cystic materials and cyst-containing masses (water/fat separation by CSI, blood-sensitive SWI, blood/calcification separation by phase image, water diffusion restriction in pus or keratinous material and in malignant solid portion by DWI, metabolite evaluation by MRS: N-acetyl mucinous compounds in mucinous material; lipid in fat, malignancy with necrosis or abscess; succinate and acetate for anaerobic bacterial infection, and vascularity by DCE-MRI) may lead to accurate diagnosis.

TABLE OF CONTENTS/OUTLINE
Pathological spectrum of cystic uterine lesions and cyst-containing uterine lesions, clinical outcomes and therapeutic strategy:
- Endometrial cavity lesions
- Myometrial lesions
- Cervical lesions
Advanced MR techniques: CSI; SWI/phase image; DWI; MRS; DCE-MRI
Practical decision tree in making differential diagnosis
Intrauterine Linear Echogenicities in the Gravid Uterus: What Radiologists Should Know

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Awards
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Identified for RadioGraphics

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TEACHING POINTS
1. Intrauterine linear echogenicities (ILE) are common findings in the gravid uterus with variable etiologies and maternal and fetal outcomes, from benign to high-risk. 2. An algorithm of regimented analysis of ILE will be presented to enable the learner to suggest a concise diagnosis. 3. Correctly categorizing ILE during pregnancy is crucial for guiding surveillance and advanced imaging strategies, as well as patient treatment and counseling plans.

TABLE OF CONTENTS/OUTLINE
1. Intrauterine anatomy to identify structures causing linear echogenicities.
2. ILE in multiple gestations: "Twin peak" sign with dichorionic diamniotic twins and "T-sign" with monochorionic diamniotic twins. Unique appearance of inter-membrane hemorrhage as a cause of ILE.
3. Uterine duplication anomalies, including associated maternal congenital abnormalities.
4. Placenta-related ILE: using placental edge and membrane appearances to differentiate between circumvallate placenta, chorioamniotic separation, and placental implantation on synechiae.
5. Utilizing linear echo thickness and location to distinguish among diagnoses.
6. Utilizing fetal position to distinguish amniotic band syndrome from benign etiologies.
7. Case examples with imaging-rich comparison of intrauterine linear echogenicity diagnoses.

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Anne M. Kennedy, MD - 2016 Honored Educator
Magnetic Resonance Imaging of Vulvar Carcinoma: What the Radiologist Should Know

All Day Room: OB Community, Learning Center

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TEACHING POINTS
To review MRI findings of vulvar carcinoma correlating them with pathological findings. To redefine which is the most appropriate MRI protocol to study vulvar carcinoma. To analyze how MRI findings can modify further treatment of vulvar carcinoma.

TABLE OF CONTENTS/OUTLINE
Vulvar carcinoma is a rare tumor, accounting for 5-8% of the gynecological malignancies. Traditionally, radiologists pay little attention to this tumor because the primary tumor can be detected at physical examination and can be staged surgically. CT, MRI, and PET-CT are being increasingly used in the management of vulvar carcinoma. The best imaging modality for evaluation of vulvar anatomy is MRI. Protocol includes T1, T2, FST2, DW and T1LAVA sequences with gadolinium. Large FOV is included to provide information about lymphadenopathy and bone metastasis. We analyze MRI studies of 20 patients during last 5 years. 9 patients showed radiological features of infiltration and 8 exhibited lymphadenopathy. We present MRI findings of vulvar carcinoma correlating them with those found at surgery. We analyze how all these findings help to determine tumor stage and hence, modify further treatment of carcinoma. Finally, we show pathologic lymphatic nodes underlining which MRI features are more reliable to assess malignancy and differentiating between superficial and deep inguinal nodes.
Diffuse Large B-Cell Lymphomas of the Female Genital Tract: Multimodal Imaging Appearances, Pathological Correlation and Radiological Mimics

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TEACHING POINTS

1. Lymphomas affecting the female genital tract are rare. Correct diagnosis and adequate staging are crucial to correct management.
2. Clinical presentation is non-specific and depends on the involved organ and tumor aggressiveness. Nearly 75% of affected women are postmenopausal and present with vaginal bleeding.
3. Variable pathological subtypes and clinical manifestations result in imaging overlap with inflammatory, neoplastic, and infectious processes.
4. Most common pathological subtypes are Diffuse Large B-Cell Lymphoma (DLBCL) or Burkitt's lymphoma (BL).

Learning Objectives

1. To evaluate the range of imaging appearances on various imaging modalities including computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET) and ultrasound (US).
2. To provide a pictorial review of the correlation between pathological and radiological anatomy, including post treatment appearances.
3. To gain a better understanding of possible mimics.

TABLE OF CONTENTS/OUTLINE

1. Background
2. Literature Review including World Health Organisation classification of Primary and Secondary Genital lymphomas
3. Materials and Methods
4. Imaging Characteristics a. Primary and Secondary Gynaecological DLBCL b. Post Treatment Appearances
5. Pathological Correlation
6. Unusual Mimics and Pitfalls
7. Discussion

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Thiru A. Sudarshan, DMRD, FRCR - 2016 Honored Educator
Hysterosalpingography: Indications, Techniques, and Diagnoses

All Day Room: OB Community, Learning Center

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TEACHING POINTS
Familiarize the learner with the indications and contraindications for hysterosalpingography (HSG) Discuss appropriate HSG technique Illustrate the spectrum of pathology that may be encountered on HSG with multimodal imaging correlates

TABLE OF CONTENTS/OUTLINE
When used in conjunction with sonography and MRI, HSG can be a valuable diagnostic tool in the work-up of women with infertility, repeated spontaneous abortion, and inability to sustain a pregnancy to term. This exhibit will: Discuss the common indications and contraindications for HSG Review proper HSG techniques (which are integral in arriving at accurate diagnoses) Systematically review the pathologic conditions encountered on HSG The spectrum of pathologies in this review will include congenital uterine malformations, uterine masses, dysfunction of tubal occlusion devices, and sequela of prior infection, inflammation, or instrumentation in the female pelvis. The key imaging features of each pathologic entity will be illustrated in conjunction with short integrated didactic components highlighting the relevant pathophysiology, management, and prognosis in each case.

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Christine O. Menias, MD - 2013 Honored Educator
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Essential Teamwork of Radiology and Pathology to Distinguish Uterine Sarcomas from Benign Mimickers

All Day Room: OB Community, Learning Center

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TEACHING POINTS

Radiologists play a vital role in the initial imaging, staging, and surveillance of uterine pathologies and recognition of concerning features warranting further imaging.
FDG PET imaging has shown to be sensitive and specific for detecting tumor recurrence.
Although each uterine sarcoma has characteristic imaging features, diagnosis is typically made histologically post hysterectomy.

TABLE OF CONTENTS/OUTLINE

I. Clinical presentation
II. Initial workup & imaging algorithm
Ultrasound Identify findings warranting MRI MRI Import points for radiology report CT Staging Surveillance PET/CT, PET/MR Literature review Imaging examples
III. Uterine sarcomas
Epidemiology Classification Smooth muscle tumors Leiomyosarcoma Endometrial stromal tumors Endometrial stromal sarcoma (ESS) High-grade ESS Tumors with both smooth muscle and epithelial components Carcinosarcoma Adenosarcoma Other rare tumors Rhabdomyosarcoma
IV. For each subtype of uterine sarcoma listed under III Epidemiology Demographics General features Staging & grading Mode of tumor spread Prognostic factors Pathology Imaging examples for each subtype Distinguishing characteristics Treatment
Mulling over Müllerian Duct Anomalies: A Pictorial Review of Their Complications

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TEACHING POINTS
1. Paired mesonephric (Wolffian) and paramesonephric (Müllerian) ducts represent the indifferent stage of embryogenesis of the female genital system. The paramesonephric ducts are the precursors of the uterus, fallopian tubes, cervix and upper vagina. Wolffian ducts regress in females, but remnants may persist, with potential for development of pathology including malignancy. Müllerian duct anomalies comprise a spectrum of developmental malformations associated with varying degrees of adverse reproductive / obstetric outcomes and other complications. Magnetic resonance imaging (MRI) and other imaging techniques have largely replaced surgery in detection of these anomalies.

Objectives: To provide a pictorial representation of these malformations, related complications and pathological correlation when appropriate

TABLE OF CONTENTS/OUTLINE
1. Embryogenesis
2. Classification System of Müllerian Duct Anomalies
3. Clinical Implications
   a. Fertility Issues
   b. Menstrual and Sexual Dysfunction
   c. Obstructive Müllerian Anomalies and Endometriosis
   d. Obstetric Complications
   e. Associated Structural Anomalies
      i. Renal Abnormalities
      ii. Gastrointestinal Anomalies
      iii. Cloacal Abnormalities
      iv. Ectopic Gonadal Tissue
   f. Diagnostic and Management Challenges
5. Imaging after Surgical Intervention
6. Discussion

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TEACHING POINTS
The purpose of the exhibit is: 1. To understand and identify the various physiologic changes in the endometrium and their imaging appearance during the menstrual cycle and pregnancy. 2. To understand the various benign and neoplastic diseases affecting the endometrium, pre and post menopausal. 3. SRU guidelines on postmenopausal bleeding

TABLE OF CONTENTS/OUTLINE
1. Physiologic changes during the menstrual cycle with sample images
2. Pathologic conditions affecting the endometrium:
   a. Endometrial polyp
   b. Submucosal fibroid
   c. Endometrial hyperplasia
   d. Endometrial cancer
   e. Tamoxifen induced changes
   f. Infection (endometritis)
   g. Adenomyosis
   h. Pseudoaneurysm and AVM
3. SRU consensus on post menopausal bleeding
4. Brief discussion on changes during pregnancy
Sample cases of each condition with comparative MRI imaging and discussion on each case
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TEACHING POINTS

Mature cystic teratomas often appear as shadowing echogenic adnexal masses. A Rokitansky nodule and dermoid mesh are classic ultrasound appearances that help with the diagnosis. At CT or MRI the presence of macroscopic fat is diagnostic. Not all echogenic shadowing ovarian masses are mature cystic teratomas. Sex cord stromal tumors are more often solid and may present as an echogenic or shadowing adnexal mass involving a similar age group. MRI is a useful problem solving tool in indeterminate cases as it detects the organ of origin and offers tissue characterization. Complications include ovarian torsion, rupture, and malignant transformation. Autoimmune hemolytic anemia and anti-NMDAR limbic encephalitis have also been reported. Solid enhancing components do not necessarily imply malignant transformation. Likewise, elevated tumor markers including Ca 19-9 and Ca-125 have been reported with benign mature cystic teratomas. For patients with elevated Ca 19-9 there is an association with larger tumors and a higher incidence for ovarian torsion. With squamous cell carcinoma, the serum squamous carcinoma (SSC) antigen level may be elevated.

TABLE OF CONTENTS/OUTLINE

Review of Imaging Findings with Pathologic Correlation Review of ComplicationsSample Cases and MimicsManagement and Clinical Considerations
Atypical Gynecologic Tumors: Multimodality Imaging, Histopathologic Correlates, and Management

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TEACHING POINTS
Review clinical features, multimodality imaging findings (US, CT, MRI, PET), and management of atypical gynecologic tumors. Selected histopathologic correlates will be presented. Increase awareness of atypical gynecologic tumors to facilitate the radiologist’s role in diagnosis, imaging follow-up, and management.

TABLE OF CONTENTS/OUTLINE
This exhibit will present case examples from our institution utilizing multiple imaging modalities with selected histopathologic correlates. Cases will include, but will not be limited to: Uterus Malignant tumors Mesenchymal neoplasms (e.g. leiomyosarcoma, endometrial stromal sarcoma, carcinosarcoma) Primary lymphoma Metastases (e.g. Krukenberg tumors) Unusual benign tumors Aggressive angiomyxoma Benign metastasizing leiomyomas Endometrium Malignant tumors Clear cell carcinoma arising from an abdominal wall endometrioma Gestational trophoblastic neoplasm/choriocarcinoma Adnexa Malignant ovarian tumors Sex-cord stromal tumors (e.g. granulosa cell tumor) Germ cell tumors (e.g. dysgerminoma, yolk sac tumor) Fallopian tube carcinoma
"Don't Miss Uterine Pathology!: An Interactive Multimodality Imaging Case Based Review

All Day Room: OB Community, Learning Center

Awards
Cum Laude

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TEACHING POINTS
To provide an interactive case-based review of essential uterine diagnoses and demonstration of multimodality imaging findings To heighten awareness of critical uterine pathology and the radiologist's role in diagnosis and management

TABLE OF CONTENTS/OUTLINE
This exhibit will present a multiple choice question case-based review of "Don't Miss" uterine pathology including critical uterine diagnoses. Clinical presentation; ultrasound, HSG, CT and MRI imaging findings; differential diagnosis; and management will be reviewed. Topics will include, but will not be limited to: Classic cases Arteriovenous malformation Müllerian malformations Adenomyosis Tumor/neoplasia Leiomyomata (e.g. aborting) Uterine cancer Invasive gestational trophoblastic neoplasia C-section complications Uterine dehiscence Uterine rupture Placenta accreta C-section scar ectopic Other post-surgical and post-procedural complications Uterine artery embolization (e.g. infection) Myomectomy (e.g. intramural ectopic)
Fetal MR Imaging: Description and Practical Interpretation of Ventricular and Periventricular Pathologies

All Day Room: OB Community, Learning Center

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TEACHING POINTS
- To explain the utility of MRI in the prenatal diagnosis of additional brain abnormalities, sonographically occult.
- To review the MRI findings of ventricular and periventricular abnormalities of fetal brain: lateral ventricles, periventricular white matter, corpus callosum.
- To differentiate the fetal brain pathologies that present with similar radiological findings on MRI, and integrate it into a global vision.
- To discuss the different causes of ventriculomegaly and how the recognition of other radiological findings, you can reach the final diagnosis of the disease.
- To learn the importance of the time of injury during the gestational period, and its relationship with alterations in the white matter.
- To recognize the key points for the correct diagnosis of periventricular cystic lesions.
- To show the special relevance of MR images in the diagnosis of agenesis of the corpus callosum, and to teach other anomalies associated.

TABLE OF CONTENTS/OUTLINE
- Fetal brain MR images.
- Review of imaging findings of ventricular and periventricular abnormalities.
- Differential diagnosis of the different causes of ventricular abnormalities, the periventricular white matter and midline, in the fetal brain.
- Relationship between the time of injury during pregnancy and radiologic findings in the white matter.
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TEACHING POINTS
To review the differential diagnosis of less common solid ovarian tumors to include their radiologic and pathologic correlation. To review the demographics and prognostic features of solid ovarian tumors. Diagnostic radiology residents and attending radiologists are the target audience for this educational exhibit.

TABLE OF CONTENTS/OUTLINE
Introduction to less common solid ovarian tumors Ovarian anatomy and blood supply Common clinical presentationsUseful imaging modalities for evaluation of solid ovarian tumors US, CT, MRI, Nuclear Medicine Radiologic imaging, gross images, and microscopy of solid ovarian tumors Brenner tumor (epithelial) teratoma (germ cell) dysgerminoma (germ cell) fibroma (sex cord / stromal) fibrothecoma (sex cord / stromal) thecoma (sex cord / stromal) granulosa cell (sex cord / stromal) Krukenberg (metastasis) carcinoid Review of specific radiologic imaging characteristics Summary / Conclusion
Gastroschisis: What the Radiologist Needs to Know

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TEACHING POINTS

Gastroschisis is the most common congenital abdominal wall defect and is further categorized as simple or complex. Antenatal imaging plays an important role in the diagnosis of gastroschisis, as well as assessing the severity of disease and its prognosis. This information is important for purposes of parental counseling and delivery planning. In complex cases, advanced imaging, such as fetal MR, can be additive to further characterize the anomaly. In this exhibit, we will show the imaging findings of simple and complex gastroschisis in the fetus and the newborn. Our educational poster is based on an IRB approved data set of fetuses with gastroschisis from one academic institution with follow up available in most cases.

TABLE OF CONTENTS/OUTLINE

- Introduction
- Prevalence
- Risk factors
- Definition of terms
- Diagnostic strategies
- Ultrasound diagnosis and surveillance
  - First trimester and second trimester diagnosis
  - Third trimester surveillance
- Advanced imaging techniques
  - 3D Ultrasound
  - Fetal MRI
- Prenatal predictors of increased risk of morbidity and mortality
- Outcomes and treatment options
- Summary of key facts and teaching points
Imaging Tips in Cervical Carcinoma: Beyond Staging

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Participants
Shinya Fujii, MD, Yonago, Japan (Presenter) Nothing to Disclose
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Naoko Mukuda, Yonago, Japan (Abstract Co-Author) Nothing to Disclose
Toshihide Ogawa, MD, Yonago, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purposes of this exhibit are:
Review the overview and current classification of cervical cancer in WHO.
Describe the MR imaging findings of cervical tumors with characteristic findings.
Comprehend the MR imaging findings after therapy including the role of diffusion-weighted imaging.

TABLE OF CONTENTS/OUTLINE
Overview of current classification in cervical carcinoma
Characteristic MR imaging findings of cervical tumors: gastric type adenocarcinoma, villoglandular carcinoma, choriocarcinoma, lymphoma, lobular endocervical glandular hyperplasia etc.
Which origin is the tumor?: endometrial cancer vs. cervical cancer
MR imaging after therapy: hysterectomy, trachelectomy, CCRT
Recurrent and metastatic pattern of cervical cancer
Correlation of ADC with prognostic parameters
Don't Go Down the Tubes: A Multimodality Approach to Imaging the Fallopian Tubes

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Participants
Kimberly Seifert, MD, New Haven, CT (Presenter) Nothing to Disclose
Mike Spektor, MD, New Haven, CT (Abstract Co-Author) Nothing to Disclose
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Mahan Mathur, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Describe the normal appearance and anatomy of the fallopian tubes Recognize the appearance of neoplastic and non-neoplastic fallopian tube pathology Recognize the importance of using a multimodality imaging approach when suspecting fallopian tube disease

TABLE OF CONTENTS/OUTLINE
Normal fallopian tube (FT) anatomy and embryology will be reviewed. Subsequently, the following disease processes will be covered: mullerian duct abnormalities resulting in agenesis or hypoplasia of the FTs, pelvic inflammatory disease (pyosalpinx, tubo-ovarian abscess and salpingitis), hydrosalpinx, hematosalpinx/endometriosis, tubal torsion, ectopic and heterotopic pregnancy, salpingitis isthmica nodosa and tubal carcinoma (primary and contiguous from endometrial/ovarian primaries). Cases will be presented utilizing a variety of imaging modalities (US, CT, MRI and HSG). Key imaging features which permit the learner to isolate the disease process to the FTs as well as make a specific diagnosis will be highlighted.
Participants
Jila Nabi, MD, Brooklyn, NY (Presenter) Nothing to Disclose
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Daniel L. Zinn, MD, Brooklyn, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. Review anatomy of the cervix and gravid uterus.
2. Describe the spectrum of imaging manifestations of cervical incompetence (CI).
3. Demonstrate pitfalls in cervical imaging.
4. Discuss the importance of imaging in the management of cervical incompetence.

TABLE OF CONTENTS/OUTLINE
Cervical incompetence occurs in 1% of pregnancies and accounts for as many as 20% of second-trimester miscarriages. Anatomy of the cervical and gravid uterus is reviewed, including dynamic changes that occur during pregnancy. The etiology and pathogenesis of CI, classification and imaging manifestations are discussed through a quiz format. Commonly encountered imaging pitfalls will be addressed. The various screening and treatment approaches and factors that influence management decisions will then be emphasized. Upon the completion of this module, the learner should be able to identify the findings that will influence treatment decisions.
Complications of the 'Un-complicated' Ovarian Lesion

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Participants
Janette Smith, MBBChir, Cambridge, United Kingdom (Presenter) Nothing to Disclose
Stephanie Nougaret, MD, Montpellier, France (Abstract Co-Author) Nothing to Disclose
Susan Freeman, MRCP, FRCP, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
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Helen C. Addley, MRCP, FRCP, Montreal, QC (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

Primary benign ovarian lesions are commonly encountered in everyday routine clinical practice as both symptomatic or as incidental findings. The majority of these diagnoses result in expected management without complication. These lesions can, however, cause complications which due to the banality of the primary diagnosis are often unexpected and challenging both for diagnosis and management. Knowledge of benign ovarian pathologies, complications, and their appearances across a range of modalities is essential to aid appropriate and timely medical or surgical management and avoid diagnostic pitfalls.

TABLE OF CONTENTS/OUTLINE

The exhibit will provide a comprehensive multimodality review of common benign ovarian findings and their uncommon complications. Examples of illustrated complications include:(1) Torsion of cysts, endometriomas, mature teratomas, cystadenofibromas and fibromas(2) Infective change of endometriomas(3) Rupture of mature teratomas and mucinous lesions(4) Malignant transformation of endometriomas to clear cell carcinoma and mature teratomas to squamous cell carcinoma(5) Distant complication of anti-NMDA encephalitis secondary to mature teratoma

Each case will include pertinent discussion of presentation, key imaging features to aid prompt diagnosis and management.

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Caroline Reinhold, MD, MSc - 2013 Honored Educator
Caroline Reinhold, MD, MSc - 2014 Honored Educator
Helen C. Addley, MRCP, FRCP - 2013 Honored Educator
Stephanie Nougaret, MD - 2013 Honored Educator
Evis Sala, MD, PhD - 2013 Honored Educator
Ovarian torsion is not an uncommon cause of pelvic pain but a gynecological emergency. Early recognition can help prevention of tissue infarction. Ultrasound is the modality of choice for ovarian torsion. Characteristic ultrasound imaging feature of ovarian torsion are well recognized, however, atypical imaging features, and pitfalls in diagnosis are not well documented. It is important for the radiologists to recognize atypical presentation of ovarian torsion; become familiar with its mimics to avoid misinterpretation.

TABLE OF CONTENTS/OUTLINE
1. Embryology of the female gonads
2. Natural history of ovarian torsion
3. Sonographic technique, protocols and image optimization
4. Review atypical presentation of surgically proven ovarian torsion with CT/MRI correlation, such as Torsion of the ovary followed by detorsion during the examination Partial torsion with ischemia/necrosis of the ovarian parenchyma Torsion of exophytic ovarian cyst with preservation of ovarian tissue
5. Discuss mimics of ovarian torsion Large acute ovarian hemorrhagic cyst Large adnexal cyst/ mass with no significant vascularity Paraovarian and paratubal cyst Complex peritoneal inclusion cyst Large adnexal mass with morphology resembling a torsed ovary Oophoritis mimicking a detorsed ovary Isolated torsion of fallopian tube and tubal cyst
The Ovaries and CT: A Review of CT Findings and Diagnosis

All Day Room: OB Community, Learning Center

Participants
Sopo Lin, MD, Hershey, PA (Presenter) Nothing to Disclose
Kathryn L. McGillen, MD, Hershey, PA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

• Review normal CT anatomy and appearance of the ovaries
• Identify ovarian pathology that has classic, pathognomonic, or specific CT appearances
• Review imaging characteristics and their pathologic correlation with common ovarian entities

TABLE OF CONTENTS/OUTLINE

Introduction: With the availability and overall increasing number of CT scans being performed, incidental ovarian findings are becoming more common, especially in the Emergency Department setting. While CT is not the optimal modality in evaluation of the ovaries, CT characteristics of ovarian pathology can be suggestive or even pathognomonic of a disease process, and it is important for the radiologist to be familiar with their characteristics.

Normal Anatomy of the Ovaries

Epithelial Tumors
- Serous
- Mucinous
- Endometrioid
- Clear cell
- Brenner

Germ Cell Tumors
- Mature Teratoma
- Immature Teratoma
- Dysgerminoma
- Embryonal Cell Carcinoma
- Choriocarcinoma

Sex Cord-Stromal Tumors
- Granulosa Cell Tumor
- Fibrothecoma
- Sclerosing Stromal Tumor

Other:
- Metastatic Disease & Krukenberg Tumor
- PCOS
- Ovarian Torsion
- Tubo-ovarian Abscess
**Participants**

Emily Daulton, MBCh, Camberley, United Kingdom (*Presenter*) Nothing to Disclose

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Nishat Bharwani, MBBS, FRCR, London, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

**TEACHING POINTS**

Dermoids are a common cause of adnexal masses. In this exhibit we will describe the appearances on US, CT and MRI that allow confident characterization, and describe complications which may occur including a pictorial review. Important management considerations will also be discussed.

Learning objectives:

- Review key diagnostic features of typical and atypical dermoids, and diagnostic pitfalls to avoid.
- Demonstrate radiological assessment of dermoids, the advantages and disadvantages of different modalities.
- Describe common and uncommon complications, and the radiological and clinical diagnosis of these.

**TABLE OF CONTENTS/OUTLINE**

- Background: Terminology and pathology: histological correlation between dermoid and teratomas
- Epidemiology
- Clinical presentation
- Treatment
- Classic imaging appearances with plain film, US, CT and MR features
- Atypical appearances with imaging examples
- Review of complications with imaging correlation
- Management
- Summary with review of the learning objectives
Participants
Yuka Okajima, MD, MPH, Chuo-ku, Japan (Presenter) Nothing to Disclose
Noriko Tanio, MD, Chuo City, Japan (Abstract Co-Author) Nothing to Disclose
Yasuyuki Kurihara, MD, Tokyo, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Management of adnexal masses in pregnancy is sometimes challenging. Surgery is indicated when the mass is suspicious for malignancy or when the risk of complications, such as torsion and rupture, is high. Imaging evaluation is essential in the clinical management.

The purpose of this exhibit is:
1. To learn spectra and epidemiology of adnexal masses and the complications in pregnancy.
2. To be familiar with general concept regarding management of adnexal masses in pregnancy.
3. To discuss strategy and diagnostic points in imaging evaluation, and the role of MR imaging in evaluation of adnexal masses in pregnancy.
4. To demonstrate MR imaging findings of adnexal masses and the complications in pregnancy.

TABLE OF CONTENTS/OUTLINE
1. Physiologic change during pregnancy;
2. Epidemiology and spectra of adnexal masses in pregnancy;
3. General concept regarding management of adnexal masses in pregnancy;
4. Strategy and diagnostic point in imaging evaluation, including the role of MR imaging;
5. Review of MR imaging findings of adnexal masses and complications during pregnancy; such as benign tumor (mature cystic teratoma, mucinous cystadenoma, struma ovari, decidualization of endometriotic cyst), seromucinous borderline tumor, malignant tumor (mucinous carcinoma, metastatic tumor), ovarian torsion, paraovarian torsion, and tubal torsion.
Blast from the Past: Hysterosalpingogram (HSG): Indications, Technique, Imaging Findings and Pitfalls

All Day Room: OB Community, Learning Center

Awards
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Participants
Maryam Rezvani, MD, Salt Lake City, UT (Presenter) Nothing to Disclose
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Akram M. Shaaban, MBCh, Salt Lake City, UT (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Emphasise the role of HSG in the era of MRI
Comprehensive review of the HSG findings in different pathological conditions

TABLE OF CONTENTS/OUTLINE
I. Indications of HSG
II. Technique
III. Imaging findings
1. Congenital anomalies: discuss imaging findings of Mullein anomalies on HSG, how to differentiate between different entities with MRI correlation
2. Inflammatory conditions including HSG in genital tuberculosis
3. Adenomyosis
4. Uterine and tubal filling defects
IV. Pitfalls

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Anne M. Kennedy, MD - 2016 Honored Educator
Khaled M. Elsayes, MD - 2014 Honored Educator
Maryam Rezvani, MD - 2015 Honored Educator
First Trimester Pregnancy Complications: What the On-Call Radiologist Needs to Know

Awards
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Participants
Courtney A. Woodfield, MD, Newtown, PA (Presenter) Consultant, Siemens AG
Philip S. Lim, MD, Abington, PA (Abstract Co-Author) Consultant, BioClinica, Inc; Consultant, ICON plc; Consultant, Siemens AG;

TEACHING POINTS
1) The most recent 2013 multispecialty established criteria for determining first trimester viability on US are more stringent and when applied differentiate between viable versus nonviable versus indeterminate first-trimester pregnancies requiring imaging follow up. 2) Appropriate management of first trimester pregnancies as normal or abnormal is dependent on the correct interpretation of US features and correct application of US criteria. 3) US is the preferred imaging modality for detecting a wide range of early pregnancy complications including pregnancies of unknown location with follow up US, and in select cases MR imaging, recommended for indeterminate US findings.

TABLE OF CONTENTS/OUTLINE
1. Review the US features of a normal first trimester intrauterine gestation. 2. List the current US criteria for diagnosing a first trimester pregnancy failure. 3. Demonstrate the various US findings of first trimester pregnancy failure. 4. Illustrate the range of early pregnancy complications diagnosed with US including the variable locations of ectopic pregnancies, subchorionic hemorrhage, molar pregnancy, spontaneous abortion, and retained products of conception. 5. Discuss the role of urgent MR imaging in determining correct patient management in select cases.
Think Outside the Box: Non-gynecological Findings on Pelvic Ultrasound

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Awards
Identified for RadioGraphics

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Akram M. Shaaban, MBBCh, Salt Lake City, UT (Presenter) Nothing to Disclose
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TEACHING POINTS
Emphasise that non-gynecological findings can be seen on pelvic US exams and may cause considerable confusion. Describe imaging findings of these entities that can help narrow the differential diagnosis with correlation with CT and/or MRI

TABLE OF CONTENTS/OUTLINE
Gastrointestinal Findings Appendicitis Mucocele of appendix Diverticulitis Broad big hernia Intestinal Obstruction
Urological Findings Ureteric stone Cystitis Ureterocele Bladder neoplasms Peritoneal Disease Ascites Peritoneal metastases Pelvic side wall and vascular Periprosthetic soft tissue masses (pseudotumours) Lymphocele Pelvic lymph nodes Arterial aneurysms

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Matched Cysts: The MR Imaging Correlate to Established US Features of Asymptomatic Ovarian and Adnexal Cysts Based on the Society of Radiologists in Ultrasound 2010 Consensus Panel Recommendations

Participants
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Philip S. Lim, MD, Abington, PA (Abstract Co-Author) Consultant, BioClinica, Inc; Consultant, ICON plc; Consultant, Siemens AG;

TEACHING POINTS
1) Asymptomatic ovarian and adnexal cysts are common findings on pelvic US. The Society of Radiologists in Ultrasound (SRU) provided recommendations for managing these cysts based on specific US features and the patient’s menopausal status. 2) Incidental ovarian and adnexal cysts are also common on MR imaging. Familiarity with the SRU’s recommendations and matching these criteria to MR imaging may help guide similar appropriate diagnosis and management of asymptomatic cysts initially seen at MR imaging. 3) MR imaging may depict more specific features of ovarian and adnexal cysts than US alone and redirect the management of such cysts.

TABLE OF CONTENTS/OUTLINE
1. Review the SRU recommendations for characterizing and managing asymptomatic ovarian and adnexal cysts on US. 2. Provide a routine comprehensive MR imaging protocol for imaging the female pelvis. 3. Illustrate the spectrum of the SRU described US features of ovarian and adnexal cysts with the matched MR imaging correlate. Example cases will be shown in all SRU categories including normal ovaries, corpus luteum, simple cyst, hemorrhagic cyst, endometrioma, dermoid, hydrosalpinx, peritoneal inclusion cyst, septated cysts, cysts with mural nodularity or solid component. 4. Demonstrate the utility of MR imaging in demonstrating more specific features and diagnoses for ovarian and adnexal cysts.
Subfertility-What the Radiologist Needs to Know

All Day Room: OB Community, Learning Center

Awards
Certificate of Merit
Identified for RadioGraphics

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TEACHING POINTS
The role of imaging within subfertility is well established but is also changing. In addition to traditional fertility assessments there is an emerging role for the radiologist. With greater detection of malignancy in younger patients there is a growing need for fertility preserving surgery. There is also a role for imaging in fertility restoring procedures in benign disease and congenital malformations.

Learning Objectives:
- To review current techniques used to investigate subfertility
- To discuss the growing role of imaging in optimization of treatment options for reversible causes of subfertility
- To discuss the role of imaging in fertility preservation and restoration

TABLE OF CONTENTS/OUTLINE
Background
Multimodality imaging assessment of subfertility
Causes of subfertility - congenital and acquired
Current treatment options in:
- Benign disease – endometriosis, ashermans, fibroids & pelvic inflammatory disease
- Fertility restoration – Fallopian tube recanalization, treatment options for women with Müllerian duct anomalies, uterine transplantation
- Fertility preservation in gynecological malignancy – trachelectomy, progesterone treatment

Conclusion
Magnetic Resonance Imaging in Deep Pelvic Endometriosis: A Holistic Approach

All Day Room: OB Community, Learning Center

Participants
Eva M. Merino Serra, MD, Hospitalet De Llobregat, Spain (Abstract Co-Author) Nothing to Disclose
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Eduard Andia, Hospitalet De Llobregat, Spain (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

The purpose of this exhibit is: 1. To evaluate characteristic and atypical findings of endometriosis in magnetic resonance imaging (MRI), emphasizing the most and less common anatomical locations for endometriotic deposits. 2. To provide guidelines for a correct radiological report in order to optimize synergy with the physician. 3. To display the optimal MRI protocol, indicating the diagnostic utility of each sequence.

TABLE OF CONTENTS/OUTLINE

Endometriosis is a condition that must be considered in women with pelvic pain and/or infertility. Transvaginal ultrasonography should be considered the first-line imaging technique, although its diagnostic yield may be limited. In deep endometriosis, MRI is the preferred imaging technique, due to higher spatial resolution of pelvic anatomy compared to other techniques and its superiority in the detection of endometriotic foci, particularly in fat-suppressed T1 sequences. MRI plays a crucial role in the assessment of possible complications such as hydronephrosis and in the differential diagnosis between benign or malignant ovarian disease with the use of diffusion-weighted imaging. We report MRI findings of endometriosis in several locations, highlighting the importance of a proper technique to optimize the diagnostic performance in this common and important disorder in women of reproductive age.
Holy Mole-y: Imaging Findings of Gestational Trophoblastic Disease and Its Sonographic Mimics

All Day Room: OB Community, Learning Center

Participants
Katherine M. Gallagher, MD, Boston, MA (Presenter) Nothing to Disclose
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Jonathan E. Scalera, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. Understand the spectrum of gestational trophoblastic disease (GTD)
2. Recognize the imaging appearance of the GTD spectrum as well as pathologies which can have similar sonographic appearance (ie. retained products of conception and AVM)
3. Formulate an approach for distinguishing the aforementioned entities based on imaging appearance, clinical presentation and quantitative Beta-hCG

TABLE OF CONTENTS/OUTLINE
Introduction and epidemiology Pathophysiology of GTD Review of imaging with emphasis on ultrasound and sample cases: Molar pregnancy Persistent Trophoblastic Neoplasia (including invasive mole, choriocarcinoma and placental-site trophoblastic tumor). Pathologies which can mimic the appearance of GTD on ultrasound (including AVM and retained products of conception). Summary
Participants
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Beatriz Nieto Baltar, Vigo, Spain (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To describe the early and late complications after cesarean delivery
To illustrate the MRI features of complications following cesarean delivery
To review how MR imaging can be integrated in the evolving diagnostic algorithm for complications after cesarean delivery

TABLE OF CONTENTS/OUTLINE
Review and classification of acute and chronic complications associated with cesarean delivery
Illustration of MRI features of the normal cesarean scar, acute (uterine dehiscence, uterine rupture) and chronic (cesarean scar or “niche”, adhesions, cesarean scar ectopic pregnancy, abnormal placentation, abdominal wall endometriosis, growing tumors at the cesarean scar) complications after cesarean delivery.
Discussion of the key imaging features which help to make a correct diagnosis.
CT Evaluation of Postpartum Abdominal Pain: Normal Appearance, Pathology, and Pitfalls

All Day Room: OB Community, Learning Center

Participants
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Kevin R. Kalisz, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Spencer Couturier, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
John R. Haaga, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. Become familiar with expected appearance of the postpartum abdomen and pelvis on CT.
2. Understand gynecologic and non-gynecologic post-partum abdominal pain pathologies and emphasize the strengths and limitations of CT in their evaluation.
3. Recognize the potential pitfalls of CT in order to avoid misdiagnosis and potential patient morbidity and mortality.

TABLE OF CONTENTS/OUTLINE
1. Introduction
2. Review of indications for imaging in the post-partum period
3. Review of modalities used to assess emergent post-partum abdomen and pelvis with strengths and weaknesses of each
4. Expected early and late postpartum findings (vaginal and caesarean section) on CT
5. CT findings of postpartum abdominal pain:
   - Gynecologic
     - Endometritis
     - Retained Products of Conception
   - Non-Gynecologic/Surgical
     - Appendicitis
     - Abscess
     - Bowel obstruction
     - Hematoma
     - Pyelonephritis/renal abscess
     - Pancreatitis
     - Necrotizing fasciitis
6. Potential imaging pitfalls and clues for differentiating normal and abnormal postpartum appearances.
Too Deeply Attached! Understanding the Pathology and Imaging of Placentation Abnormalities

All Day Room: OB Community, Learning Center

Participants
Mariam Moshiri, MD, Seattle, WA (Presenter) Consultant, Reed Elsevier; Author, Reed Elsevier; Theodore J. Dubinsky, MD, Seattle, WA (Abstract Co-Author) Stockholder, Global Cancer Technology; Grant, Toshiba Corporation
Puneet Bhargava, MD, Shoreline, WA (Abstract Co-Author) Editor, Reed Elsevier
Douglas S. Katz, MD, Mineola, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Describe normal development and imaging of the placenta
Define the adherent placenta spectrum (placentation abnormality) and risk factors
Describe imaging features of placentation abnormalities
Describe potential management options

TABLE OF CONTENTS/OUTLINE
Briefly review the normal development of the placenta and its multimodality imaging, with an emphasis on sonography
Define various types of placentation abnormalities: adherent placenta: accrete, increta, percreta, previa, with corresponding findings on sonography, and in selected cases, on MR
Show correlative pathologic images on select cases
Discuss controversies regarding adherent placenta imaging and assessment
Discuss possible clinical and imaging management pathways of adherent placenta, and provide an algorithmic approach
Conclusion: After studying this exhibit, the radiologist will be able to carefully evaluate placentas on imaging, assess for placentation abnormalities, and help clinicians formulate an approach to imaging and management of pregnancy and delivery

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Theodore J. Dubinsky, MD - 2012 Honored Educator
Theodore J. Dubinsky, MD - 2013 Honored Educator
The Good, the Bad and the Ugly: A Quiz Highlighting Classic and Uncommon Findings in Endometriosis

All Day Room: OB Community, Learning Center

Participants
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Patricia Balcacer, MD, Detroit, MI (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

Endometriosis is a common pathology identified on pelvic MRI. The purpose of this project is to emphasize classic findings of endometriosis on pelvic MRI as well as pitfalls such as disease mimics. 1. The viewer will become familiar with classic and uncommon findings in endometriosis with an emphasis on disease mimics. 2. Emphasis will also be placed on normal anatomy involved in selected cases.

TABLE OF CONTENTS/OUTLINE

Cases will be presented in a quiz format with answers following question slides. Key imaging findings and relevant anatomy will be highlighted in the discussion of each case. The list of cases will include but is not limited to: 1) Classic ovarian endometrioma; pelvic MRI signal characteristics 2) Solid endometrioid implants; MRI findings and locations. Examples will include round ligament, uterosacral, rectosigmoid and Cesarean section implants. 3) Solid endometrioid implant mimicking adenomyosis 4) Malignant degeneration of Cesarean section implant.
The Ultimate First Trimester Checklist! An Approach to Imaging Pitfalls and Diagnosis of Fetal Anomalies

All Day Room: OB Community, Learning Center

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TEACHING POINTS
1-Understand commonly encountered pitfalls in first trimester ultrasound
2-Review normal fetal development in the first trimester, compare normal and abnormal sonographic findings, and how to avoid erroneous diagnosis

TABLE OF CONTENTS/OUTLINE
1-Briefly review normal fetal development in first trimester and the associated expected sonographic findings
2- Review the imaging appearance of conditions which can present on sonography in the first trimester: anencephaly, acrania, cystic hygroma, spinal defects, omphalocele, gastrochisis, abnormal fetal body wall and limb defects, GU anomalies, twinning, and gestational trophoblastic disease, and in select cases correlative pathologic images related to the diagnosis
3- Briefly review the new Society of Radiologists in Ultrasound (SRU) recommendations for interpretation of first trimester sonography
4- Review the role of follow up imaging, and review associated clinical recommendations

Summary: After reviewing this exhibit, the radiologist will be able to carefully evaluate a first trimester ultrasound examination, understand the spectrum of normal and abnormal findings, and avoid any potential pitfalls in the interpretation of early fetal anomalies on sonography.

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Mariam Moshiri, MD - 2013 Honored Educator
Mariam Moshiri, MD - 2015 Honored Educator
Theodore J. Dubinsky, MD - 2012 Honored Educator
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Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Multimodality Imaging in Secondary Postpartum Hemorrhage: Retained Products of Conception and Related Conditions

All Day Room: OB Community, Learning Center

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Certificate of Merit

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TEACHING POINTS
To review the epidemiology, etiology, and clinical manifestations of retained products of conception (RPOC) as a principle cause of secondary postpartum hemorrhage (PPH) To understand ultrasound (US), computed tomography (CT), and magnetic resonance (MR) imaging features of RPOC and related conditions To identify the treatment options for patients with secondary PPH

TABLE OF CONTENTS/OUTLINE
RPOC is a common cause of secondary PPH, most instances of RPOC show spontaneous regression or are safely removed by dilation and curettage (D&C). However RPOC with prominent vascularity or a concomitant uterine vascular malformation is a diagnostic dilemma and needs careful management, because D&C may lead to catastrophic hemorrhage. CT and MR examination play an important role in diagnosing secondary PPH when US findings are indeterminate. Radiologists should be familiar with CT and MR imaging features of secondary PPH for proper treatment planning. Epidemiology, etiology, and clinical diagnosis of RPOC US, CT, MR imaging and angiographic features of RPOC and related conditions Treatment strategy: Depends on clinical stability, severity of bleeding, suspected etiology, and the patient's desire for future fertility RPOC Uterine vascular malformation Subinvolution of the placental implantation site Gestational trophoblastic disease
Pictorial Review of Struma Ovarian with Pathologic Correlation

All Day Room: OB Community, Learning Center

Participants
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Cheol Min Park, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. To recognize the imaging characteristics of struma ovarii
2. To learn how to differentiate with other ovarian lesions
3. To correlate radiologic findings with findings at pathologic analysis

TABLE OF CONTENTS/OUTLINE
I. Overview of struma ovarii: Definition, pathology, epidemiology, symptom, diagnosis, treatment
II. Review the imaging features of struma ovarii in previous literature: Ultrasonography: "Struma pearls", Thyroid follicle (CT: high density, MR T2WI: loculi of low signal intensity, MR T1WI: Partly high signal intensity)
III. Radiologic features of struma ovarii, revisited: Multilobular lesion with strong enhancing solid portion and some foci of low signal intensity in MR T2WI
IV. Pathologic Correlation
Hysterosalpingography in the Diagnosis of Asherman’s Syndrome: Illustration of the Range of Appearances of Scar Tissue/Synechiae and the Importance of HSG Technique and Accurate Localisation of Synechiae for Successful Patient Management

All Day Room: OB Community, Learning Center

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Participants
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TEACHING POINTS

The purpose of this exhibit is to: 1. Review the aetiology of Asherman’s syndrome 2. Emphasise the need for meticulous HSG technique to demonstrate the lesions and to maintain a high index of suspicion in the at-risk population 3. Illustrate the range of HSG appearances of Asherman’s syndrome pre and post-operatively.

TABLE OF CONTENTS/OUTLINE

- Background & definition of Asherman’s syndrome
- Aetiology: Endometrial trauma, infection, UAE, other
- Clinical presentation: Infertility, menstrual disorder, recurrent miscarriage, obstetric complications
- Incidence
- HSG technique: Emphasize importance of en-face view and oblique projections
- HSG features of Asherman’s ranging from small localized lesions to diffuse uterine involvement
- Other imaging modalities, US, HyCoSy, MRI
- Classification of severity base on areas of cavity involved
- Management, imaging follow-up and outcomes
The classic clinical and sonographic presentation of molar pregnancy is rare before the second trimester, making early diagnosis difficult. The sonographic appearance of early molar pregnancy can overlap with other diagnoses including early pregnancy failure, but there are specific features that suggest it. Early sonographic detection of molar pregnancy can change patient management and prompt histopathological analysis. Molar pregnancy increases the likelihood of developing persistent gestational trophoblastic neoplasia. Our objective is to provide an overview of the sonographic appearance of molar pregnancies in the first trimester, highlighting signs specific to complete and partial moles. Increasing familiarity with early sonographic findings will improve early detection and allow appropriate management of molar pregnancies.

TABLE OF CONTENTS/OUTLINE

1. Overview types of gestational trophoblastic disease. 2. Review characteristic clinical and sonographic presentations of complete and partial molar pregnancies. 3. Highlight specific sonographic features suggestive of complete and partial molar pregnancies on early pregnancy ultrasound. 4. Examine differential diagnostic considerations in the sonographic evaluation of early molar pregnancies. 5. Discuss why early detection is important for patient management.
Participants
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Mostafa Atri, MD, Toronto, ON (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The aim of this exhibit is to provide a comprehensive review of gestational trophoblastic disease (GTD) and retained products of conception improving diagnostic confidence and detection, facilitating early appropriate clinical management. The spectrum of disease ranges from benign conditions such as hydatidiform mole (complete and partial) to malignant conditions collectively called gestational trophoblastic neoplasia (GTN). Retained products of conception (RPOC) are the main differential. Unusual presentations of RPOC including RPOC with zero B-hCG and arteriovenous fistula (AVF) should be recognized on US.

TABLE OF CONTENTS/OUTLINE
- To review placental development.
- To illustrate the greyscale, Doppler and MRI features of benign GTD (Hydatidiform mole); complete and partial.
- To illustrate the greyscale, Doppler and MRI features of GTN including Placental Site Trophoblastic Tumor (PSTT).
- To illustrate greyscale, Doppler, and MRI features of retained products of conception, and unusual presentations of RPOC.
- To describe the management of each condition.
Imaging Features of Complex Solid and Multicystic Ovarian Lesions: Proposed Algorithm for Differential Diagnosis

All Day Room: OB Community, Learning Center

Participants
Eun Sun Lee, MD, PhD, Seoul, Korea, Republic Of (Presenter) Nothing to Disclose
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Byung Ihn Choi, MD, PhD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The major teaching points of this exhibit are: 1. Complex solid and multicystic ovarian lesions form a broad spectrum, ranging from benign to malignant. 2. Key imaging features can help to hone differential diagnoses, correlating with the patient's clinical information. Utilization of a diagnostic algorithm for complex solid and multicystic ovarian lesions will also allow radiologists to use a step by step approach to hone the differential diagnosis. 3. Familiarity with the clinical setting and imaging appearance of complex solid and multicystic adnexal lesions as depicted with US, and MRI will facilitate prompt and accurate diagnosis and treatment.

TABLE OF CONTENTS/OUTLINE
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TEACHING POINTS
Introduce and describe a relatively new technique of permanent contraceptive device (Essure); Evaluate post-insertion images of the device, including normal appearances on different methods, and examples of failure and complications.

TABLE OF CONTENTS/OUTLINE
Brief introduction of Essure, its clinical use and the main advantages; Imaging of normal imaging findings of the device on: conventional X-ray hysterosalpingography ultrasonography computed body tomography magnetic resonance; Highlights of main imaging findings of device placement failure and most frequent complications; Summary and conclusion.
Fetal Growth: Review of Doppler Evaluation and Developing Ultrasound Techniques

All Day Room: OB Community, Learning Center

Awards
Identified for RadioGraphics

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Daphne K. Walker, MD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
After reviewing this presentation the reader should gain:

- Knowledge of fetal risks, techniques & understanding of Doppler growth assessment throughout development in singleton & twin gestations
- Improved understanding of the fetal circulatory system & changes in blood flow with fetal growth & well being
- Review of the pathophysiology of fetal growth disturbances & future ultrasound techniques for the evaluation of pathologic changes

TABLE OF CONTENTS/OUTLINE

- Introduction
- Epidemiology
- IUGR Childhood obesity epidemic
- History of fetal Doppler
- Doppler and Fetal Risks
- Placental-fetal circulation
- Singleton pregnancy
- Twin gestation (Twin-Twin Transfusion Syndrome)
- Review of Doppler evaluation for Fetal Growth
- Arterial Doppler evaluation
- Maternal uterine artery
- Fetal Umbilical artery
- Fetal middle cerebral artery and the “brain-sparing effect”
- Ductus venosus evaluation
- Theories of fetal stress and hemodynamic and neurohormonal responses to diminished oxygen and/or nutrient supply
- Economization of fetal resources: fetal fat deposition versus brain development
- Developing technologies
- Fetal fat measurements
- Cerebroplacental ratios
Magnetic Resonance Imaging Findings of Vagina: Key Points for Making Differential Diagnosis

All Day Room: OB Community, Learning Center

Participants
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Mamoru Niitsu, MD, Saitama, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. Familiarity with variety of lesions of the vagina is important for MR image interpretation.
2. Optimized MRI techniques allow for improved visualization of the normal vagina and related disorders.
3. Key points of specific MRI features allow differentiation of a vast array of benign and malignant conditions involving the vagina.

TABLE OF CONTENTS/OUTLINE
1. Normal Anatomy of Vagina
2. Optimized MRI techniques
3. Review MR lesions
   a. Malignant tumor (Adenocarcinoma, Malignant Lymphoma, Melanoma, Secondary tumor)
   b. Benign tumor (Neurofibromatosis)
   c. Infectious/Inflammatory
   d. Vascular
   e. Iatrogenic
   f. Foreign body
Follow-up of Autotransplantation of Cryopreserved Ovarian Tissue: Imaging Findings

All Day Room: OB Community, Learning Center

Participants
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TEACHING POINTS

Oncologic treatments often lead to sterility due to destruction of the ovarian reserve in young women. Transplantation of her own cryopreserved ovarian tissue is a promising method for fertility preservation because it can restores both fertility and hormonal status in women after anticancer treatment. Follow-up after auto-transplantation includes E2 and FSH blood levels but also imaging with trans vaginal US (TVUS) and MRI to calculate ovarian volume, evaluate antral follicles and assess the ovarian stromal artery by pulsed Doppler TVUS. MRI can help for the detection of ovarian tissue in case of heterotopic transplantation. Based on series of 24 cases of autotransplantation (20 orthotopic and 4 heterotopic) of cryopreserved ovarian tissue performed in our institution, the aim of this exhibit is to: 1-Present imaging finding (TVUS and MRI) of cryopreserved ovarian tissue as a function of time after auto-transplantation 2-Present the imaging aspect of ortho and heterotopic transplants 3-To discuss imaging parameters that appears to be related to a clinical success of the transplantation (pregnancies in 6 cases)

TABLE OF CONTENTS/OUTLINE

- Baseline imaging before transplantation and immediately after transplantation-Imaging findings as a function of time after transplantation-Clinical outcome of women Difficulties of TVUS solved by MRI- Pitfalls
Imaging Appearance and Management of Borderline Ovarian Tumors

Awards
Certificate of Merit

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Wendaline M. VanBuren, MD, Rochester, MN (Presenter) Nothing to Disclose
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Yuliya Lakhman, MD, New York, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Borderline ovarian tumors represent a challenging subset of non-invasive ovarian neoplasms for radiologists and surgeons, and have a non-specific imaging appearances on ultrasound, CT and MRI. These tumors are classically difficult to prospectively predict by imaging, but typically occur in younger women and have a favorable prognosis. Current management is based on surgical staging, but the identification of potential imaging features can help to direct surgical exploration.

TABLE OF CONTENTS/OUTLINE
Background of borderline ovarian tumors - Clinical presentation & non-imaging assessment - Etiology - Histologic Classification - Mucinous - Serous Tumor staging - Technique - Inaccuracy - Imaging Appearance - US - CT - MRI - Treatment - Surgical

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LESSONS FROM THE GYNAECOLOGY ONCOLOGY TUMOR BOARD

All Day Room: OB Community, Learning Center

Awards
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TEACHING POINTS

With the advent of minimally invasive surgical techniques, earlier diagnosis and new pharmacological agents there is greater onus for pre-treatment imaging to provide an accurate diagnosis. The Radiologist plays an integral role in guiding individualized management pathways but cases can be complex and incorrect image interpretation can lead to incorrect treatment. This educational exhibit will discuss and illustrate potential pitfalls in image acquisition and interpretation with state of the art imaging techniques from a tertiary gynecology referral centre. In addition we will provide interpretation pearls and advice on how to overcome common problems.

Learning objectives:
- To understand the recommended imaging protocols for evaluation of gynecological malignancy
- To discuss how to optimize the image acquisition protocols to enable accurate reporting
- To be aware of interpretation pitfalls in gynaecological imaging, understand how they will alter surgical management and learn how to avoid them

TABLE OF CONTENTS/OUTLINE

- Background
- CT protocols and image reconstruction
- MRI protocols tailored to tumor type
- Optimization of multi-modality imaging protocols
- Growing role of advanced imaging techniques
- Pitfalls in imaging gynecological malignancy with tips on how to avoid them
- Conclusion
Spectrum of Serous Carcinoma of Ovary, Fallopian Tube and Peritoneum: Differences between High-Grade and Low-Grade Serous Carcinoma in Carcinogenesis and Imaging Features

Participants
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TEACHING POINTS
Serous carcinoma has been classified into high-grade and low-grade in terms of carcinogenesis, pathological findings and clinical features by revision of WHO classification in 2014. High-grade serous carcinoma (HGSC) is common tumor with poor prognosis and is recently considered to be derived from serous tubal intraepithelial carcinoma. Low-grade serous carcinoma (LGSC) occurs far less often than HGSC, and is closely associated with serous borderline tumor. Teaching points are: 1. To understand the differences between high-grade and low-grade serous carcinoma in terms of carcinogenesis, clinical features and imaging characteristics. 2. To review the imaging findings of HGSC of ovary, fallopian tube and peritoneum and differential diagnosis. 3. To recognize the two pathways of lymphatic spread of serous carcinoma both below and above the diaphragm.

TABLE OF CONTENTS/OUTLINE
1. Carcinogenesis of serous carcinoma
2. High-grade serous carcinoma
   A. Imaging of ovarian, fallopian tube and peritoneal cancer
   B. Dissemination and metastasis
   C. Differential diagnosis
   D. Radiogenomics
3. Adenoma-carcinoma sequence
   A. Serous cystadenoma/adenofibroma
   B. Serous borderline tumor
   C. Low-grade serous carcinoma
Non Gynecological Abdominal Manifestations of Endometriosis: MRI Findings

All Day Room: OB Community, Learning Center

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TEACHING POINTS
1- To review the common and uncommon non gynecological endometriotic lesions. 2- To get familiar with the diagnosis and preoperative assessment of endometriosis using MR imaging.

TABLE OF CONTENTS/OUTLINE
- Review the definition of Deep Pelvic Endometriosis. - Clinical and MRI features of common and uncommon non gynecological sites of involvement: • Bowel • Ureter • Bladder • Abdominal wall • Nerves • Upper abdomen and diaphragm • Other sites - List the differential diagnosis. - Summary and home messages.
Expect the Unexpected: Adnexal Masses in the Pregnant Patient

All Day Room: OB Community, Learning Center

Participants
Lindsey M. Negrete, MD, San Diego, CA (Presenter) Nothing to Disclose
Lucy B. Spalluto, MD, Nashville, TN (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. Adnexal masses may be found in women of all ages and pregnant females are no exception. Increased utilization of the antenatal ultrasound has increased the detection of asymptomatic adnexal masses. 2. An estimated 0.2 to 2 percent of pregnancies are complicated by an adnexal mass. Though largely benign, approximately 1 to 6 percent of these masses are malignant. 3. As signs of ovarian cancer (back pain and abdominal swelling) overlap with expected normal symptoms of pregnancy, imaging is key in the initial assessment. 4. Management of adnexal masses discovered during pregnancy may include serial monitoring, surgical intervention, and surgical staging. Quick and efficient assessment is critical at the time of antenatal ultrasound interpretation.

TABLE OF CONTENTS/OUTLINE
1. Review imaging and pathologic characteristics of adnexal masses in pregnancy including, but not limited to: A. Benign: Functional cyst, mature cystic teratoma, cystadenoma, endometrioma, ovarian torsion; B. Malignant: Serous cystadenocarcinoma, mucinous cystadenocarcinoma 2. Discuss recommended management options for adnexal masses in pregnancy including: A. no follow up. B. Surveillance. C. Surgical Intervention (type of intervention and timing of intervention). 3. Briefly review long term outcomes of various adnexal masses identified in pregnancy
About 25% of cervical carcinomas are locally advanced at diagnosis, despite prevention strategies implemented even in developed countries. Chemoradiotherapy remains the standard therapeutic approach for locally advanced disease due to its effectiveness in reducing local and distant recurrence, and improvements in overall survival rates. MRI is well established as the imaging modality for detection and local staging of cervical carcinoma. MRI is the imaging modality of choice to help the decision process of therapeutic strategy and is also the best modality for showing recurrent disease and monitoring therapeutic response. The purpose of this study is: To present cases of partial response, complete response and disease progression. To describe MRI findings of complications during and after chemoradiotherapy in cases of locally advanced cervical carcinoma. To show entities that may mimic progression of cervical carcinoma.

TABLE OF CONTENTS/OUTLINE

Identify MRI appearances of posttherapy changes in patients with locally advanced cervical carcinoma. Discuss the complications of pelvic irradiation performed for treatment of cervical carcinoma. Describe the imaging features of recurrent cervical carcinoma in the pelvis, lymph nodes and distant metastases.
Ob175-Ed-X

Ultrasound Assessment of the Pelvis after Uterine Artery Embolization with CT and MRI Correlation

All Day Room: OB Community, Learning Center

Participants
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Teaching Points
Uterine artery embolization (UAE) is an increasingly performed procedure for treatment of different uterine pathologies. Ultrasound can be successfully utilized to assess the efficacy of the UAE treatment and to evaluate for possible post procedural complications. It is important for the radiologists to be familiar with expected findings in the pelvis after UAE and be able to recognize the life threatening complications.

Table of Contents/Outline
1. Review applications of uterine artery embolization
2. Brief summary of relevant vascular anatomy
3. Review ultrasound protocol and image optimization
4. Review expected ultrasound findings after UAE: post-op intracavitary air and particles, hemorrhage, fibroid calcifications
5. Discuss sonographic assessment for efficacy of UAE treatment: a. evaluation of fibroid size and vascularity b. evaluation of tumor burden c. absence or presence of flow in the embolized AVMs, pseudoaneurysms, and retained products of conception
6. Review sonographic features of potential UAE-associated complications: infectious disease (endometritis, myometritis, pelvic inflammatory disease), fibroid passage, fibroid regrowth, pelvic vein thrombosis, ovarian dysfunction, endometrial cancer, and uterine necrosis. Correlation with CT and MRI will be provided.
7. Management of the complications will be discussed

Honored Educators
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Leslie M. Scoutt, MD - 2014 Honored Educator
The goal of this study is to familiarize radiologists with applications of ultrasound in evaluation of uterus after endometrial ablation. This will serve to enhance recognition of normal imaging findings and life threatening conditions and help radiologists create a focused differential diagnosis for various complications after the procedure.

TABLE OF CONTENTS/OUTLINE

1. Review pathophysiology of dysfunctional uterine bleeding.
2. Review of medical and surgical treatment options in management of DUB with emphasis on endometrial ablation.
3. Discuss ultrasound protocol and image optimization in assessment of uterus after ablation.
4. Sonographic features of the post ablation uterus will be divided into the following categories:
   1. Expected changes (early: intracavitary air, intrauterine and cervical hematoma, edema of the uterus; late: contracture of endometrial cavity, thinning of the endometrium)
   2. Complications (immediate: endometritis, myometritis, salpingitis; cornual and central hematometra, hematosalpinx; chronic: synechia, infertility, ectopic pregnancy, abnormal placentation, endometriosis (from retrograde menstruation), malignancy (development of adenocarcinoma of the uterus))
5. Management of the presented post-ablation complications will be reviewed.

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Leslie M. Scoutt, MD - 2014 Honored Educator
TEACHING POINTS

1. Atypical location endometriosis can present with a wide range of syndromes depending on the site affected, and is always associated with pelvic manifestations of disease. 2. MR is the technique of choice for detection and characterization of pelvic disease, as well as of atypical locations. A systematic analysis of the peritoneal cavity must be undergone, including all atypical sites. Moreover, to look for atypical locations, MR protocol should be tailored to the specific symptoms of every patient. 3. The most common locations for atypical endometriotic implants are surgical scars, including laparotomy scars, episiotomy scars and perineal scars related to previous surgery. Also, pelvic muscles and liver are common atypical locations. 4. Infrequent atypical locations include the periumbilical area, inguinal canal, perineum, subdiaphragmatic spaces, pudendal nerve, omentum and lung.

TABLE OF CONTENTS/OUTLINE

1. Introduction and learning objectives
2. MRI protocol
3. Signs of endometriotic disease
4. Frequent atypical locations: laparotomy scars, episiotomy scars, perineal scars, pelvic muscles and liver
5. Infrequent Atypical locations: periumbilical area, inguinal canal, perineum, subdiaphragmatic spaces, pudendal nerve, omentum and lung
6. Tips for a good report
7. Take home points
Ultrasound Assessment of Mimics of Pelvic Inflammatory Disease

Awards
Certificate of Merit

Participants
Annalice Chang, MD, San Diego, CA (Presenter) Nothing to Disclose
Jonathan D. Kirsch, MD, New Haven, CT (Abstract Co-Author) Nothing to Disclose
Mike Spektor, MD, New Haven, CT (Abstract Co-Author) Nothing to Disclose
Leslie M. Scoutt, MD, New Haven, CT (Abstract Co-Author) Consultant, Koninklijke Philips NV
Regina J. Hooley, MD, New Haven, CT (Abstract Co-Author) Consultant, FUJIFILM Holdings Corporation; Consultant, Siemens AG
Margarita V. Revzin, MD, Wilton, CT (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To familiarize radiologist with application of ultrasound in assessment of pelvic inflammatory disease and its mimics. This will aid in improving radiologists ability to correctly diagnose this disease and minimize rate of misdiagnosis and misinterpretation

TABLE OF CONTENTS/OUTLINE
1. Natural history of pelvic inflammatory disease will be discussed
2. Review of relevant anatomy, embryology and physiology of the reproductive organs will be discussed
3. Review ultrasound protocols for evaluation of pelvic inflammatory disease with emphasis on utilization of different modes and optimization of gray scale and color Doppler parameters to improve evaluation of the uterus, ovaries and fallopian tubes and the surrounding structures
4. Diagnostic ultrasound findings of pelvic inflammatory disease will be summarized with detailed discussion of early and advanced forms of this disease
5. Pitfalls and mimics will be discussed including pelvic endometriosis/endometrioma, isolated fallopian tube torsion, ovarian torsion, hemorrhagic ovarian cyst, ovarian neoplasm, fallopian tube neoplasm, appendicitis, perforated diverticulitis with abscess formation
6. Current management of the pelvic inflammatory disease will be discussed

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Leslie M. Scoutt, MD - 2014 Honored Educator
MRI Diagnosis of Endometriosis

All Day Room: OB Community, Learning Center

Participants
Stephen Johnston, MD, Tucson, AZ (Presenter) Nothing to Disclose
Bobby T. Kalb, MD, Tucson, AZ (Abstract Co-Author) Nothing to Disclose
Iva Petkovska, MD, Tucson, AZ (Abstract Co-Author) Nothing to Disclose
Diego R. Martin, MD, PhD, Tucson, AZ (Abstract Co-Author) Nothing to Disclose
Hina Arif, Vancouver, BC (Abstract Co-Author) Nothing to Disclose
James R. Costello, MD, PhD, Tucson, AZ (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Use MRI to accurately diagnose endometriosis as a cause of acute abdominal pain. To distinguish an endometrioma from a hemorrhagic ovarian cyst. Using a rapid, non-contrast MRI protocol to diagnose endometriosis in the emergency setting.

TABLE OF CONTENTS/OUTLINE
Outline: Background Imaging findings Summary and Clinical Implications. Background: Endometriosis affects an estimated 1.7 out of 1000 women aged 15-44, causing pain, infertility, and multiple other symptoms. Endometriosis is a common cause of abdominopelvic pain that frequently persists unrecognized with a delayed diagnosis. Initial diagnosis is commonly made at laparoscopy. Using non-contrast MRI, the diagnosis can be accurately achieved and distinguished from similar etiologies. Imaging Findings: Non-contrast T1w sequences are the key images for MRI diagnosis of endometriosis. Endometriomas demonstrate inherent and homogeneously intense T1 signal, the so-called light bulb bright signal sign. Hemorrhagic ovarian cysts show T1 signal which is heterogeneous and demonstrates a progressive gradient of intensity with layering of the T1 bright blood products. On T2-weighted sequences endometriomas typically have homogeneously low to intermediate signal. Hemorrhagic ovarian cysts typically demonstrate T2 layering.
Commonly Seen Fetal Cardiac Anomalies and How Not to Miss Them

Participants
Manjiri K. Dighe, MD, Seattle, WA (Presenter) Research Grant, General Electric Company
Nitin G. Chaubal, MD, MBBS, Mumbai, India (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

1. To review the anatomy of the fetal heart as seen on routine second trimester screening ultrasound
2. Describe the commonly seen anomalies with a description of their postnatal outcome
3. Learn how to evaluate the fetal heart on prenatal US and how not to miss commonly seen anomalies.

TABLE OF CONTENTS/OUTLINE

1. Review the anatomy and embryology of the fetal heart
2. Review the appropriate technique to acquire images on routine fetal second trimester screening
3. Review the advanced techniques for evaluation of fetal heart – for example 3D evaluation and Spatiotemporal image correlation (STIC)
4. Describe the imaging appearance of various commonly seen fetal heart anomalies
5. Common pitfalls in evaluation of the fetal heart
6. Discussion of the outcomes of commonly seen fetal heart anomalies
'There's Something in My Belly besides My Baby!': A Multimodality Pictorial Review of Incidental and Pathologic Adnexal Findings during Pregnancy

Participants
Stephanie Ruiz Baussan, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Andrea M. Abbott, MD, Newark, NJ (Presenter) Nothing to Disclose
Kerri Vincenti, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Linda W. Nunes, MD, MPH, Plymouth Meeting, PA (Abstract Co-Author) Nothing to Disclose
Hima Prabhakar, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1-2% of pregnant women are found to have a pathologic pelvic mass (excluding a physiologic corpus luteum) during early pregnancy on routine ultrasound (US) examinations. Discuss normal female adnexal anatomy during pregnancy. Provide a tailored differential for acute pelvic pain pathology in females that are not related to the ongoing pregnancy or arising from the uterus. Discuss the use and importance of US and MRI imaging modalities in evaluation of normal and pathologic adnexal findings and next steps; evaluate pitfalls of US and MRI in these clinical settings. Discuss importance of adequately characterizing the underlying etiology of the acute or incidental finding in the setting of pregnancy necessary to guide treatment.

TABLE OF CONTENTS/OUTLINE
Introduction Normal adnexal anatomy in pregnancy. Approach/Method Perform a retrospective review at our PACS database of pregnant patients presenting in the setting of acute pelvic pain not related to pregnancy. Review of incidental adnexal findings on both US and MRI. A pictorial review illustrating the different pathologies will be presented with pertinent clinical correlations. Ovarian etiology Normal variants Ovarian masses Other ovarian pathology Non-ovarian etiology Tubal pathology Non-adnexal pelvic pathology Conclusion
Participants
Anne M. Kennedy, MD, Salt Lake City, UT (Presenter) Author with royalties, Reed Elsevier
Paula J. Woodward, MD, Salt Lake City, UT (Abstract Co-Author) Vice President, Reed Elsevier
Scott J. Parker, MD, Salt Lake City, UT (Abstract Co-Author)

TEACHING POINTS
1) Analyze findings on obstetric imaging studies. 2) Develop differential diagnoses based on the clinical information and imaging findings. 3) Recognize the importance of accurate prenatal diagnosis on pregnancy management.

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Anne M. Kennedy, MD - 2016 Honored Educator
FDG PET-CT Identification of Distant Metastatic Disease in Uterine Cervical and Endometrial Cancers: Analysis from ACRIN 6671/GOG0233

**PURPOSE**

To estimate the accuracy of staging PET-CT for detecting distant metastasis in patients with advanced cervical or high grade endometrial cancer in the ACRIN6671/GOG0233 patient cohort and to compare site and central radiologist test performance.

**METHOD AND MATERIALS**

In an IRB approved study, PET-CT and clinical data were retrospectively reviewed for all patients enrolled in the ACRIN 6671/GOG0233 trial. Two central readers, blinded to site read and reference standard, rated PET-CTs for distant metastasis (on 1-6 scale; with 4-6 indicating "positive"). Reference standard was pathology and follow-up radiology reports. Diagnostic accuracy of site and central review was estimated and compared using generalized estimating equation models and nonparametric bootstrap for clustered data.

**RESULTS**

153 cervical and 203 endometrial cancer patients were enrolled at 28 sites. Overall prevalence of distant metastasis was 13.7% (21/153) for cervical and 11.8% (24/203) for endometrial cancer, with most common locations being lung (5.2%) and peritoneum (4.6%) for cervical and peritoneum (6.4%) for endometrial cancer. Site PET-CT reads demonstrated 47.6% sensitivity, 93.9% specificity, 91.9% NPV, 55.6% PPV, and area under the ROC curve (AUC) of 0.75 for detecting cervical cancer metastasis compared with 66.7%/93.9%/95.5%/59.3%/0.84 for endometrial cancer metastasis. The specificity (97.7% and 98.6%) and AUC (0.78 and 0.89) for central readers in detecting cervical and endometrial cancer metastases, respectively, were both higher compared with site review in both cancer groups (P<0.01 for specificity and P<0.001 for AUC).

**CONCLUSION**

FDG PET-CT demonstrates high specificity and NPV for detecting distant metastasis and should be included in the pretreatment evaluation. Central radiology review offers potential improvement of PET-CT performance for metastatic detection.

**CLINICAL RELEVANCE/APPLICATION**

Use of pre-treatment FDG PET-CT to detect distant metastasis in cervical and endometrial cancer can spare patients unnecessary aggressive therapy, with a false positive rate < 5%.

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Susanna I. Lee, MD, PhD - 2013 Honored Educator

Prevalence of Ovarian Cancer in Adnexal Cysts Initially Identified on CT Exams

**METHOD AND MATERIALS**

In an IRB approved study, PET-CT and clinical data were retrospectively reviewed for all patients enrolled in the ACRIN 6671/GOG0233 trial. Two central readers, blinded to site read and reference standard, rated PET-CTs for distant metastasis (on 1-6 scale; with 4-6 indicating "positive"). Reference standard was pathology and follow-up radiology reports. Diagnostic accuracy of site and central review was estimated and compared using generalized estimating equation models and nonparametric bootstrap for clustered data.

**RESULTS**

153 cervical and 203 endometrial cancer patients were enrolled at 28 sites. Overall prevalence of distant metastasis was 13.7% (21/153) for cervical and 11.8% (24/203) for endometrial cancer, with most common locations being lung (5.2%) and peritoneum (4.6%) for cervical and peritoneum (6.4%) for endometrial cancer. Site PET-CT reads demonstrated 47.6% sensitivity, 93.9% specificity, 91.9% NPV, 55.6% PPV, and area under the ROC curve (AUC) of 0.75 for detecting cervical cancer metastasis compared with 66.7%/93.9%/95.5%/59.3%/0.84 for endometrial cancer metastasis. The specificity (97.7% and 98.6%) and AUC (0.78 and 0.89) for central readers in detecting cervical and endometrial cancer metastases, respectively, were both higher compared with site review in both cancer groups (P<0.01 for specificity and P<0.001 for AUC).

**CONCLUSION**

FDG PET-CT demonstrates high specificity and NPV for detecting distant metastasis and should be included in the pretreatment evaluation. Central radiology review offers potential improvement of PET-CT performance for metastatic detection.

**CLINICAL RELEVANCE/APPLICATION**

Use of pre-treatment FDG PET-CT to detect distant metastasis in cervical and endometrial cancer can spare patients unnecessary aggressive therapy, with a false positive rate < 5%.

**Honored Educators**

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Susanna I. Lee, MD, PhD - 2013 Honored Educator
PURPOSE
To assess the clinical outcome of adnexal cysts initially identified on CT, to determine if incidental cysts need follow-up.

METHOD AND MATERIALS
In this HIPAA-compliant, IRB-approved study the institutional database was searched for abdomen and pelvis CTs with or without intravenous contrast between 06/2003 and 12/2010 for female patients that were reported to have adnexal cysts. Imaging appearance of adnexal cysts was obtained from review of CT studies. Patients with known ovarian cysts or cancer were excluded. Clinical outcome was assessed using follow-up imaging studies, medical records, and state cancer registry. Descriptive statistics and 95% confidence intervals were calculated. A power analysis was performed to determine sample size.

RESULTS
2763/42111 (6.6%, 95%CI: 6.3-6.8%) women undergoing abdominal and pelvic CT examinations in the study period (mean age 48.1±18.1 years, range 15-102) had new finding of ovarian cyst. Average follow-up was 5.1±3.8 years (range 0-12.8 years). Median cyst size was 3.1 cm, IQR 2.3-4.3 cm, range 0.8-20.0 cm. 18/2763 (0.7%, 95%CI: 0.4-1.0%) patients were found to have ovarian cancer. 0/1032 (95%CI: 0-0.4%) patients with simple cysts were diagnosed with ovarian cancer. 6/1697 (0.4%, 95%CI: 0.1-0.8%) patients with complex cysts on initial CT (initial cyst size 1.2, 2.3, 4.3, 4.5, 5.6, and 8.4 cm) and age 30, 37, 55, 62, 65, and 71 years, were diagnosed with ovarian cancer after 1-17 months (median 3.5 months) follow up with serous borderline, serous, and seromucinous pathology. 12/34 (35.3%, 95%CI: 19.8-53.5%) of patients with cysts highly suspicious for cancer (omentum deposits, a large amount of ascites, or prominent soft tissue nodularity on index CT) had ovarian cancer and 2/34 (5.9%, 95%CI:0.7-19.7%) patients had metastases to the ovary.

CONCLUSION
Prevalence of previously unknown adnexal cysts on CT is 6.6%, with cancer rate at 0.7% (95%CI 0.4-1.0%). All simple cysts were benign (95%CI 99.6-100%). In complex cysts without suspicious features for cancer on index CT the risk to develop cancer was 0.4% (95%CI 0.1-0.8%).

CLINICAL RELEVANCE/APPLICATION
Incidental simple cysts are very unlikely to develop into ovarian cancer, and thus likely do not need follow-up. Complex cysts without features highly suspicious for cancer in women of any age have a low risk of developing into cancer.

SSA11-03 3D Volumetric MRI Higher Order Texture Analysis for Preoperative Risk Stratification of Endometrial Cancer

Sunday, Nov. 27 11:05AM - 11:15AM Room: E353B

Participants
Yoshiko Ueno, MD, PhD, Montreal, QC (Presenter) Nothing to Disclose
Martin Vallieres, Montreal, QC (Abstract Co-Author) Nothing to Disclose
Ives R. Levesque, PhD, Montreal, QC (Abstract Co-Author) Nothing to Disclose
Foucauld Chamming’s, MD, PhD, Montreal, QC (Abstract Co-Author) Speaker, Supersonic Imagine
Anthony Dohan, MD, Montreal, QC (Abstract Co-Author) Nothing to Disclose
Caroline Reinhold, MD, MSC, Montreal, QC (Abstract Co-Author) Consultant, GlaxoSmithKline plc

PURPOSE
This study aimed to develop a multivariate model based on 3D volumetric MRI higher order texture analysis for the preoperative risk stratification of endometrial cancer.

METHOD AND MATERIALS
Institutional review board was obtained for this retrospective study. We retrospectively analyzed the data of 93 patients (mean age, 65.4 years) who underwent 1.5-T MRI scan before hysterectomy for endometrial cancer. Four non-texture features (volume, size, and shape features) and forty-two texture features (3 first-order, 8 second-order and 31 higher-order features) were extracted from the whole tumour region of MR images (T2WI, DWI at b=500 and 1000 s/mm2, ADC map at b=0,500 s/mm2 and b=0, 1000 s/mm2, early- and equilibrium-phase, post contrast-enhanced images). These features were incorporated into multivariate models by logistic regression for prediction of three binary endpoints: lymphovascular space invasion (LVSI), deep myometrium invasion (MI ≥ 50%), and high tumour grade (Type II histology, grade 3 Type I histology). Prediction performance of each model was estimated at 0.83, 0.84, and 0.81 for LVSI, deep MI, and high grade tumour, respectively. Sensitivity, specificity, and accuracy of each model was estimated: 74.0%, 74.0%, and 73.7% for LVSI; 78.0%, 73.0%, and 75.0% for deep MI; 69.0%, 75.0%, and 72.0% for high tumour grade.

RESULTS
Forty-seven out of 93 (50.5%) patients had LVSI, 41 (44.0%) had deep MI, and 30 (32.2%) had high tumour grade. Multivariate prediction models separated the patients into a positive and negative group for each outcome. The AUC of each prediction model was estimated with 100 bootstrap testing samples in terms of areas under the receiver-operating characteristic curve (AUC), sensitivity, and specificity.

CONCLUSION
Multivariate models based on 3D volumetric MRI texture achieved good prediction performance for LVSI deep MI, and high grade tumour in the pre-operative assessment of patients with endometrial carcinoma.

CLINICAL RELEVANCE/APPLICATION
3D volumetric MRI texture analysis may be useful for the preoperative risk stratification of endometrial cancer and has the potential to improve treatment planning.

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SSA11-04  Comparison of the Diagnostic Accuracy of Multiparametric MRI and Fluorine-18 Fluorodeoxyglucose (18F-FDG) Positron Emission Tomography Combined with CT (PET/CT) in the Differentiation between Uterine Sarcoma and Benign Leiomyoma

Sunday, Nov. 27 11:15AM - 11:25AM Room: E353B

Participants
Masataka Nakagawa, Kumamoto, Japan (Presenter) Nothing to Disclose
Tomohiro Namimoto, MD, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Kie Shimizu, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Fumi Sakamoto, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Shinya Shiraishi, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Seitaro Oda, MD, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Takeshi Nakaura, MD, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Yasuyuki Yamashita, MD, Kumamoto, Japan (Abstract Co-Author) Consultant, DAIICHI SANKYO Group

PURPOSE
To compare the diagnostic accuracy of multiparametric magnetic resonance imaging (MRI) and Fluorine-18 fluorodeoxyglucose (18F-FDG) positron emission tomography combined with CT (PET/CT) in the differentiation between uterine sarcoma and benign leiomyoma.

METHOD AND MATERIALS
This retrospective study was approved by the institutional review board. The requirement to obtain informed consent was waived. Eighty-nine consecutive patients diagnosed with benign leiomyoma or uterine sarcoma who underwent pelvic MRI exam at 3T and 18F-FDG PET/CT before surgery were included. Of 89 patients, 11 (12.4%) patients had uterine sarcomas and 78 (87.6%) patients had benign leiomyomas. Two radiologists blinded to the diagnoses of uterine tumors independently evaluated images based on multiparametric MRI (T2-weighted images, T1-weighted images, dynamic MRI, with or without DWI) and rated likelihood of the presence of malignancy on a scale of 1 to 5 (1, definitely absent; 2, probably absent; 3, equivocal; 4, probably present; 5, definitely present). The apparent diffusion coefficients (ADC) values were calculated from b=0 and 1000 s/mm². The mean ADC value was also evaluated. Receiver-operating-characteristic (ROC) curve analysis was performed to compare the diagnostic performance among multiparametric MRI with/without DWI, mean ADC value and SUVmax.

RESULTS
The area under the curves (AUCs) of ROC for multiparametric MRI with DWI, MRI without DWI, SUVmax, and meanADC were 0.963, 0.915, 0.892, and 0.814 for differentiation uterine sarcoma from benign leiomyoma, respectively.

CONCLUSION
Multiparametric MRI with DWI had highest AUC of ROC and can provide accurate information for differentiation between uterine sarcoma and benign leiomyoma.

CLINICAL RELEVANCE/APPLICATION
Multiparametric MRI with DWI had highest AUC of ROC and can provide accurate information for differentiation between uterine sarcoma and benign leiomyoma.

SSA11-05  Texture Analysis as an MR Imaging Biomarker to Identify Histological Features or Tumor Aggressivity and to Predict Tumor Response to Neo-adjuvant Chemotherapy in Patients with Cancer of the Uterine Cervix

Sunday, Nov. 27 11:25AM - 11:35AM Room: E353B

Participants
Maria Ciolina, MD, Rome, Italy (Presenter) Nothing to Disclose
Valeria Vinci, MD, Rome, Italy (Abstract Co-Author) Nothing to Disclose
Marco Rengo, MD, Rome, Italy (Abstract Co-Author) Nothing to Disclose
Lucia Manganaro, MD, Rome, Italy (Abstract Co-Author) Nothing to Disclose
Andrea Laghi, MD, Rome, Italy (Abstract Co-Author) Speaker, Bracco Group Speaker, Bayer AG Speaker, General Electric Company Speaker, Koninklijke Philips NV

PURPOSE
To determine the performance of texture analysis, in predicting tumoral response to neo-adjuvant chemotherapy (NACHT) and to assess if a relationship exists between texture tissue heterogeneity and histological type and tumoral grading in patients with cancer of uterine cervix.

METHOD AND MATERIALS
28 patients with local advanced cervical cancer (FIGO IIB-III A), underwent pre-chemotherapy MRI. Texture analysis parameters (mean, mpp, entropy, skewness e kurtosis) were quantified using a commercial research software algorithms and delineating a ROI around the tumor margins on T2w sequences. Surgical specimen served as the gold standard. Unpaired t test was used, to evaluate if obtained data were statistically different comparing histological types, G3 and G1-G2 tumors and responders vs non-
RESULTS

Mean and skewness showed a strong correlation with the histological type: adenocarcinomas presented higher mean and skewness values (69.8±10.5 e 0.55±0.19) in comparison with squamocellular carcinomas. Using a cut-off value ≥ 29 for mean it was possible to differentiate the two histological types with a sensitivity of 100% and a specificity of 81%. Kurtosis showed a positive correlation with tumor response to NACHT resulting higher in responder patients (v.m. 5.7±1.1) in comparison with non-responders (v.m. 2.3±0.5). The optimal Kurtosis cut-off value for the identification of non-responders tumors was ≥ 3.7 with a sensitivity of 92% and a specificity of 75%.

CONCLUSION

Texture Analysis applied to T2w images of uterine cervical cancer seems to be a promising imaging biomarker of tumor heterogeneity that might be useful to predict response to neo-adjuvant-chemotherapy and that show also a potential role to differentiate histological tumor types.

CLINICAL RELEVANCE/APPLICATION

Texture Analysis applied to uterine cervical cancer seems to be a promising tool to describe tumor heterogeneity. The finding of a correlation between texture parameters and response to therapy might be useful to predict response to neo-adjuvant-chemotherapy with the future aim of obtaining a more personalize therapy protocol.

SSA11-06 The Value of Uterine Artery Hemodynamic Parameters Before Chemotherapy in Predicting Methotrexate Resistance in Low-risk Gestational Trophoblastic Neoplasia

Sunday, Nov. 27 11:35AM - 11:45AM Room: E353B

Participants
Jiale Qin, MD, PhD, Hangzhou, China (Presenter) Nothing to Disclose
Xiaodong Wu, Hangzhou, China (Abstract Co-Author) Nothing to Disclose
Jianmin Luo, Hangzhou, China (Abstract Co-Author) Nothing to Disclose
Junmei Wang, Hangzhou, China (Abstract Co-Author) Nothing to Disclose
Weiguo Lu, Hangzhou, China (Abstract Co-Author) Nothing to Disclose
Xing Xie, Hangzhou, China (Abstract Co-Author) Nothing to Disclose

PURPOSE

MTX single regimen is commonly used as the initial chemotherapy in low-risk GTN. In practice, about 30% cases become resistant to MTX after several courses, and then switch to other agents. Switching drug after the development of MTX resistance prolongs the overall duration of chemotherapy and accumulates more side effects in normal organs. Therefore, the method to predict MTX resistance prior to treatment is desirable. The mechanism of GTN occurrence is considered trophoblastic cells invading uterine myometrial vessels, resulting in the blood flow changed. Ultrasound, especially Spectral Doppler, is one of real-time blood flow imaging methods to detect the in-vivo hemodynamics. In our study, we analyzed the hemodynamic parameters of vessels in both GTN uterine lesion and uterine artery, to explore the relationship between these sonographic parameters and MTX response in order to find sonographic predictive parameters.

METHOD AND MATERIALS

Prospective analysis was carried out in a total of 80 low-risk GTN patients treated with MTX between September 2012 and Match 2016 in our institute. Hemodynamic parameters (PS, ED, TAmx, TAmean, S/D, PI and RI) in uterine artery were assessed by ultrasound. In the case of GTN uterine lesion detected, tumor size and intratumor hemodynamic parameters in the lesion were additional measured. The relationships between sonographic parameters and MTX response were analyzed.

RESULTS

The MTX response rate was 68.8%. Univariable logistic regression analysis identified that serum hCG level, FIGO score, the maximal PS, ED, TAmx and TAmean of uterine artery were the significant predictors for MTX response (p<0.05). Multivariable logistic regression analysis indicated that the maximal PS, TAmx and TAmean of uterine artery were independent predictors to MTX response. Among them, TAmean was most powerful to predict MTX response with 0.720 AUC. It had 75.0% sensitivity and 63.2% specificity at the cutoff value of 19.16cm/s. Interestingly, none of intratumor hemodynamic parameters was significantly correlated with MTX response.

CONCLUSION

The hemodynamic parameters of uterine artery obtained prior to chemotherapy, such as PS, TAmx and TAmean, could be used as an independent factor for predicting MTX response in the low-risk GTN patients.

CLINICAL RELEVANCE/APPLICATION

Uterine artery hemodynamic parameters before chemotherapy could be applied to select treatment protocols for management of low-risk GTN

SSA11-07 Preoperative DCE Perfusion-MRI Parameters Predict Aggressive Histology and Tumor Grade in Endometrial Carcinomas

Sunday, Nov. 27 11:45AM - 11:55AM Room: E353B

Participants
Kristine E. Fasmer, Bergen, Norway (Presenter) Nothing to Disclose
Atle Bjornrud, PhD, Oslo, Norway (Abstract Co-Author) Intellectual property, Nordic Neuronal AS Board member, Nordic Neuronal AS
Sigmund Ytre-Hauge, MD, Bergen, Norway (Abstract Co-Author) Nothing to Disclose
Inger Johanne Magnussen, MD, Bergen, Norway (Abstract Co-Author) Nothing to Disclose
Renate Gruner, Bergen, Norway (Abstract Co-Author) Nothing to Disclose
Jone Trovik, MD, Bergen, Norway (Abstract Co-Author) Nothing to Disclose

PURPOSE

Texture Analysis applied to T2w images of uterine cervical cancer seems to be a promising imaging biomarker of tumor heterogeneity. The finding of a correlation between texture parameters and response to therapy might be useful to predict response to neo-adjuvant-chemotherapy and that show also a potential role to differentiate histological tumor types.

METHOD AND MATERIALS

Prospective analysis was carried out in a total of 80 low-risk GTN patients treated with MTX between September 2012 and Match 2016 in our institute. Hemodynamic parameters (PS, ED, TAmx, TAmean, S/D, PI and RI) in uterine artery were assessed by ultrasound. In the case of GTN uterine lesion detected, tumor size and intratumor hemodynamic parameters in the lesion were additional measured. The relationships between sonographic parameters and MTX response were analyzed.

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CONCLUSION

The hemodynamic parameters of uterine artery obtained prior to chemotherapy, such as PS, TAmx and TAmean, could be used as an independent factor for predicting MTX response in the low-risk GTN patients.

CLINICAL RELEVANCE/APPLICATION

Uterine artery hemodynamic parameters before chemotherapy could be applied to select treatment protocols for management of low-risk GTN
Purpose
To explore measures of tumor microvasculature assessed by preoperative dynamic contrast-enhanced (DCE) MRI in relation to histological subtype and surgicopathological stage in endometrial carcinomas.

Method and Materials
Preoperative pelvic contrast-enhanced DCE-MRI (1.5T) was performed prospectively in 185 consecutive patients with histologically confirmed endometrial carcinomas. Tumor region of interest (ROI) and corresponding normal myometrial ROI was manually drawn on the DCE images at 2 min post-contrast on the slice displaying the largest cross-section tumor area. Parametric maps were generated using the extended Tofts kinetic model combined with a population-based arterial input function. Blood flow (Fb), transfer constant from extravascular extracellular space (Ees) to blood (Kep), transfer from blood to Ees (Ktrans) and volume of Ees (Ve) were calculated for both the endometrial tumor and normal myometrium. Statistical analysis was conducted to explore the differences between tumor values and normal myometrial values (Student's paired t-test), correlation of tumor values, histological subtype and the staging parameters (Mann-Whitney U-test) and to evaluate the prognostic value of the DCE-MRI tumor parameters (Kaplan-Meier).

Results
Tumor Fb, Ve and Ktrans were significantly lower in endometrioid tumors compared with normal myometrium (p≤0.001). Low tumor Fb and Kep were also significantly associated with high-risk histologic subtype (histological grade 3 and non-endometrioid tumors) (p≤0.03). No significant associations were identified between the tumor DCE-MRI values and the staging parameters cervical stroma invasion, myometrial invasion or lymph node metastases. Patients with low tumor Fb tended to have reduced survival (p=0.08).

Conclusion
DCE-MRI allows for novel characterization of the tumor microvasculature in endometrial cancer. Non-endometrioid tumors and higher grade endometrial cancers exhibit lower tumor blood flow, which tends to be linked to reduced survival. Our findings suggest that tumor hypoxia may represent a pathogenic mechanism in the subgroup of most aggressive endometrial cancers.

Clinical Relevance/Application
DCE-MRI parameters reflecting tumor microvasculature are associated with aggressive histology and high-risk endometrial carcinomas and tend to have an impact on survival.
The assessment of tumoral heterogeneity in the era of personalized medicine is important, as increased heterogeneity has been associated with distinct genomic abnormalities and worse patient outcomes. Our radiomics approach in these standard-of-care CT scans can have a clinical impact by offering a non-invasive tool that might improve treatment effectiveness or predict outcome.

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Stephanie Nougaret, MD - 2013 Honored Educator
Evis Sala, MD, PhD - 2013 Honored Educator

SSA11-09 Can Magnetic Resonance Imaging Predict Aggressiveness of Endometrial Cancer?

Sunday, Nov. 27 12:05PM - 12:15PM Room: E353B

Awards
Student Travel Stipend Award

Participants
Mona Ahmed, MD, Houston, TX (Presenter) Nothing to Disclose
Jaafar F. Alkhafaji, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Caleb A. Class, PhD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Wei Wei, Houston, TX (Abstract Co-Author) Nothing to Disclose
Revathy B. Iyer, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Priya R. Bhosale, MD, Bellaire, TX (Abstract Co-Author) Nothing to Disclose

PURPOSE
Patients with endometrial cancer (EC) may undergo pre-operative magnetic resonance imaging (MRI) for treatment planning. The purpose of this study was to evaluate MRI characteristics of EC and correlate with pathology, genomic features and recurrence free survival.

METHOD AND MATERIALS
71 patients with biopsy-proven EC were retrospectively analyzed following IRB approval. 3 radiologists reviewed imaging findings on sagittal dynamic post contrast T1WI (DCE) and sagittal T2WI sequences. Depth of myometrial invasion (DMI) was recorded as <50% and > or = 50%. Qualitative signal intensity (SI) was recorded as >myometrium, =myometrium and <myometrium

RESULTS
Statistically significant correlation was noted between lower delayed DCE SI and the presence of MSI (p=0.042). 3 readers showed substantial agreement (0.62) based on Kappa analysis for qualitative tumor SI on DCE images. Tumors with SI >myometrium on T2WI showed higher DMI (p=0.028). 12 patients were lost to follow-up, recurrence-free survival analysis was performed on 59 patients. The patients with delayed DCE SI ROI of >209, had better recurrence-free survival (p= 0.014). Based on multivariate analysis, patients with MSI-stable disease and increased delayed DCE SI had better recurrence-free survival (p=0.027). We found no correlation between MRI SI and tumor sub-type or grade.

CONCLUSION
Patients with MSI-stable EC showing high SI on delayed DCE had better recurrence-free survival. Tumors with high T2WI SI demonstrated aggressive features on pathology.

CLINICAL RELEVANCE/APPLICATION
MRI may be used as a prognostic indicator in evaluating recurrence free survival and can be used to determine which patients may benefit from comprehensive surgical staging.

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/

Priya R. Bhosale, MD - 2012 Honored Educator
**Obstetrics/Gynecology Sunday Poster Discussions**

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

*AMA PRA Category 1 Credit ™: .50*

**Participants**

**Sub-Events**

**OB102-ED-SUA1 Abnormal Fourth Trimester Findings: Head to Toe Imaging Manifestations of Postpartum Complications**

**Station #1**

Participants

Kerri Vincenti, MD, Philadelphia, PA (Presenter) Nothing to Disclose
Hima Prabhakar, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Dayna Levin, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

**TEACHING POINTS**

To review normal postpartum uterine anatomy
To discuss typical clinical manifestations and associated imaging findings of common and uncommon complications in postpartum patients
To learn the optimal imaging modalities for evaluating various imaging findings

**TABLE OF CONTENTS/OUTLINE**

Review of normal uterus in the postpartum period
Classic clinical presentation and imaging findings of complications, organized by major affected systems as seen on Ultrasound/MRI/CT/Nuclear Medicine:
- Nervous System
- Cardiovascular System
- Respiratory System
- Digestive System
- Reproductive System
- Urinary System
- Lymphatic System
- Endocrine System
- Musculoskeletal System
- Integumentary System

Common imaging pitfalls and/or mimics to avoid when searching for complications
Appropriate imaging modalities for the most common and/or dangerous complications (incorporating ACR criteria when available)
Summary

**OB128-ED-SUA2 3D Ultrasound of the Female Pelvis-Beyond the IUD**

**Station #2**

Participants

Ghizlane Bouzghar, MD, Philadelphia, PA (Presenter) Nothing to Disclose
Bryan J. Kang, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Shuchi K. Rodgers, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Peter S. Wang, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Cheryl L. Kirby, MD, Cherry Hill, NJ (Abstract Co-Author) Nothing to Disclose

**TEACHING POINTS**

3D volume ultrasound can produce images of the female pelvis comparable to MRI and CT without radiation, at a lower cost, and in a shorter period of time. Proper acquisition, orientation labeling and post-processing of 3D ultrasound of the female pelvis is important for diagnostic accuracy. A variety of gynecologic conditions (congenital uterine anomalies, endometrial abnormalities, submucosal fibroids) can be evaluated with 3D ultrasound and may obviate need for sonohysterography. Normal and ectopic pregnancy implantation can be accurately characterized with 3D ultrasound, particularly interstitial ectopic pregnancy. 3D ultrasound is useful in evaluation of pregnancy implantation in the presence of a uterine anomaly as well as intrauterine device (IUD).

**TABLE OF CONTENTS/OUTLINE**

1. Acquisition technique and orientation labeling of female pelvis 3D ultrasound
2. Normal 3D ultrasound of the uterus
3. Gynecological use
   a. Müllerian duct anomalies
   b. Abnormalities of the endometrium and endometrial cavity
   c. Adenomyosis
   d. Fibroid mapping
   e. Intrauterine device type and position
   f. Assessment of adnexal lesions
4. Obstetrical use
   a. Normal pregnancy implantation
   b. Pregnancy implantation in the presence of an IUD or congenital uterine anomaly
   c. Ectopic pregnancy
      i. Cervical
      ii. Cesarean scar
      iii. Interstitial
   d. Angular versus interstitial pregnancy


**Station #3**

Participants
Learning Objectives/Aims Review updated information in origin and pathogenesis of ovarian epithelial cancers. Discuss updated changes in FIGO staging of endometrial, cervical, and ovarian cancers that affect management decisions. Describe the role of MR imaging in deciphering these important stages and treatment follow-up. Review potential imaging-related pitfalls that can result in patient mismanagement and suggest possible solutions to the

TABLE OF CONTENTS/OUTLINE

Role of multiparametric MRI in assessing gynecologic cancers

**Ovarian cancer:** Tubal carcinogenesis of high-grade serous cancer & new information in 2014 WHO & FIGO classifications as per this concept. Goal of imaging is to detect metastatic disease, prevent under staging, and provide surgical roadmap.

**Endometrial cancer:** MR is useful in distinguishing Stage IA (<50% myometrial involvement) and IB (>50%). Disruption of the cervical stromal ring upgrades the cancer to Stage II.

**Cervical cancer:** MR imaging helps differentiate Stage IB1 (< 4cm) versus IB2 (>4cm), Stage IIIA (invading lower 1/3 of vagina, and IIA (No parametrial invasion) versus IIB (+ parametrial invasion). The above findings are important to identify since their presence precludes surgery.

Imaging-related pitfalls & solutions

Post treatment assessment & surveillance

Future imaging techniques

Conclusion

Honored Educators

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

**Sub-Events**

**OB103-ED-SUB1**  
What Every Radiologist Should Know about Adnexal Torsion: A Pictorial Review and Pitfalls in Imaging  
Station #1

**Awards**

**Identified for RadioGraphics**

**Participants**

Guillaume Ssi-Yan-Kai, Clamart, France (Presenter) Nothing to Disclose  
Anne-Laure Rivain, Clamart, France (Abstract Co-Author) Nothing to Disclose  
Caroline Trichot, Clamart, France (Abstract Co-Author) Nothing to Disclose  
Sophie Prevot, Clamart, France (Abstract Co-Author) Nothing to Disclose  
Xavier Deffieux, Clamart, France (Abstract Co-Author) Nothing to Disclose  
Jocelyne De Laveaucoupet, MD, Clamart, France (Abstract Co-Author) Nothing to Disclose

**TEACHING POINTS**

1. To review anatomical considerations of the female pelvis and describe the types of adnexal torsions  
2. To highlight the imaging features of adnexal torsions on ultrasonography, doppler, CT and MRI  
3. To identify the main mimickers of adnexal torsions

**TABLE OF CONTENTS/OUTLINE**

The goal of this review is to raise radiologists' awareness of adnexal torsions' pathophysiology, clinical presentation and radiological features. The differentiation of malignant ovarian tumors from chronic adnexal torsion can be challenging.  

A. Anatomy of the female pelvis and adnexa  
B. Pathophysiology  
1. (Tubo-) Ovarian torsion  
2. Isolated fallopian tube torsion  
3. Chronic adnexal torsion  
C. Imaging features of torsion on Ultrasonography, Doppler, CT, MRI  
1. Representative cases  
2. Special cases of torsions: in pregnancy, in childhood, in elderly  
D. Mimics  
1. Haemorrhagic corpus luteal cyst  
2. Appendicitis  
3. Ovarian hyper stimulation syndrome  
4. Tubo-ovarian abscess / Pyosalpinx

**OB139-ED-SUB2**  
The Morbidly Adherent Placenta: A Practical Approach to the MR Imaging and Diagnosis of Placenta Accreta  
Station #2

**Participants**

Courtney A. Woodfield, MD, Newtown, PA (Presenter) Consultant, Siemens AG  
Philip S. Lim, MD, Abington, PA (Abstract Co-Author) Consultant, BioClinica, Inc ; Consultant, ICON plc ; Consultant, Siemens AG ;

**TEACHING POINTS**

1. Placenta accreta occurs along a spectrum of disease and accurate diagnosis of the presence and type of accreta is critical to directing correct patient management.  
2. Multiple MR imaging signs of placenta accreta have been described and in combination increase the diagnostic accuracy of MR imaging.  
3. An efficient comprehensive MR imaging protocol and familiarity with both the normal and abnormal appearance of the placenta can improve the performance of MR imaging for placenta accreta.

**TABLE OF CONTENTS/OUTLINE**

1. Review the risk factors for and the various types of placenta accreta  
2. Provide indications for MR imaging and a comprehensive MR imaging protocol for evaluation of placenta accreta  
3. Describe the MR imaging features of the normal placenta  
4. Illustrate the MR imaging signs of placenta accreta including extraterine invasion, intraplacental T2 dark bands, abnormal vascularity, heterogeneous signal, placental bulge, focal myometrial thinning/interruption, urinary bladder tenting, and placental protrusion into the cervix  
5. Summarize a stepwise approach to evaluating the placenta for signs of accreta  
6. Discuss the MR imaging pearls and pitfalls of diagnosing placenta accreta  
7. Review the current management options for patients diagnosed with placenta accreta.
**Pediatric Series: Fetal/Neonatal**
Sunday, Nov. 27 2:00PM - 3:30PM Room: S102AB

**RC113-01**  
**Congenital Diaphragmatic Hernia Imaging**

Participants  
Beth M. Kline-Fath, MD, Cincinnati, OH, (beth.kline-fath@cchmc.org) *(Moderator)* Nothing to Disclose  
Amy R. Mehollin-Ray, MD, Houston, TX, (armeholl@texaschildrens.org) *(Presenter)* Nothing to Disclose

**LEARNING OBJECTIVES**
1) Distinguish the various subtypes of diaphragmatic hernia on fetal ultrasound and MRI.  
2) Learn to measure lung-head ratio, total fetal lung volume and liver herniation and apply the values to define prognosis.  
3) Utilize fetal imaging to prepare the multidisciplinary team for potential fetal and post-natal therapies for diaphragmatic hernia.

**ABSTRACT**

Intrauterine growth restriction is associated with an increased perinatal mortality and morbidity and is associated with a decreased oxygen delivery to the fetus. With the relationship between T2 relaxation time and oxygen saturation (sO2), magnetic resonance oximetry represents a valuable method for a direct noninvasive determination of fetal oxygen saturation. The purpose of this work was to investigate a relationship between fetal sO2 and T2 relaxation time using in-vitro fetal blood samples. Parameters describing the T2 relaxation of fetal blood were consecutively validated in-vivo in one fetus.

**METHOD AND MATERIALS**

A balanced steady-state free precession (SSFP) sequence in combination with T2 preparation pulses was applied at 1.5 Tesla (Achieva, Philips Healthcare, Best, The Netherlands) for T2 determination. Fetal blood for in-vitro measurements was derived from the umbilical cord during abdominal delivery from 9 different fetuses. The blood from each fetus was heparinized and divided into 5 samples with different oxygen saturation levels (30 % to 100%). The relationship between T2 and sO2 was fitted based on the Luz and Meiboom model using measured signal intensities and sO2 values measured using a blood gas analyzer. Consecutively, the fitted parameters (T20, tex and a) were compared between each fetal blood sample and applied to T2 measurements in the left ventricle in one fetus (34 gestation week) using the same SSFP sequence.

**RESULTS**

Mean parameters of the blood samples were 160±10 ms (T20), 4.5 ms±1.2 (tex) and 0.032±0.002 10^3 sec^-1 (a). The mean parameters were retrospectively used to calculate the sO2 for each sample for verification (r = 0.9). Results of measured signal intensities in the left fetal ventricle using the mean calculated parameters resulted in a sO2 value of 98 %.

**CONCLUSION**

In vitro parameters to calculate blood sO2 were similar for fetal cord blood samples compared to measured sO2 values and measurements were successfully evaluated in-vivo. In conclusion, MR oximetry is a promising method for a noninvasively determination of fetal oxygen saturation. In future, the calculated parameters have to be validated in a larger fetal population.

**CLINICAL RELEVANCE/APPLICATION**

In vivo MR oximetry within the fetal heart could help in the diagnosis of fetal hypoxia and associated growth abnormalities.

**RC113-02**  
**In Vitro and in Vivo MR Measurement of Fetal Blood Oxygen Sturation: Initial Results**

Participants  
Hendrik Kooljmann, PhD, Hamburg, Germany *(Presenter)* Nothing to Disclose  
Manuela Tavares de Sousa, Hamburg, Germany *(Abstract Co-Author)* Nothing to Disclose  
Jin Yamamura, MD, Hamburg, Germany *(Abstract Co-Author)* Nothing to Disclose  
Mathias Klaeck, Hamburg, Germany *(Abstract Co-Author)* Nothing to Disclose  
Kurt Hecher, MD, Hamburg, Germany *(Abstract Co-Author)* Nothing to Disclose  
Gerhard B. Adam, MD, Hamburg, Germany *(Abstract Co-Author)* Nothing to Disclose  
Bjoern Schoennagel, MD, Hamburg, Germany *(Abstract Co-Author)* Nothing to Disclose

**PURPOSE**

Intrauterine growth restriction is associated with an increased perinatal mortality and morbidity and is associated with a decreased oxygen delivery to the fetus. With the relationship between T2 relaxation time and oxygen saturation (sO2), magnetic resonance oximetry represents a valuable method for a direct noninvasive determination of fetal oxygen saturation. The purpose of this work was to investigate a relationship between fetal sO2 and T2 relaxation time using in-vitro fetal blood samples. Parameters describing the T2 relaxation of fetal blood were consecutively validated in-vivo in one fetus.

**METHOD AND MATERIALS**

A balanced steady-state free precession (SSFP) sequence in combination with T2 preparation pulses was applied at 1.5 Tesla (Achieva, Philips Healthcare, Best, The Netherlands) for T2 determination. Fetal blood for in-vitro measurements was derived from the umbilical cord during abdominal delivery from 9 different fetuses. The blood from each fetus was heparinized and divided into 5 samples with different oxygen saturation levels (30 % to 100%). The relationship between T2 and sO2 was fitted based on the Luz and Meiboom model using measured signal intensities and sO2 values measured using a blood gas analyzer. Consecutively, the fitted parameters (T20, tex and a) were compared between each fetal blood sample and applied to T2 measurements in the left ventricle in one fetus (34 gestation week) using the same SSFP sequence.

**RESULTS**

Mean parameters of the blood samples were 160±10 ms (T20), 4.5 ms±1.2 (tex) and 0.032±0.002 10^3 sec^-1 (a). The mean parameters were retrospectively used to calculate the sO2 for each sample for verification (r = 0.9). Results of measured signal intensities in the left fetal ventricle using the mean calculated parameters resulted in a sO2 value of 98 %.

**CONCLUSION**

In vitro parameters to calculate blood sO2 were similar for fetal cord blood samples compared to measured sO2 values and measurements were successfully evaluated in-vivo. In conclusion, MR oximetry is a promising method for a noninvasively determination of fetal oxygen saturation. In future, the calculated parameters have to be validated in a larger fetal population.

**CLINICAL RELEVANCE/APPLICATION**

In vivo MR oximetry within the fetal heart could help in the diagnosis of fetal hypoxia and associated growth abnormalities.

**RC113-03**  
**Utility of Virtual Autopsy (Post-mortem MRI) in the Phenotypic Characterization of Stillbirths**
Fetal CMR can accurately diagnose persistent LSVC, especially in situations that limit echocardiography.

CONCLUSION

cases drains into the coronary sinus.

innominate vein. Approximately 15.9% of patients (7 cases) the fetal persistent LSVC drains directly into the atrium, 37 (84.1%) vascular ring ( n = 3) , pulmonary atresia with ventricular septal defect (PA/VSD) (n = 1) , tetralogy of Fallot (TOF, n = 2) , transposition of great arteries (TGA, n = 2), coarctation of the aorta (CoA, n = 5) , double aortic arch (n=1), right aortic arch (RAoA ) with tricuspid atresia (n = 1), ventricular septal defects (VSD, n = 5), double outlet right ventricle (DORV, n = 2), complete transposition

METHOD AND MATERIALS

The prenatal echocardiography (and/or ultrasound) and CMR data of 44 fetuses with persistent LSVC, which confirmed by postnatal autopsy (n=7). After detailed history taking, clinical examination, clinical photographs and whole body infantogram; fetus was transported to MRI room ( in 10% formalin). Whole body MRI at 1.5T scanner was performed using 3D DRIVE for brain, spine, heart, abdomen, axial T2W TSE for brain, and axial single shot TSE for chest and abdomen. Conventional autopsy was performed as per standard protocol. Both radiologists and pathologists were blinded for each other's findings. Individual malformations detected based on conventional autopsy and postmortem MRI were compared. Diagnosis based on autopsy and MRI findings were made separately and were compared with the clinical diagnosis.

RESULTS

Virtual autopsy had an overall sensitivity and specificity of 77.7% and 99.8% respectively for the detection of malformations. Sensitivity was better for brain and spinal cord (93.1%), renal (96.1%) and pulmonary (91.1%) malformations and relatively poor for cardiovascular (60.9%), musculoskeletal (56.8%) and gastrointestinal (80.6%) malformations. Post-mortem MRI provided additional information over a conventional autopsy in brain and spinal cord malformations in 5 cases. Clinical diagnosis was revised after virtual autopsy in 14 cases (32.5%) and after conventional autopsy in 18 cases (41.8%). In 35 (81.4%) out of 43 cases, final diagnosis based on virtual autopsy was concordant with that of conventional autopsy.

CONCLUSION

Virtual autopsy using post-mortem MRI can be an acceptable alternative to conventional autopsy when refused. Post-mortem MRI allows in situ evaluation of brain and may even give additive value over a conventional autopsy.

CLINICAL RELEVANCE/APPLICATION

Post mortem MRI of still born fetus should be done for genetic counselling and prognostication, when conventional autopsy is refused for any reasons in the evaluation of stillbirths, especially if brain and spinal cord malformations are found on antenatal ultrasonogram.

RC113-04 Cardiovascular Magnetic Resonance of Fetal Persistent Left Superior Vena Cava in Chinese

METHOD AND MATERIALS

The prenatal echocardiography (and/or ultrasound) and CMR data of 44 fetuses with persistent LSVC, which confirmed by postnatal diagnoses between January 2010 and June 2015 were reviewed retrospectively. All prenatal CMR was performed at 1.5 T. Imaging sequences included steady-state free-precession (SSFP) sequences, real-time SSFP, single-shot turbo spin echo (SSTSE) and T1-weighted turbo field echo (T1W_TFE) sequences. The images were mostly acquired along the transverse view of the fetal thorax, the four-chamber, short-axis, coronal and oblique sagittal planes of the fetal heart.

RESULTS

All the 44 cases of fetal persistent (LSVC) were correctly diagnosed by fetal CMR, but only 32 cases (72.7%) were correctly diagnosed by first fetal US and/or echocardiography before fetal CMR. 32 cases were associated with other cardiovascular abnormalities and 6 cases with extracardiac abnormalities, 6 cases had no associated condition. Among the 32 fetuses, the congenital cardiovascular abnormalities included heterotaxy syndromes (n = 8) (7 cases of asplenia and 1 case of polysplenia) , tricuspid atresia (n = 1), ventricular septal defects (VSD, n = 5), double outlet right ventricle (DORV, n = 2), complete transposition of great arteries (TGA, n = 2), coarctation of the aorta (CoA, n = 5) , double aortic arch (n=1), right aortic arch (RAoA ) with vascular ring ( n = 3) , pulmonary atresia with ventricular septal defect (PA/VSD) (n = 1) , tetralogy of Fallot (TOF, n = 2) , hypoplastic left heart syndrome (HLHS, n=2). 39 (88.6%) cases the innominate vein were absent, 5 (11.4%) cases had the innominate vein. Approximately 15.9% of patients (7 cases) the fetal persistent LSVC drains directly into the atrium, 37 (84.1%) cases drains into the coronary sinus.

CONCLUSION

Fetal CMR can accurately diagnose persistent LSVC, especially in situations that limit echocardiography.
**Clinical Relevance/Application**
Fetal CMR can accurately diagnose persistent LSVC, especially in situations that limit echocardiography. Fetal CMR can also display the innominate vein between the bilateral superior vena cava.

**Purpose**
To illustrate the appearance of fetal non-obstructive aortic arch anomalies at prenatal cardiac magnetic resonance imaging

**Method and Materials**
Between June 2005 and October 2015, 92 fetuses with congenital non-obstructive aortic arch anomalies confirmed by postnatal imaging were evaluated using fetal echocardiography and cardiac MRI in our hospital. Cardiac MRI was performed using 1.5T unit. Among the 92 cases, fetal cardiac MRI was performed at 20 to 33 weeks’ gestation (mean 24.5 weeks). Imaging sequences included steady-state free-precession (SSFP), real-time SSFP and single-shot turbo spin echo (SSTSE) sequences. The images were mostly acquired along the transverse view of the fetal thorax, the four-chamber, short-axis, coronal and oblique sagittal planes of the fetal heart.

**Results**
The 92 cases of fetal congenital non-obstructive aortic arch anomalies included double aortic arch (n=26), right aortic arch with aberrant left subclavian artery (n=31), right aortic arch with mirror image branching (n=25), right aortic arch with right ductus arteriosus (n=2), right aortic arch with mirror image branching with retroesophageal ductus (n=3), left aortic arch with aberrant right subclavian artery (n=2) and cervical aortic arch (n=3). The fetal congenital non-obstructive aortic arch anomalies formed vascular ring can be correctly diagnosed using fetal cardiac MRI by experienced doctors; Only 69 cases (75%) were correctly diagnosed as congenital non-obstructive aortic arch anomalies by fetal echocardiography.

**Conclusion**
Fetal cardiac MRI can provide diagnostic information for fetal congenital non-obstructive aortic arch anomalies. Fetal congenital non-obstructive aortic arch anomalies can easily get important clues at the transverse view of aortic arch.

**Clinical Relevance/Application**
Fetal cardiac MRI can provide accurate diagnostic information for fetal congenital non-obstructive aortic arch anomalies and is recommended as an adjunct to fetal echocardiography.

**Purpose**
The objective of this study is to assess the maternal–fetal attachment (MFA) in six blind pregnant women by means three-dimensional (3D) physical models from 3D ultrasound and magnetic resonance imaging (MRI) scan data.

**Method and Materials**
We performed a prospective observational cross-sectional study with six blind pregnant women who performed 3D ultrasound and MRI exams to build 3D physical models for their fetuses. The MFA was assessed quantitatively by means a questionnaire of three questions, each one with a score ranging from 0 to 3. We considered MFA values > 7 to each pregnant woman. The descriptive data were expressed by mean ± standard deviation (SD). The pregnant women were included to this study after providing informed consent.

**Results**
The mean (±SD) maternal age was 32 ± 2.7 years. The mean gestational age at 3DUS and MRI exams were 23.1 ± 3.7 and 21.3 ± 0.9 weeks, respectively. The mean of gestational age at delivery was 36.5 ± 4.7 weeks and all of them were cesarean sections. The mean newborn weight was 2615.8 ± 871.9 g and the gender was 50% both female and male. The MFA was quantitatively observed in all pregnant women, with maximum value (9) in all of them.

**Conclusion**
The MFA was quantitatively observed in all blind pregnant women using 3D physical models.

**Clinical Relevance/Application**
The three-dimensional (3D) physical models from 3D ultrasound and magnetic resonance imaging (MRI) scan data were designed to
improve the maternal-fetal attachment (MFA) in blind pregnant women. The techniques described in this study can be applied at different stages of pregnancy and constitute an innovative contribution to research on fetal abnormalities. We believe that physical models will help in the tactile and interactive study of complex abnormalities in multiple disciplines. They may also be useful for prospective parents because a 3D physical model with the characteristics of the fetus should allow a more direct emotional connection to their unborn child.

**RC113-07  Perinatal Imaging of the Airway: Prenatal Imaging, with Postnatal Correlation, Including a Discussion of the EXIT (Ex-Utero-Intrapartum-Treatment) Procedure**

Sunday, Nov. 27 3:10PM - 3:30PM Room: S102AB

Participants
Carol E. Barnewolt, MD, Boston, MA (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**

1) Understand how to approach imaging of the fetal airway, using both sonography and MRI when pathology such as cervical teratomas, mediastinal masses, and tracheal atresia are expected to adversely affect airway development and function. 2) Learn how the imager can provide critical imaging support before, during, and after specialized deliveries, particularly the so-called EXIT (ex-utero-intra-partum treatment) delivery.

**ABSTRACT**
**RC129A  Role of MRI in Staging Endometrial and Cervical Cancer**

Participants
Andrea G. Rockall, MRCP, FRCR, London, United Kingdom (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**
To know the current indications for MRI in patients with cervix or endometrial cancer. To be familiar with the MRI protocol requirements for staging cervix or endometrial cancer. To recognize the stages of cervix and endometrial cancer on MRI. To be familiar with some common pitfalls when using MRI to stage uterine cancer.

**ABSTRACT**
1) To explain how to analyze an MR imaging for staging uterine cancer. 2) To develop how to use ADNEX MR SCORING system to classify adnexal masses. 3) To identify pitfalls in MR interpretation and avoid the false negative or false positive of the score. 4) To list the different step to make a good MR report.
Participants
Anne M. Kennedy, MD, Salt Lake City, UT (Presenter) Author with royalties, Reed Elsevier
Paula J. Woodward, MD, Salt Lake City, UT (Abstract Co-Author) Vice President, Reed Elsevier
Scott J. Parker, MD, Salt Lake City, UT (Abstract Co-Author)
Laura Lynch, MD, Salt Lake City, UT (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1) Analyze findings on obstetric imaging studies. 2) Develop differential diagnoses based on the clinical information and imaging findings. 3) Recognize the importance of accurate prenatal diagnosis on pregnancy management.

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/

Anne M. Kennedy, MD - 2016 Honored Educator
Hot Topic Session: Zika Virus: What the Radiologist Needs to Know

Monday, Nov. 28 7:15AM - 8:15AM Room: E450B

Participants
Richard L. Robertson, MD, Boston, MA (Moderator) Nothing to Disclose

LEARNING OBJECTIVES
1) To describe the Zika epidemic spread. 2) To illustrate the appearance of congenital Zika both prenatal and postnatal using ultrasound, MRI, and CT. 3) To discuss developments from the infectious disease perspectives, including vaccine development.

URL
http://pubs.rsna.org/doi/full/10.1148/radiol.2016161584

Sub-Events

SPSH21A Introduction: Why is Zika from an Imaging Perspective So Different from other Congenital Infections

Participants
Richard L. Robertson, MD, Boston, MA (Presenter) Nothing to Disclose

SPSH21B Facing the Zika Epidemic in Brazil: The Epidemiology and the Role of the Radiologist

Participants
Jacob Szejnfeld, MD, Sao Paulo, Brazil, (jacob.cura@gmail.com) (Presenter) Nothing to Disclose

Handout: Jacob Szejnfeld

SPSH21C Multidomality Prenatal Imaging Findings of Congenital Zika Infection

Participants
Patricia Oliveira-Szejnfeld, MD, Sao Paulo, Brazil, (patricia.fetal@gmail.com) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES

ABSTRACT

SPSH21D New Insights on Imaging and Pathological Correlations on Zika Infection

Participants
Fernanda Tovar-Moll, MD, PhD, Rio de Janeiro, Brazil (Presenter) Nothing to Disclose

SPSH21E Controlling Zika Virus: Update on Prevention Strategies and Vaccination

Participants
Andrew Hale, MD, Boston, MA (Presenter) Nothing to Disclose

SPSH21F Panel Discussion

Participants
Gynecologic Ultrasound (An Interactive Session)

Monday, Nov. 28 8:30AM - 10:00AM Room: E353B

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

Participants

Sub-Events

RC210A  Uterus and Endometrium

Participants
Ruth B. Goldstein, MD, San Francisco, CA (Presenter) Nothing to Disclose

LEARNING OBJECTIVES

1) Be able to state the acceptable standards for endometrial assessment in women with abnormal vaginal bleeding. 2) Be able to recognize a uterine abnormality in a postmenopausal woman that warrants further evaluation including tissue sampling or MRI. 3) Be able to recognize and diagnose adenomyosis.

RC210B  Ovarian Masses

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

LEARNING OBJECTIVES

1) To learn how to characterize ovarian cysts and determine whether they are benign or malignant. 2) To learn how to recognize the actual tissue diagnosis of an adnexal mass using ultrasound. 3) To learn to recognize non ovarian masses: hydrocele, peritoneal inclusion cysts, appendiceal mass, dilated ureter, rectal lesions etc. 4) To learn the importance of color Doppler as well as recent scoring systems to determine whether or not a mass is malignant.

ABSTRACT

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

URL

http://chamie.com.br/download
Fallopian Tube Catheterization (Hands-on)

Monday, Nov. 28 8:30AM - 10:00AM Room: E260

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, (thurmonds@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 catheterization 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 to use commercially available catheters and devices in plastic models for fallopian tube catheterization, and to speak directly to world experts about this exciting procedure.

Active Handout: Amy Suzanne Thurmond

SSC15

Radiation Oncology (Gynecologic)
Monday, Nov. 28 10:30AM - 12:00PM Room: S104A

Participants
Jerry J. Jaboin, MD, PhD, St. Louis, MO (Moderator) Nothing to Disclose
Tracy M. Sherertz, MD, San Francisco, CA (Moderator) Nothing to Disclose

Sub-Events

SSC15-01 Evaluation of Therapeutic Response to Concurrent Chemoradiotherapy in Patients With Advanced Cervical Squamous Carcinoma Using Dynamic Contrast-Enhanced MR Imaging

Participants
Yue Dong, Shen Yang, China (Presenter) Nothing to Disclose
Zao H. Zhang, Shen Yang, China (Abstract Co-Author) Nothing to Disclose
Shuai He, Shen Yang, China (Abstract Co-Author) Nothing to Disclose
Yahong Luo, Shenyang, China (Abstract Co-Author) Nothing to Disclose

PURPOSE
To investigate the changes of dynamic contrast-enhanced MR imaging (DCE-MRI) parameters in the patients with advanced cervical squamous carcinoma before and after concurrent chemo-radiotherapy (CCRT), and to correlate the parameters with final tumour response to therapy.

METHOD AND MATERIALS
Forty-five patients with advanced cervical squamous cancer underwent DW-MRI before CCRT (preTx), 4 weeks (postT1) after initiating treatment and at 1 month (postT2) after the end of treatment. DCE-MRI was obtained using a 3D fast field echo sequence in the axial plane (TR/TE 3.6/1.8 ms, flip angle 15°, acquisition time 5 min). Images were obtained immediately after a bolus injection of gadolinium DTPA (Magnevis, GE) at a rate of 3 ml/s. Pharmacokinetic analysis was performed according to extended tofts model, and the following quantitative parameters were calculated: volume transfer constant (Ktrans), rate constant (kep) and fraction of extravascular extracellular volume (Ve). DCE-MRI parameters were calculated in the tumour and normal myometrium. Final response to treatment as determined by changes in tumour size and volume was correlated with pre-treatment DCE-MRI parameters at each point.

RESULTS
Before therapy, the mean values of Ktrans, kep and Ve in the tumors were significantly lower than those in the myometrium (P<0.05). DCE-MRI parameters in the tumors showed significantly increased changes in response to CCRT (P<0.05) and in particular Ktrans and Ve demonstrated early significant increase (postT1) (P<0.01), but those in normal myometrium did not show a significant difference (P>0.05). Ktrans of the tumors at (preTx) was statistically associated with tumour size or volume change at postT1 and postT2. Changes of Ktrans and kep in tumor at postT1 had a significant correlation with tumor size and volume change at postT2.

CONCLUSION
DCE-MRI parameters may help evaluate early changes of cervical squamous cancer to CCRT.

CLINICAL RELEVANCE/APPLICATION
DCE-MRI parameters, as early biomarkers, have the potential to evaluate therapeutic responses to CCRT in advanced cervical squamous cancers.

SSC15-02 Prediction of Patient Outcome in Locally Advanced Cervical Carcinoma Following Chemo-radiation - Comparative Effectiveness of Qualitative Response Assessment Interpretation Criteria using MRI and 18F-FDG PET-CT

Participants
Andrew F. Scarsbrook, FRCR, Leeds, United Kingdom (Presenter) Nothing to Disclose
Sriram Vaidyanathan, MD, FRCR, Leeds, United Kingdom (Abstract Co-Author) Nothing to Disclose
Fahmid Chowdhury, MBBBS, FRCS, Leeds, United Kingdom (Abstract Co-Author) Nothing to Disclose
Sarah E. Swift, Leeds, United Kingdom (Abstract Co-Author) Nothing to Disclose
Rachel Cooper, Leeds, United Kingdom (Abstract Co-Author) Nothing to Disclose
Chirag Patel, FRCR, Oxford, United Kingdom (Abstract Co-Author) Nothing to Disclose

PURPOSE
Evaluation of a qualitative response assessment scoring system at MRI and 18F-FDG PET-CT following chemo-radiation for locally advanced cervical carcinomas and correlation with patient outcome.

METHOD AND MATERIALS
77 patients with locally advanced cervical carcinoma treated with radical chemo-radiotherapy (CRT) in a single center (2011-2014) underwent MRI and 18F-FDG PET-CT 3 months post therapy. Tumor response at MRI was assessed using a 3-point scale based on residual T2-weighted signal intensity. Metabolic response at PET-CT was assessed using a 5-point scale ranging from background activity to progressive metabolic disease. Clinical and radiologic follow-up was performed in all patients (minimum 18 months). Progression-free (PFS) and overall survival (OS) was calculated using the Kaplan-Meier method (Mantel-Cox log-rank) and groups responses were correlated using Chi2 test.

RESULTS

Of 77 patients with median (range) age of 45 (24-75) years, 39 (51%) had complete response (CR) on MRI (Score M1), 10 relapsed (26%). Of 29 with complete metabolic response (CMR, Score P1/2) on PET, 2 (7%) recurred. Of 21 patients with CR on MRI and PET-CT, 2 relapsed (10%). Of 32 patients (42%) with partial response (PR) at MRI (Score M2), 15 relapsed (47%). All 8 patients with M2 and negative PET-CT remained disease free at follow-up. Of 38 patients (49%) with indeterminate uptake on PET (Score P3/4), 19 relapsed (50%). Recurrence was lower in patients with M1 (6/15, 40%) compared to M2 (11/21, 52%). 5/6 patients (83%) with significant signal intensity at MRI (Score M3) relapsed. PET-CT demonstrated progressive disease (PD, Score P5) in 9 patients (12%). Kaplan-Meier demonstrated a highly statistically significant difference in PFS and OS between patients with CMR, indeterminate uptake, PMR and PD (Log-rank, P< 0.0001). Chi2 test demonstrated a highly statistically significant association between increasing qualitative score and risk of recurrence or death (P<0.001).

CONCLUSION

MRI and PET-CT provide complementary information post CRT in locally advanced cervical cancer. Qualitative scoring systems in this clinical scenario predict outcome and may help guide further patient management.

CLINICAL RELEVANCE/APPLICATION

In the era of precision medicine, objective MRI and PET-CT response assessment criteria may help guide an individualized approach to subsequent patient management in locally advanced cervical cancer.

SSC15-03 Concurrent Chemoradiotherapy Using Daily Low-Dose Cisplatin for Extrapelvic Lymph Node Recurrences after Curative Treatment for Cervical Cancer: Clinical Outcomes and in Vitro Study

Monday, Nov. 28 10:50AM - 11:00AM Room: S104A

Participants
Aki Kanazawa, Chiba, Japan (Presenter) Nothing to Disclose

ABSTRACT

Purpose/Objective(s): To investigate the clinical outcomes of radiotherapy for extrapelvic lymph node recurrences after curative treatment for cervical cancer and discuss the results of our in vitro study on the effectiveness of concurrent chemoradiotherapy.

Materials/Methods: A total of 20 patients, aged 29-75, who underwent radiotherapy for lymph node recurrence from 2002 and 2015 were included. The location of recurrence was para-aortic lymph node in 7, supraclavicular in 8, mediastinal in 1, supraventricular + mediastinal in 2, and supraclavicular + para-aortic in 2 patients. The histology was squamous cell carcinoma, adenocarcinoma, adenosquamous cell carcinoma in 12, 7, 1 patient. The median total radiation dose (EQD2) was 50 Gy. Thirteen patients received concurrent chemoradiotherapy with daily low-dose cisplatin (median 8 mg/m2 per day). In addition, in vitro study was conducted; HeLa-S3 cells after exposing radiation with different doses of cisplatin were cultured and 3H-thymidine uptake was measured. Results: Local responses immediately following radiotherapy were CR in 13 patients and PR in 3 (80%). Treatment was well tolerated, with no GI/mucosal toxicity, 35% grade 3-4 leukopenia, and 25% grade 3-4 thrombocytopenia. With median follow-up period of 17 months, the 2-year local control rate was 45% and the 3-year overall survival rate was 43%. Four patients are still alive without disease over 5 years. Recurrence was observed at the field margin in 3, in-field in 9, both in and out of field in 3 patients. Neither use of chemotherapy nor dose over 50 Gy affected overall survival. A shorter interval between initial treatment and first recurrence had marginal impact on patient's poor prognosis; patients with NED vs. others: 18 months vs. 6 months. In vitro study demonstrated that exposure to blood cisplatin levels of ≥2.5 mg/mL had a synergistic effect in the radiation and low-dose cisplatin. Conclusion: Radiotherapy for extrapelvic lymph node recurrences after curative treatment for cervical cancer could lead to long-term survival for some patients. In vitro study using HeLa-S3 cells supported the use of concurrent administration of low-dose cisplatin with radiation therapy.

SSC15-04 Metabolic Response on Post-treatment 18F-FDG PET/CT to Predict Local Control and Survival Outcomes in Vulvar Cancer

Monday, Nov. 28 11:00AM - 11:10AM Room: S104A

Awards
Trainee Research Prize - Medical Student

Participants
Common J. Hassanzadeh, Kansas City, MO (Presenter) Nothing to Disclose
Yuan J. Rao, MD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose

PURPOSE

To investigate the response to therapy for vulvar carcinoma using post-therapy imaging with F-18 fluorodeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) and compare the metabolic response to local regional control and survival outcomes.

METHOD AND MATERIALS

This was a retrospective study of 23 women with vulvar cancer. Radiation intent was definitive in 12 patients (52%), adjuvant radiation after surgery in 8 patients (35%), and neoadjuvant radiation prior to surgery in 3 patients (13%). All patients received intensity modulated radiation treatment to a mean dose of 55.6 Gy (range 49.6 to 70 Gy). Prior to any treatment, all patients received a staging FDG-PET/CT. Post-treatment whole body FDG-PET/CT was performed at 0.2 to 7 months (median 2.5 months) after completion of radiation therapy.

RESULTS

...
The post-treatment FDG-PET showed no evidence of disease (complete metabolic response) in 13 patients. Residual disease or progressive disease on FDG-PET was seen in 10 patients. A Cox proportional hazards model of clinical outcome indicated that post-treatment PET response was the most significant predictor of biopsy-proven local-regional control (HR = 8.89, 95% CI 1.8-43.9, \( p=0.01 \)) and overall survival (HR 9.16, 95% CI 1.05-79.6, \( p=0.045 \)) compared to other prognostic parameters. The 2-year local-regional control rate was 90% for patients with no evidence of disease vs. 22.5% for patients with residual or progressive disease on post-treatment PET. The 2-year overall survival was 100% for patients with no evidence of disease vs. 42.8% for patients with residual or progressive disease.

CONCLUSION

In this single-institution study of women with vulvar cancer, the post-treatment FDG response on whole-body FDG-PET/CT was predictive of local regional control and survival.

CLINICAL RELEVANCE/APPLICATION

Post-treatment 18F-FDG PET/CT may help physicians identify a subset of patients diagnosed with vulvar cancer at a higher risk of recurrence who may benefit from salvage therapy, such as surgery or radiation.

**SSC15-06** Pelvic Bone Marrow Sparing in Volumetric Modulated Arc Therapy Reduced the Hematologic Toxicity for Cervical Cancer

**Monday, Nov. 28 11:20AM - 11:30AM Room: S104A**

**Participants**
Yao Sun, Oak Brook, IL (Presenter) Nothing to Disclose
Zhiyong Yuan, Tianjin, China (Abstract Co-Author) Nothing to Disclose
Zhen tao, Tianjin, China (Abstract Co-Author) Nothing to Disclose

**ABSTRACT**

**Purpose/Objective(s):** To determine if bone marrow sparing (BMS) in volumetric modulated arc therapy (VMAT) reduce the hematologic toxicity compared with VMAT without BMS.

**Materials/Methods:** Two groups of 10+ patients with cervical cancer at our institution were enrolled respectively. All the patients received postoperative VMAT to 50.4Gy to the pelvic lymphatics and vagina. All plans were generated using our in-house-developed automatic inverse planning (AIP) algorithm. One group was treated with BMS-VMAT, while the other group was treated with VMAT without BMS. Planning objectives for PTV were minimum dose = 95%, maximum dose = 107%.

**Results:** The pelvic bone marrow (PBM) was limited to V5 t-test. The X2 test was used to compare rates of hematologic toxicity. Results: All the patients were clinical stage IA2-IIB. The median age was 54 years old. After radical hysterectomy, eleven patients were diagnosed to have lymphovascular space involvement (LVSI); 5 patients had primary tumor size larger than 4cm; 9 patients had more than a third of stromal invasion. No patients had positive lymph node, parametria or positive surgical margins. The two groups resulted in equivalent homogeneity (1.07±1.2% vs 1.10±3.1%; P=0.210) and conformity index (0.84±2.7% vs 0.82±1.2%; P=0.444). The PBM dose metrics showed a significant decrease in V5 (83.1±3.2% vs 89.0±4.8%; P=0.037) and V10 (74.8±6.1% vs 82.3±2.1%; P=0.008) in the BMS-VMAT group compared to the VMAT group.

**Conclusion:** BMS-VMAT reduced irradiation of PBM compared to VMAT without BMS, especially in the low dose radiation (V5 and V10). This analysis supports the hypothesis that low dose radiation of PBM is associated with acute HT during postoperative radiotherapy for cervical cancer. Techniques to limit pelvic bone marrow irradiation can reduce HT in cervical cancer patients.
CONCLUSION

This study demonstrated that NFkB-p65 have a significantly higher incidence of cytoplasmic versus nuclear expression. Cytoplasmic NFkB-p65 over-expression (H-index ≥180) was associated with a non-statistically significant trend towards poor clinical outcomes in locally advanced cervical cancer patients treated definitively with CRT.

CLINICAL RELEVANCE/APPLICATION

NFkB-p65 have a significantly higher incidence of cytoplasmic versus nuclear expression, and did not demonstrate significant association with treatment outcomes in locally advanced cervical cancer patients treated definitively with CRT.

ABSTRACT

Purpose/Objective(s): The optimal treatment modality for patients with high-risk endometrial cancers, including the sequencing of radiation and chemotherapy, is not yet well established. Here we report our experience of radiation “sandwiched” between 6 cycles of chemotherapy for patients with surgically staged high-risk endometrioid adenocarcinoma (EA). Materials/Methods: From April 2010 – June 2014, 27 patients with Stage IA-IVB histologically confirmed high-risk EA were treated with a combination of adjuvant sandwich chemoradiation. Inclusion criteria include patients with histologically documented EA defined by the following: IA Grade 3 with LVSI, IB G2 or IB G3, any surgical Stage II or Stage III disease, and any surgical Stage IV disease with no residual macroscopic tumor. Chemotherapy consisted of a combination of Carboplatin (AUC 6 pre-RT and AUC 5 post-RT) and Paclitaxel (175 mg/m2). Chemotherapy was administered every 21 days for 3 cycles, followed by a planned chemotherapy break during which external beam radiotherapy (EBRT) and 3 high dose rate (HDR) brachytherapy vaginal cylinder treatments were sequentially delivered. Chemotherapy was resumed after the completion of EBRT and typically overlapped with the HDR brachytherapy. Post-RT chemotherapy was administered for 3 cycles. EBRT consisted of 45 Gy to the pelvis utilizing IMRT, and extended field RT (EFRT), to include the para-aortic (PA) nodes, was used if 2 or more pelvic lymph nodes were involved or if there was PA disease. RTOG toxicity criteria were used to calculate the cumulative gastrointestinal (GI), genitourinary (GU), and hematologic toxicity. Results: Mean age of our cohort at diagnosis was 58 years. The median follow up was 25 months. 7 patients had Stage I disease (25%), 5 patients had Stage II disease (17.9%), 4 patients had Stage IIIA disease (14.3%), 6 patients had Stage IIIC1 disease (25%), 4 patients had Stage IIIC2 disease (14.3%) and 1 patient had Stage IVB disease (3.6%). There were no local or distant failures in our cohort. The rate of acute Grade 2 GI and GU toxicity was 10.7% and 0%, respectively. Acute grade 3 GI toxicity occurred in 1 patient (3.6%). The rate of late grade 3 GU or GI toxicity was 3.6% and 3.6%, respectively. The rate of acute grade 3 thrombocytopenia, anemia, and neutropenia were 7.1%, 3.6%, and 35.7%, respectively. 7.1% of patients required chemotherapy dose reduction and 17.9% of patients required cycle delay. Conclusion: In patients with high risk EA, adjuvant sandwich chemoradiation results in excellent loco-regional and distant control with acceptable toxicity.
Participants

Sub-Events

**OB106-ED-MOA1**

**3D/4D Translabial Ultrasound and Dynamic Magnetic Resonance Imaging of the Pelvic Floor: A Comprehensive Approach of the Normal Anatomy and Pelvic Floor Dysfunction**

Station #1

**Awards**

*Identified for RadioGraphics*

Participants

Luciana P. Chamie, MD, PhD, Sao Paulo, Brazil (Presenter) Nothing to Disclose
Duarte M. Ribeiro, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Angela H. Caiado, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Gisele Warmbrand, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Paulo C. Serafini, MD, PhD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose

**TEACHING POINTS**

To review the protocol and imaging algorithm of the 3D/4D translabial ultrasound and dynamic MRI of the pelvic floor
To review the normal anatomy of the pelvic floor through both methods
To demonstrate abnormal findings of the three compartments of the pelvis, such as cistocele, uterine prolapse, rectocele, enterocele, peritoneocele and pelvic floor descent, emphasizing advantages and limitations of each method

**TABLE OF CONTENTS/OUTLINE**

A. Clinical and epidemiological aspects of pelvic floor dysfunction
B. Pathophysiology
C. Diagnostic Imaging: 3D/4D translabial ultrasound of the pelvic floor - protocol and imaging findings
D. Dynamic pelvic MRI - protocol and imaging findings with emphasis on the importance of the evacuatory phase
G. Normal anatomy
H. Abnormal findings: cistocele, uterine prolapse, rectocele, enterocele, peritoneocele and pelvic floor descent
I. Pitfalls and limitations of each method
J. Summary

**OB142-ED-MOA2**

**MRI of Malignant Neoplasms of the Uterine Corpus and Cervix: Staging, Treatment Planning, and Follow-up. How to Make it Easy**

Station #2

Participants

Fatima Matute Teresa, MD, Madrid, Spain (Presenter) Nothing to Disclose
Mercedes Ruiz Tolon, madrid, Spain (Abstract Co-Author) Nothing to Disclose

**TEACHING POINTS**

A. To demonstrate diagnostic strategy of malignant neoplasms of the uterine corpus and cervix by using MRI techniques
B. Learn how to interpret the MRI findings
C. Review the limitations and potential pitfalls of MRI in the malignant neoplasms of the uterine corpus and cervix
D. To provide an educational and pictorial review of the MRI findings of malignant neoplasms of the uterine corpus and cervix

**TABLE OF CONTENTS/OUTLINE**

A. Normal anatomy
B. Imaging technique, MR pulse sequences
C. Diagnostic checklist
D. Staging
E. Lymphadenopathy evaluation
F. Treatment planning
G. Follow-up
H. Outcomes (include complications)
I. Limitations and potential pitfalls of MRI
J. Final recommendations
Lunch & Learn: Transitioning to DR, Clinical and Financial Benefits Beyond Preventing Reimbursement Penalties: Supported by Fujifilm (invite-only)

Monday, Nov. 28 12:30PM - 1:30PM Room: S403B

Participants

PARTICIPANTS

Jerry Thomas, MS, FAAPM, DABR, CHP, DABSNM Wichita, KS
William Tobin BS, Tyler, TX

PROGRAM INFORMATION

This course does not offer CME credit.
**Atypical Sites of Deeply Infiltrative Endometriosis: Clinical Characteristics and Imaging Findings**

**TEACHING POINTS**

The purpose of this exhibit is: 1. To demonstrate atypical sites of deeply infiltrative endometriosis such as small bowel, lungs, pleura, diaphragm, pelvic nerves, pelvic floor, umbilicus, abdominal wall incisions and episiotomy scars. 2. To discuss the pathogenesis, clinical suspicion and imaging characteristics of each atypical site. 3. To explain the utility and importance of imaging methods in the diagnosis and clinical counseling.

**TABLE OF CONTENTS/OUTLINE**

- Possible mechanisms and pathogenesis of atypical endometriotic sites
- Relationship between atypical sites and pelvic disease
- Clinical presentation
- Demonstration of imaging findings – US, CT and MRI with surgical correlation
- Discuss the imaging role and therapeutic options
- Summary

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**The Pathways and Risk of Lymphatic Metastasis in Female Genital Pelvic Malignancies**

**TEACHING POINTS**

Lymph node status is an important factor for making treatment strategy and estimation of prognosis in addition to the FIGO stage in female pelvic cancers. Recognizing the lymphatic pathways and risk factors of metastasis in each tumor will facilitate to depict the nodal metastases and lead to successful surgery. These knowledge will teach where diagnostic radiologists should attend the image of CT or MRI and also important to discuss with gynecological oncologists.

**TABLE OF CONTENTS/OUTLINE**

1. Normal anatomy
   - Normal lymph node groups
   - Normal lymphatic pathways
2. Female pelvic malignancies: cervical cancer, endometrial cancer and ovarian cancers
3. Risk factors of nodal metastasis in each disease

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Participants:

- **Luciana P. Chamie, MD, PhD, Sao Paulo, Brazil (Presenter) Nothing to Disclose**
- **Duarte M. Ribeiro, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose**
- **Dario A. Tiferes, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose**
- **Augusto C. Macedo Neto, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose**
- **Paulo C. Serafini, MD, PhD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose**

- **Yusaku Moribata, MD, Kyoto, Japan (Presenter) Nothing to Disclose**
- **Aki Kido, MD, Kyoto, Japan (Abstract Co-Author) Nothing to Disclose**
- **Fuki Shitano, MD,PhD, New York, NY (Abstract Co-Author) Nothing to Disclose**
- **Kayo Kiguchi, Kyoto, Japan (Abstract Co-Author) Nothing to Disclose**
- **Yasuhisa Kurata, Kyoto, Japan (Abstract Co-Author) Nothing to Disclose**
- **Kyoko Kameyama, Kyoto, Japan (Abstract Co-Author) Nothing to Disclose**
- **Noriomi Matsumura, Kyoto, Japan (Abstract Co-Author) Nothing to Disclose**
- **Kaori Togashi, MD, PhD, Kyoto, Japan (Abstract Co-Author) Research Grant, Bayer AG Research Grant, DAIICHI SANKYO Group Research Grant, Eisai Co, Ltd Research Grant, FUJIFILM Holdings Corporation Research Grant, Nihon Medi-Physics Co, Ltd Research Grant, Shimadzu Corporation Research Grant, Toshiba Corporation Research Grant, Covidien AG**

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**Station #1**

**Identified for RadioGraphics**

**Station #2**
Participants
Anne M. Kennedy, MD, Salt Lake City, UT (Presenter) Author with royalties, Reed Elsevier
Paula J. Woodward, MD, Salt Lake City, UT (Abstract Co-Author) Vice President, Reed Elsevier
Scott J. Parker, MD, Salt Lake City, UT (Abstract Co-Author)
Brett Einerson, MD, MPH, Salt Lake City, UT (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1) Analyze findings on obstetric imaging studies. 2) Develop differential diagnoses based on the clinical information and imaging findings. 3) Recognize the importance of accurate prenatal diagnosis on pregnancy management.

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/

Anne M. Kennedy, MD - 2016 Honored Educator
**First Trimester Ultrasound**

**Tuesday, Nov. 29 8:30AM - 10:00AM Room: S402AB**

**GU OB US**

*AMA PRA Category 1 Credit™: 1.50*

*ARRT Category A+ Credits: 1.50*

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### Participants

**Active Handout:** Carol Beer Benson


**Sub-Events**

**RC310A  Ectopic Pregnancy**

**Participants**

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

**LEARNING OBJECTIVES**

1) More accurately diagnose tubal ectopic pregnancies. 2) Diagnose unusual ectopic pregnancies, including cervical and interstitial pregnancies. 3) Distinguish early intrauterine pregnancy from ectopic pregnancy.

**ABSTRACT**

**Active Handout:** Peter Michael Doubilet


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**RC310B  Diagnosis of Failed Pregnancy**

**Participants**

Mindy M. Horrow, MD, Philadelphia, PA, (horrowm@einstein.edu) (Presenter) Spouse, Employee, Merck & Co, Inc

**LEARNING OBJECTIVES**

1) Review normal embryonic development in the first trimester. 2) Describe issues related to safe interpretation of first trimester pregnancy including definitely normal, definitely abnormal and indeterminate findings that require follow up. 3) List criteria that are diagnostic for pregnancy failure and distinguish from those that are suspicious for pregnancy failure.

**ABSTRACT**

**Honored Educators**

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

Mindy M. Horrow, MD - 2013 Honored Educator

Mindy M. Horrow, MD - 2016 Honored Educator

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**RC310C  Mid-late First Trimester**

**Participants**

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

**LEARNING OBJECTIVES**

1) Recognize the importance of evaluating the developing fetal head during the late first trimester for early detection of large neural tube defects. 2) Incorporate measurement of the nuchal translucency into their assessment of the fetuses of gestational age 11-14 weeks. 3) Recognize sonographic abnormalities of the ventral wall to distinguish normal physiologic bowel herniation from defects including omphalocele and gastroschisis.

**ABSTRACT**

This lecture will discuss the sonographic appearance of fetal anatomy in the latter part of the third trimester in order to help participants recognize abnormalities of the fetus at this early gestational age. While many anomalies cannot be detected until later in pregnancy, the discussion will focus on those anomalies that can be detected in the first trimester. Specific topics covered will be central nervous system anomalies, including anencephaly, encephalocele and holoprosencephaly, ventral wall defects including omphalocele and gastroschisis, bladder outlet obstruction, and skeletal anomalies including skeletal dysplasias. Detection of anomalies early in gestation, before the second trimester, permits time to assess the fetus for other anomalies, syndromes, and aneuploidy.
The Safety of Magnetic Resonance Imaging during Pregnancy

TEACHING POINTS

MRI is an excellent diagnostic tool which may be utilized to evaluate maternal and/or fetal conditions during pregnancy. There is currently no evidence that MRI causes fetal harm, but a clear consensus on the safety of MRI during pregnancy is also not forthcoming. The proposed risks inherent in MRI are very different from computed tomography. A thorough understanding of these risks allows the radiologists to minimize risk as appropriate to the clinical situation. The current research has failed to show detriment to the fetus using a 1.5 Tesla magnet. More research is warranted to determine the safety profile for 3.0 Tesla magnets and studies with maternal intravenous Gadolinium.

TABLE OF CONTENTS/OUTLINE

- 3 main components of MRI including potential hazards & current safety research: Static Magnetic Field Time-Varying Magnetic Gradient Fields Pulse Radio Frequency Fields Fetal Diagnostic Applications Maternal Diagnostic Applications Pregnant MRI Workers: Safety and Recommendations Recommendations: Trimester Magnet Strength Sequences Intravenous contrast Areas for Future Research

First Experience of 18F- FDG PET/ MR Imaging for Whole Body Staging of Women with Gynecologic Malignancies: A Pictorial Essay

TEACHING POINTS

Clinical 18F- FDG PET/MRI is becoming a superior alternative to PET/CT in the initial evaluation of women with pelvic malignancies. Indeed it allows a local anatomic evaluation of pelvic cancers with a superior soft tissue contrast, and a functional evaluation combining MRI and PET with less patient radiation compared to PET/CT. But this technique has to be finely tuned to avoid technical problems. The aim of this exhibit is to: 1) present Imaging protocols of PET/MRI in gynecologic malignancies used in our institution and the specific technical problems induced by this technology. 2) describe the aspects of endometrial, cervical and ovarian cancers in 18F-FDG PET/MRI, and the pitfalls that can be encountered with this technique.

TABLE OF CONTENTS/OUTLINE

- Patient preparation
- Imaging PET/MRI protocols in the evaluation of endometrial, cervical and advanced ovarian cancers.
- Patterns of endometrial, cervical and advanced ovarian cancers in 18 F-FDG PET/MRI.
- Pitfalls
Participants

Sub-Events

**OB107-ED-TUB1**

**Review of Common Fetal Neural Tube Defects and Central Nervous System (CNS) Anomalies**

Station #1

Participants

Sarah R. Ceglar, MD, Los Angeles, CA (Presenter) Nothing to Disclose
Kristina E. Hoque, MD, PhD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Daphne K. Walker, MD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is: (1) Schematic review of CNS embryology and developmental anatomy
(2) Imaging and review of common neural tube defects and CNS anomalies
(3) Presentation of select cases from our institution

**TABLE OF CONTENTS/OUTLINE**

Introduction Schematic review of normal CNS embryology and developmental anatomy Imaging of the fetal CNS Ultrasound (US) First trimester Second trimester screening Maternal Fetal Medicine Neurosonogram Adjunct imaging 3D ultrasound Volumetric analysis of intracranial structures Fetal MRI Virtual autopsy: post mortem fetal brain MRI Review of common neural tube defects and CNS anomalies Head: Chiari II malformation, ventriculomegaly, anencephaly, encephalocele, Dandy-Walker malformation, holoprosencephaly, etc. Spine: spina bifida, vertebral anomalies, etc. Presentation of select cases from our institution Review of in utero interventions: myelomeningocele repair, ventriculoamniotic shunting, etc.

**OB157-ED-TUB2**

**Functional MR Imaging in Gynecologic Malignancies: Current Status and Future Perspectives**

Station #2

Participants

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

**TEACHING POINTS**

The major teaching points of this exhibit are: 1. Functional MR imaging techniques play an important role in detection, characterization, staging, treatment response, and outcome prediction, as well as providing conventional morphologic imaging. 2. Familiarity with the characteristics and imaging features of functional MR imaging in gynecologic malignancies will facilitate prompt and accurate diagnosis and treatment.

**TABLE OF CONTENTS/OUTLINE**

Participants
Anne M. Kennedy, MD, Salt Lake City, UT (Presenter) Author with royalties, Reed Elsevier
Paula J. Woodward, MD, Salt Lake City, UT (Abstract Co-Author) Vice President, Reed Elsevier
Scott J. Parker, MD, Salt Lake City, UT (Abstract Co-Author)

TEACHING POINTS
1) Analyze findings on obstetric imaging studies. 2) Develop differential diagnoses based on the clinical information and imaging findings. 3) Recognize the importance of accurate prenatal diagnosis on pregnancy management.

Honored Educators
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Anne M. Kennedy, MD - 2016 Honored Educator
**OB161-ED-WEA**

'How to Sort through This Mess?' Role of MRI in Managing Post-operative Patients with Sling and Mesh

Station #1

Participants

Gitanjali Bajaj, MBBS, Little Rock, AR (Abstract Co-Author) Nothing to Disclose
Tarun Pandey, MD, FRCR, Little Rock, AR (Abstract Co-Author) Nothing to Disclose
Kedar Jambhekar, MD, Little Rock, AR (Abstract Co-Author) Nothing to Disclose
Roopa Ram, MD, Little Rock, AR (Presenter) Nothing to Disclose

TEACHING POINTS

1. Discuss various surgical techniques for management of patients with stress urinary incontinence and pelvic organ prolapse, two common conditions in the spectrum of pelvic floor dysfunction
2. Discuss role of imaging in evaluating and managing complicated post operative patients with sling/mesh with emphasis on high resolution pelvic MRI
3. Discuss evolving role of newer techniques such as MR neurography in diagnosing post operative patients with chronic pelvic pain

TABLE OF CONTENTS/OUTLINE

1. Schematics showing various surgical approaches used to treat stress incontinence and pelvic organ prolapse
2. MRI appearances of normal and abnormal sling and mesh
3. Case based examples to show how MRI changed management of complicated post operative patients.
4. MR neurography technique and examples showing nerve entrapment
5. Reporting template for mesh and sling

**OB004-EB-WEA**

Finding the Fetus: A Multimodality Overview of the Ectopic Pregnancy Spectrum, Mimickers and Clinical Management

Participants

Stephen Herrmann, MD, Galveston, TX (Presenter) Nothing to Disclose
Eric Bih, MD, Sugar Land, TX (Abstract Co-Author) Nothing to Disclose
Sara M. Ortiz-Romero, MD, Galveston, TX (Abstract Co-Author) Nothing to Disclose
Mary S. Guirguis, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Rami Eldaya, MD, Galveston, TX (Abstract Co-Author) Nothing to Disclose
Devin M. DeVito, MD, Galveston, TX (Abstract Co-Author) Nothing to Disclose
Samuel Gatzeit, MD, Galveston, TX (Abstract Co-Author) Nothing to Disclose
Eduardo J. Matta, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Kimberly S. Kirschner, MD, Galveston, TX (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

- Anatomical review of normal uterine, endometrial and placenta utilizing: cartoons, magnetic resonance imaging (MRI) and ultrasound (US).
- Provide a summary table for pathophysiology, diagnostic criteria, imaging findings, and common clinical complications.
- Provide radiological imaging of ectopic pregnancies in multiple modalities including MRI, and US.
- Presentation of multiple cases of pathology mimicking various ectopic pregnancies and tips to make the correct diagnosis.

TABLE OF CONTENTS/OUTLINE

We will present a pictorial essay of the imaging features of ectopic pregnancies, using a location-specific approach.

1) Patient demographics and clinical presentation of ectopic pregnancies.
2) MRI, US and cartoon representation of ectopic pregnancies.
3) Ectopic pregnancy mimickers and strategies for when follow up or further imaging should be obtained.
4) Important imaging features that must be reported to aid the clinicians to aid in making the appropriate treatment strategy.
5) Clinical management of patients with ectopic pregnancies.
Participants

Sub-Events

**OB116-ED-WEB1**  
Fetal GI Tract Atresias - From Esophagus to Anus

Station #1

Awards
Cum Laude

Participants
Thomas Gibson, MD, Portland, OR (*Presenter*)  
Nothing to Disclose

Kyle Jensen, MD, Portland, OR (*Abstract Co-Author*)  
Nothing to Disclose

Neda Jafarian, MD, Portland, OR (*Abstract Co-Author*)  
Nothing to Disclose

Roya Sohaey, MD, Portland, OR (*Abstract Co-Author*)  
Nothing to Disclose

Karen Y. Oh, MD, Portland, OR (*Abstract Co-Author*)  
Nothing to Disclose

TEACHING POINTS

1. Gastrointestinal (GI) tract anomalies can be difficult to diagnose in utero, with detection rate around 34%.  
2. Accurate diagnosis can herald unsuspected syndromic or chromosomal abnormalities, which affects pregnancy counseling, expectations, and outcomes.  
3. Embryologic GI tract development is one key to understanding each site of atresia.  
4. Ultrasound is the standard for obstetric imaging and can provide clues to the site of atresia.  
5. Fetal MR can be a helpful adjunct modality to facilitate diagnosis.

**TABLE OF CONTENTS/OUTLINE**

1. Embryologic development of the GI tract  
2. Imaging findings seen with esophageal, duodenal, jejunal, ileal, colonic, and anal atresias  
3. Presentation of antenatal cases with postnatal imaging correlation and outcomes  
4. Summary of key differentiating imaging features

**OB167-ED-WEB2**  
Algorithmic Approach to Evaluation of Sonographically Indeterminate Adnexal Masses Using Multi-Parametric MRI

Station #2

Awards
Cum Laude

Participants
Fuki Shitano, MD, PhD, New York, NY (*Presenter*)  
Nothing to Disclose

Stephanie Nougaret, MD, Montpellier, France (*Abstract Co-Author*)  
Nothing to Disclose

Shinya Fujii, MD, Yonago, Japan (*Abstract Co-Author*)  
Nothing to Disclose

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

Hebert Alberto Vargas, MD, New York, NY (*Abstract Co-Author*)  
Nothing to Disclose

Hedvig Hricak, MD, PhD, New York, NY (*Abstract Co-Author*)  
Nothing to Disclose

Evis Sala, MD, PhD, New York, NY (*Abstract Co-Author*)  
Nothing to Disclose

Yuliya Lakhman, MD, New York, NY (*Abstract Co-Author*)  
Nothing to Disclose

TEACHING POINTS

Evaluation of sonographically indeterminate adnexal masses is a common indication for MRI. Majority of indeterminate masses are benign and their definitive characterization avoids unnecessary surgery or imaging follow-up which minimizes healthcare costs and patients' anxiety. Small proportion of indeterminate adnexal masses is malignant and their prompt evaluation with MRI ensures timely diagnosis and management. We present a step-by-step schema for the characterization of adnexal masses with multi-parametric MRI. This approach relies on clinical data and MRI features: signal intensity and morphology on conventional T1-weighted and T2-weighted imaging (T1WI, T2WI), diffusion and enhancement characteristics on multi-parametric imaging. **Teaching Points:** Highlight tailored MRI protocol for the evaluation of adnexal masses Demonstrate a step-by-step approach for the characterization of adnexal masses using clinical information and multi-parametric MRI

**TABLE OF CONTENTS/OUTLINE**

Tailored MRI protocol Detection and normal appearance of the ovaries Identification of mass origin Signal characteristics and morphology on T1WI and T2WI T1 hyperintense masses T2 solid masses T2 complex cystic or cystic-solid masses Value of multi-parametric MRI Diffusion-weighted imaging Dynamic contrast-enhanced imaging

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Stephanie Nougaret, MD - 2013 Honored Educator  
Christine O. Menias, MD - 2013 Honored Educator
SSM10

Genitourinary (Benign Gynecological Disease)

Wednesday, Nov. 30 3:00PM - 4:00PM Room: E351

Participants
Julia R. Fielding, MD, Dallas, TX (Moderator) Nothing to Disclose
Raj M. Paspulati, MD, Cleveland, OH (Moderator) Nothing to Disclose

Sub-Events

SSM10-01  Colorectal Endometriosis: Indication to Bowel Resection Based on Pelvic MR Findings in A Single Center

Wednesday, Nov. 30 3:00PM - 3:10PM Room: E351

Participants
Arnaldo Scardapane, Bari, Italy (Presenter) Nothing to Disclose
Filomena Lorusso, Castellana Grotte, Italy (Abstract Co-Author) Nothing to Disclose
Amato Antonio Stabile Ianora, Bari, Italy (Abstract Co-Author) Nothing to Disclose
Stefano Bettocchi, Bari, Italy (Abstract Co-Author) Nothing to Disclose
Giuseppe Angelelli, Bari, Italy (Abstract Co-Author) Nothing to Disclose

PURPOSE

to establish the role of MRI in predicting the need and the type of surgery in patients with colorectal endometriosis

METHOD AND MATERIALS

The MR Images of 195 patients operated for pelvic endometriosis were reviewed in consensus by two experienced radiologists. All MR scans were acquired with a 1.5 T scanner and a phased array coil. A standard high resolution pelvic MR was performed in all patients consisting in a standard High resolution pelvic MRI protocol (T2w TSE sequences in the axial, sagittal and coronal plane and in T1w and THRIVE sequences in the axial plane) completed by MR- Colonography (MR-C) in all the cases. The presence of endometriotic pelvic lesions was annotated. Intestinal lesion were measured in short and long axis and the grade of stenosis was established on MR-C. A multivariate logistic regression was used to establish the predictors of intestinal resection in the laparoscopic procedure, while one way ANOVA was used to compare nodules resected with different techniques (shaving, discoid or segmental resection).

RESULTS

56/195 (29%) patients received an intestinal resection, namely 20/56 received a discoid resection and 36/56 segmental resection). Multivariate logistic regression demonstrated a predictive value of nodular short axis (OR=2.29 (1.21-4.35); p=0.011) and the degree of stenosis (OR=1.20 (1.06-1.35); p=0.03). ROC analysis demonstrated an AUC of 0.98 for the "short axis" and 0.97 for the parameter "stenosis". Using a cut off value of 11 mm of short axis and 30% of stenosis sensitivity and specificity values were respectively 93%-98% and 94%-98%. ANOVA analysis showed significantly higher values of Short axis, long Axis and Stenosis for patients receiving segmental resection vs discoid resection vs adhesiolysis and rectal shaving.

CONCLUSION

The presence of an endometriotic rectal nodule > 11 mm in short axis causing a luminal stenosis > 30% in pelvic MRI reliably predict the need of a rectal resection. Nodule size differs significantly in women receiving different type of resection.

CLINICAL RELEVANCE/APPLICATION

MRI is a non invasive method that can predict the need and the type of bowel resection in patients with colorectal endometriosis.

SSM10-02  Society of Radiologists in Ultrasound (SRU) Guidelines for Adnexal Cysts: Adherence and Practical Challenges

Wednesday, Nov. 30 3:10PM - 3:20PM Room: E351

Participants
Katherine E. Maturen, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Alexander D. Blaty, BS, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Ashish P. Wasnik, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Krupa K. Patel-Lippmann, MD, Durham, NC (Abstract Co-Author) Nothing to Disclose
Jessica B. Robbins, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Sarah L. Averill, MD, Iowa City, IA (Abstract Co-Author) Nothing to Disclose
Elizabeth B. Maddox, Madison, WI (Abstract Co-Author) Nothing to Disclose
Laurie Huffman, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Lisa Barroilhet, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Elizabeth A. Sadowski, MD, Madison, WI (Presenter) Nothing to Disclose

PURPOSE

In 2010, the Society of Radiologists in Ultrasound (SRU) published a consensus statement directing management of asymptomatic adnexal cysts. The purpose of this study is to evaluate radiologists' subsequent adherence to the guidelines for a large group of cysts with known outcomes.
METHOD AND MATERIALS

IRB-approved retrospective multi-institutional study evaluated ultrasound (US) imaging features, dictated recommendations, and clinical outcomes of consecutive adnexal cysts from Jan-Jun 2011. Dictated reports were categorized according to specific recommendation when articulated, or via subjective assessment of the degree of concern expressed in the report language. Images were reviewed and SRU rating retrospectively assigned.

RESULTS

Images and reports were analyzed for 556 cysts. Specific recommendations were made in dictated reports for 349 (62.8%) cysts: 64 no followup (11.5%), 231 US (41.5%), 27 MRI (4.9%) and 27 surgical evaluation (4.9%). The overall correlation between dictated report and SRU approach was weak (Pearson’s R=0.34 [95% CI 0.26-0.41] p <.0001). In total, SRU and original dictations concurred on management in 245 (44%) cysts. Original reports underrecommended followup in 152 (27.3%) cysts and overrecommended followup in 159 (28.7%) cysts. If recommendations are binarized into “no followup” and “any followup”, Sn, Sp, PPV and NPV for neoplasm were 80.4%, 37.1%, 20.2% and 90.5% for the original reports and 96.7%, 54.7%, 29.8% and 98.8% for the SRU rating. In logistic regression, both recommendation types were predictors of neoplasm but a one unit increase in SRU rating conferred a higher odds ratio (SRU OR 2.59 [95% CI 2.06;3.27], p<.0001 vs. original dictation OR 1.59 [95% CI 1.15,2.22], p=.005).

CONCLUSION

Adherence to SRU management guidelines for adnexal cysts was 44% in originally dictated reports. Original dictations recommended followup for fewer neoplasms and more physiologic cysts, and were overall less predictive of neoplasm than the retrospectively applied SRU approach.

CLINICAL RELEVANCE/APPLICATION

The 2010 Society of Radiologists in Ultrasound (SRU) guidelines for management of adnexal cysts provide a framework for clear management recommendations and are more predictive of neoplasm than an unstructured approach.

Honored Educators

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Katherine E. Maturen, MD - 2014 Honored Educator

SSM10-03 Uterine Adenomyosis: Development of an US and MRI Based Scoring System While Comparing the Diagnostic Accuracy of Two Modalities

Wednesday, Nov. 30 3:20PM - 3:30PM Room: E351

Participants

Anil Chauhan, MD, Philadelphia, PA (Presenter) Nothing to Disclose
William A. Shaffer, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Lisa P. Jones, MD, PhD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Jill E. Langer, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Steven C. Horii, MD, Philadelphia, PA (Abstract Co-Author) Spouse, Employee, Cerner Corporation
Lisa P. Jones, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Hanna M. Zafar, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

PURPOSE

Major studies defining US and MRI criteria for diagnosing uterine adenomyosis have been published more than a decade ago. Imaging technology, indications of imaging and clinical management of uterine symptomatology has overwhelmingly changed since then and this warrants a re-assessment of diagnostic accuracy of US and MRI in diagnosing adenomyosis. The purpose of this study was: 1) To compare the accuracy of US and MRI for the diagnosis of adenomyosis; and 2) To develop US and MRI based scoring systems for diagnosis of adenomyosis.

METHOD AND MATERIALS

We retrospectively identified 76 patients who have had hysterectomy along with pre-operative US and MRI exams. Cases with no transvaginal exam, and mass lesions involving more than half of the uterus were excluded. The imaging exams were interpreted blindly by experienced radiologists. Multiple imaging features were recorded along with confidence level of radiologist for interpreting these exams. Nine US and 10 MRI features were given scores of one each in pursuit of developing a scoring system.

RESULTS

Adenomyosis was present in 42 out of 76 (55%) patients on pathology. The sensitivity, specificity, positive predictive value and negative predictive value of US were 86%, 56%, 71%, and 76%, respectively. Similar values for MRI were 69%, 71%, 74%, and 65%. Maximum Junctional Zone thickness and presence of subendometrial/myometral T2 hyperintensities on MRI demonstrated higher sensitivity/specificity than US. Moderate/Severe heterogeneity, linear striations, hyperechoic foci, and echogenic islands within the myometrium led to sensitivity and specificity of 88% and 56%. US score of >3 and >6 led to Sensitivity/Specificity of 67%/67% and 38%/85%, respectively. MRI score of >2 and >4 led to Sensitivity/Specificity of 57%/85% and 43%/91%, respectively. Thirty out of 76 (40%) cases had US-MRI discordance, with US being more correct (12 vs 5) in presence of disease and MRI being more correct (9 vs 4) in absence of disease.

CONCLUSION

Although both US and MRI have inherent limitations for diagnosing adenomyosis, adding scoring system can potentially improve specificity of the imaging diagnosis.
**CLINICAL RELEVANCE/APPLICATION**

Adenomyosis is highly prevalent in symptomatic female patient and imaging has potential limitations in its diagnosis. Therefore, a scoring system based on common imaging features may add value in improving specificity of adenomyosis diagnosis by imaging.

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Evan S. Siegelman, MD - 2013 Honored Educator

**SSM10-04 Monitoring Leiomyoma Response to Uterine Artery Embolization Using Diffusion and Perfusion Indices from Diffusion-Weighted Imaging**

Wednesday, Nov. 30 3:30PM - 3:40PM Room: E351

Participants

Mengjiao Cao, Shanghai, China (Presenter) Nothing to Disclose
Shiteng Suo, Shanghai, China (Abstract Co-Author) Nothing to Disclose
Yan Zhou, PhD, shanghai, China (Abstract Co-Author) Nothing to Disclose
Xuebin Zhang, Shanghai, China (Abstract Co-Author) Nothing to Disclose
Jianrong Xu, Shanghai, China (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

To investigate the potential of diffusion and perfusion indices (ADC and perfusion fraction \( f \)) from DWI at 3.0 T in monitoring treatment response to uterine artery embolization (UAE) at 6-month follow-up.

**METHOD AND MATERIALS**

Twelve female patients (median age, 42 years; range, 24–56 years) with symptomatic uterine fibroids who underwent pelvic MRI and DWI before and 6 months after UAE were included. 3.0-T DWI was acquired by using b-values of 0 and 1000 s/mm\(^2\) for ADC calculation, and 0~1200 s/mm\(^2\) for perfusion fraction \( f \) calculation. The Wilcoxon signed-rank test and Spearman rank correlation test were used for statistics.

**RESULTS**

All patients underwent successful UAE procedures with a relief of symptoms, reduced fibroid volume and complete infarction at follow-up MRI. A total of 17 fibroids were studied. The median ADCs showed a statistically significant increase from 1.20×10\(^{-3}\) mm\(^2\)/s (range, 0.86–1.66×10\(^{-3}\) mm\(^2\)/s) at baseline to 1.56×10\(^{-3}\) mm\(^2\)/s (range, 1.00–1.86×10\(^{-3}\) mm\(^2\)/s) at 6-month follow-up (\( P = 0.0003 \)). Conversely, the median perfusion fraction \( f \) was significantly decreased after UAE (\( P = 0.0001 \)), with a median pre-UAE value of 14.2% (range, 6.7%–17.6%) and a median post-UAE value of 9.2% (range, 3.2%–14.6%). Significant correlations were found between fibroid volume reduction rate and percentage changes in ADC and perfusion fraction \( f \) at 6-month follow-up relative to baseline, with \( \rho \) values of -0.50 (\( P = 0.04 \)) and 0.55 (\( P = 0.02 \)), respectively.

**CONCLUSION**

ADC and perfusion fraction \( f \) obtained from DWI at 3.0 T may help to evaluate treatment response to UAE.

**CLINICAL RELEVANCE/APPLICATION**

DWI-derived diffusion and perfusion indices (ADC and perfusion fraction \( f \)) may facilitate the quantitative assessment of treatment response to UAE at 6-month follow-up.

**SSM10-05 The Predictive Value of Quantitative DCE Metrics for Immediate Therapeutic Response of High-Intensity Focused Ultrasound Ablation of Symptomatic Uterine Fibroids**

Wednesday, Nov. 30 3:40PM - 3:50PM Room: E351

Participants

Chao Wei, HeFei, China (Presenter) Nothing to Disclose
Jiang Ning Dong, HeFei, China (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

To investigate the value of quantitative dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) parameters in the prediction of the immediate therapeutic response of high-intensity focused ultrasound (HIFU) therapy in the treatment of symptomatic uterine fibroids.

**METHOD AND MATERIALS**

A total of 78 symptomatic uterine fibroids (diameter: 3.0 cm-9.3 cm) in 65 female patients were treated with MR-HIFU therapy. All patients underwent conventional and DCE MRI scan in 3 days before and after HIFU treatment. Permeability parameters \( \text{Ktrans}, \text{Kep}, \text{Ve}, \text{Vp} \), and T1 perfusion parameters \( \text{BF}, \text{BV} \) of Pretreatment were measured as a baseline; and immediate non-perfused volume ratio (NPVR) was used as an immediate ablation efficiency. Dates were assigned to NPVR >70 % and NPVR <70 % group. Then the differences of DCE-MRI parameters between the previous group and the correlations between the DCE-MRI parameters and NPVR were analyzed retrospectively. The ROC curve analyses were performed to study the predictive performance of different parameters for ablation efficacy.

**RESULTS**

(1) It was observed that the pretreatment \( \text{Ktrans}, \text{Kep}, \text{Ve}, \text{BF} \) values of the NPVR >70 % group was significantly lower than the NPVR <70 % group(\( p<0.05 \)). (2) The immediate NPVR was negatively correlated with the \( \text{Ktrans}, \text{BF} \) values before HIFU treatment (\( r = -0.561, -0.712 \) and -0.528, respectively; \( p<0.05 \) for all). (3)The AUC of pretreatment \( \text{Ktrans}, \text{BF} \) values used to
predict the immediate NPVR were 0.810, 0.909, 0.795 respectively \((p<0.05 \text{ for all})\). At the cut-off value, \(k_{\text{trans}}, B_F, B_V\) provided the higher sensitivity \((k_{\text{trans}}: 96.8\%, B_F:90.3\%, B_V:71.0\%)\) and specificity \((k_{\text{trans}}: 57.4\%, B_F:81.9\%, B_V:74.5\%)\) in predicting for the ablation efficacy.

**CONCLUSION**

A higher \(k_{\text{trans}}, B_F, B_V\) value at baseline DCE-MRI suggested a poor ablation efficacy of HIFU therapy for symptomatic uterine fibroids. The \(B_F\) values showed the best predictive value, followed by \(k_{\text{trans}}\) and then \(B_V\).

**CLINICAL RELEVANCE/APPLICATION**

The pretreatment DCE-MRI parameters could be useful biomarkers for prediction the ablation efficacy in selecting of suitable candidates for HIFU treatment or changing the treatment plan which most likely to yield optimum results.

**SSM10-06** Deeply Infiltrative Endometriosis (DIE) with Myometrial Invasion: 'Mantle-shaped' Pattern (MSP)-A Marker for Severe DIE Associated with High Prevalence of Intestinal and Bladder Lesions

**Participants**
Luciana P. Chamie, MD, PhD, Sao Paulo, Brazil (Presenter) Nothing to Disclose
Duarte M. Ribeiro, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Gladis R. Ribeiro, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Tatiana Bonetti, PhD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Paulo C. Serafini, MD, PhD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

The purpose of this manuscript is to describe a form of DIE with deep myometrial invasion called "mantle-shaped" pattern (MSP) that is a marker for severe DIE with high prevalence of intestinal and bladder lesions.

**METHOD AND MATERIALS**

This is prospective cross-sectional study from August 2010 to June 2015. 2737 women (mean age of 35.9 years) suspected of having DIE underwent a transvaginal sonography after bowel preparation (TVSBP) by an experienced radiologist for the diagnosis and mapping of the disease. The clinical suspicion was based on the complaining of chronic pelvic pain and infertility for more than 1 year. The imaging protocol was based on previous published data. The imaging criteria for severe DIE were also established. Among patients with positive imaging findings for DIE, the presence of the MSP was assessed along with the other sites affected.

**RESULTS**

From all 2737 women assessed, 1065 did not have endometriosis (46.4%) and 1468 of them demonstrated DIE lesions (53.6%). The MSP was identified in 151 women (5.5%) among DIE group. The group of DIE women without MSP exhibited 4 sites of DIE involvement, while the group with MSP had an average of 7.5 DIE sites affected. Women with MSP had 68.2% of intestinal lesions compared to 25% of those without MSP. Bladder lesions were identified in 15.2% of women with MSP compared to 1.7% of women without MSP. The posterior compartment of the pelvic cavity was the most common location for the MSP (70.9%) against the anterior compartment (30.5%). The retrocervical region was the most common location of DIE lesions in both groups.

**CONCLUSION**

The MSP is a form of DIE associated with deep myometrial invasion and is a marker for severe disease with high prevalence of visceral involvement, such as bladder and intestinal lesions. It is also a predictor for worse fertile prognosis and for potential residual disease after surgery. Patients with complete removal of these tissue are risky for uterine rupture during pregnancy.

**CLINICAL RELEVANCE/APPLICATION**

The MSP is a marker for severe DIE with high prevalence of intestinal and bladder lesions.
Controversy Session: Pelvic Imaging in the Emergency Department: Ultrasound, CT or MRI?

Wednesday, Nov. 30 4:30PM - 6:00PM Room: S404CD

GU OB CT MR US ER

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

Participants
Douglas S. Katz, MD, Mineola, NY, (dkatz@winthrop.org) (Moderator) Nothing to Disclose
Mariam Moshiri, MD, Seattle, WA, (moshiri@uw.edu) (Moderator) Consultant, Reed Elsevier; Author, Reed Elsevier;

LEARNING OBJECTIVES
1) To overview the current role of ultrasound, CT, and MR in the imaging of non-pregnant and pregnant women with known or suspected acute pelvic conditions, with an emphasis on evidence-based information and societal guidelines, to discuss the advantages and disadvantages of ultrasound, CT, and MR for imaging the acute female pelvis in several common/relatively common scenarios to overview specific protocols for performing effective and accurate ultrasound, CT, and MR imaging examinations of the acute female pelvis, to discuss current controversies regarding the roles of ultrasound, CT, and MR in the imaging of the acute female pelvis.

ABSTRACT

Sub-Events

Participants
Sheila Sheth, MD, Cockeysville, MD, (ssheth@jhmi.edu) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) To review radiation dose associated with current pelvic CT imaging. 2) To describe available strategies for minimizing radiation dose. 3) To identify CT imaging findings in a variety of diagnoses in both pregnant and non-pregnant patients presenting with acute pelvic pain.

ABSTRACT
In this session, we will review CT radiation dose, associated risks, and strategies to minimize patient dose. Cases will be shown to highlight the diagnostic accuracy of CT in the ED as well as to illustrate how protocols may be optimized depending upon the leading differential diagnosis.

URL

Participants
Ana P. Lourenco, MD, Providence, RI, (alourenco@lifespan.org) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Review the Role of MRI in acute Pelvic conditions in the Pregnant and Nonpregnant Patient in Case-Based format. 2) Discuss the role of MRI in evaluating indeterminant lesions at US and CT in acute GYN conditions.

ABSTRACT

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Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Obstetrical Imaging Thursday Case of the Day
Thursday, Dec. 1 7:00AM - 11:59PM Room: Case of Day, Learning Center

Participants
Anne M. Kennedy, MD, Salt Lake City, UT (Presenter) Author with royalties, Reed Elsevier
Paula J. Woodward, MD, Salt Lake City, UT (Abstract Co-Author) Vice President, Reed Elsevier
Scott J. Parker, MD, Salt Lake City, UT (Abstract Co-Author)

TEACHING POINTS
1) Analyze findings on obstetric imaging studies. 2) Develop differential diagnoses based on the clinical information and imaging findings. 3) Recognize the importance of accurate prenatal diagnosis on pregnancy management.

Honored Educators
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Anne M. Kennedy, MD - 2016 Honored Educator
Participants

Sub-Events

OB120-ED-THA1  Saline Infused Sonohysterography-Technique and Spectrum of Disease

Station #1

Awards
Certificate of Merit

Participants
B. Dustin Pooler, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Lori Mankowski Gettle, MD, Hummelstown, PA (Abstract Co-Author) Nothing to Disclose
Jessica B. Robbins, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Vincenzo K. Wong, Houston, TX (Presenter) Nothing to Disclose

TEACHING POINTS
Review technique for performing saline infused sonohysterography
Review normal anatomy on saline infused sonohysterography
Identify common pathology encountered with saline infused sonohysterography
Discuss pitfalls of saline infused sonohysterography

TABLE OF CONTENTS/OUTLINE
Saline infused sonohysterography technique
Normal saline infused sonohysterography anatomy
Pathology encountered with saline infused hysterosonography
Endometrial hyperplasia
Intrauterine adhesions
Tamoxifen changes
Endometrial carcinoma
Endometrial polyp
Submucosal leiomyoma
Retained products of conception
Pitfalls of saline infused sonohysterography

OB005-EB-THA  Endometriosis: Helping the Surgeon through MRI

Hardcopy Backboard

Participants
Daniela B. Grammatico, Buenos Aires, Argentina (Presenter) Nothing to Disclose
Lorena Coto Solari, MD, Caba, Argentina (Abstract Co-Author) Nothing to Disclose
Evelina V. Hernandez, Buenos Aires, Argentina (Abstract Co-Author) Nothing to Disclose
Maria Gavina, Buenos Aires, Argentina (Abstract Co-Author) Nothing to Disclose
Maria L. Rico, MD, Tigre, Argentina (Abstract Co-Author) Nothing to Disclose
Juan C. Mazzucco, MD, Buenos Aires, Argentina (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To describe the MRI findings of endometriosis and the relations with adjacent organs required by the surgeon for surgical planning
To explain the utility of high-resolution MRI in the diagnosis of this pathology
To correlate with a graphic summary the MRI images with the intraoperative findings obtained in the surgical procedure

TABLE OF CONTENTS/OUTLINE
Describe the pathology
Types of affection: ovarian, peritoneal and deep endometriosis
Frequent findings: Endometriomas
Deep endometriosis: gastrointestinal organs involved, urinary organs involved
Review of MRI imaging findings
Details lesions in order to perform an adequate surgical strategy
Correlation of MRI images with findings during surgery
Intraoperative images
Conclusion
OB125-ED-THB1  
Transvaginal Ultrasound (TV US) Guided Procedures: A Review

Awards
Certificate of Merit

Participants
Mollie A. Rashid, MD, Los Angeles, CA (Presenter) Nothing to Disclose
Hisham A. Tchelepi, MD, Los Angeles, CA (Abstract Co-Author) Research Grant, General Electric Company; Research Grant, Roper Industries, Inc
Daphne K. Walker, MD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To review principles and techniques for ultrasound guided procedures using a transvaginal approach
To discuss indications and applications for TV US guided procedures
To illustrate case examples with pathologic correlation
To discuss potential benefits and disadvantages

TABLE OF CONTENTS/OUTLINE
History and background
Principles
Literature review
Indications and Applications
Patient Selection
Types of procedures
Biopsies
Drainages
Limitations of alternative methods
Our technique for performing TV US guided procedures
Schematic presentation
Tips and pearls
Case examples from our institution with pathologic correlation, including, but not limited to:
Ovarian masses, including malignant tumors
Abscess drainage, with and without catheter placement
Post-procedural management and potential complications
Additional applications and future directions of TV US procedures

OB170-ED-THB2  
The New 2014 World Health Organization (WHO) Classification of Ovarian Cancer: A Primer for Radiologists

Awards
Magna Cum Laude

Participants
Farhan S. Amanullah, MD, Houston, TX (Presenter) Nothing to Disclose
Varaha Tammisetti, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Philip T. Valente, MD, San Antonio, TX (Abstract Co-Author) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Sriniwas R. Prasad, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Venkata S. Katabathina, MD, San Antonio, TX (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Familiarize audience with 2014 WHO classification & FIGO staging of ovarian malignancies
Review current research that focus on origin & pathogenesis of different subtypes of ovarian cancer
Describe cross-sectional imaging findings of existing and new borderline ovarian tumors & carcinomas
Discuss potential implications for risk evaluation, screening, and prophylactic treatment for ovarian cancer

TABLE OF CONTENTS/OUTLINE
2014 FIGO staging of ovarian cancer
Serous tumors: borderline tumor (BOT), low-grade carcinoma & high grade carcinoma; primary fallopian tube & peritoneal carcinoma
Mucinous: BOT & carcinoma
Endometrioid: endometriotic cyst, BOT & carcinoma
Clear cell: BOT & carcinoma
Brenner tumors: Benign & malignant
Seromucinous tumors: New entity; cystadenoma/BOT/carcinomas
Cross-sectional imaging spectrum & Future imaging techniques
Clinical & management implications
Recent findings on origin, pathogenesis & prognosis of different ovarian subtypes are taken into account while designing this new classification schemata and is mainly based on histopathologic findings and show important impact on prognosis & treatment. Fallopian tubal epithelium is proven to be the site of origin of most of high-grade serous carcinomas. Based on this, novel imaging techniques, prophylactic treatments & screening methods are being investigated to reduce mortality.

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Venkata S. Katabathina, MD - 2012 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Srinivasa R. Prasad, MD - 2012 Honored Educator
**Second and Third Trimester Obstetrical Ultrasound**

*Thursday, Dec. 1 4:30PM - 6:00PM Room: E450B*

**RC710A  Multiple Gestations**

**Participants**
Anne M. Kennedy, MD, Salt Lake City, UT, (anne.kennedy@hsc.utah.edu) *(Presenter)* Author with royalties, Reed Elsevier

**LEARNING OBJECTIVES**
1) Determine chorionicity in multiple pregnancies. 2) Recognize the complications of monochorionic placentation particularly twin twin transfusion syndrome, twin reversed arterial perfusion sequence and the consequences of demise of one twin. 3) Recognize discordant twin growth.

**ABSTRACT**

Active Handout: Anne M. Kennedy


**Honored Educators**

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Anne M. Kennedy, MD - 2016 Honored Educator

**RC710B  Fetal Central Nervous System: Strategies for Accurate Diagnosis**

**Participants**
Roya Sohaey, MD, Portland, OR *(Presenter)* Nothing to Disclose

**LEARNING OBJECTIVES**
1) Develop an anatomic approach for evaluating the fetal brain at the time of mid-gestation anatomy scan. 2) Differentiate between significant and insignificant subtle findings when evaluating the fetal brain. 3) Develop an anatomy-based differential diagnosis for most brain anomalies. 4) Develop an understanding of which cases would benefit from fetal MR.

**ABSTRACT**

By the conclusion of this course, the participant will understand the strength of the current standard mid-gestational calvarial views for detecting subtle and obvious brain malformations. Additional scanning strategies are presented for more specific diagnoses once the anomaly is identified. When an accurate diagnosis is made, then the associations with genetic syndromes and other anomalies can be considered. Fetal MR is often additive and its benefits and limitations will be considered.

**RC710C  Placenta and Cervix**

**Participants**
Sara M. Durfee, MD, Boston, MA, (sdurfee@partners.org) *(Presenter)* Nothing to Disclose

**LEARNING OBJECTIVES**
1) Identify the cause of vaginal bleeding in patients with placental abnormalities that include placenta previa and placental abruption. 2) Describe the sonographic features of placenta accreta. 3) Apply practical techniques to a standard transvaginal examination of the cervix in the risk assessment for preterm birth during pregnancy.

**ABSTRACT**
Pediatric Fetal (An Interactive Session)
Thursday, Dec. 1 4:30PM - 6:00PM Room: S404CD

Participants

Sub-Events

RC713A  Fetal Imaging - Looking Outside the Fetus

Participants
Maria A. Calvo-Garcia, MD, Cincinnati, OH, (maria.calvo@cchmc.org) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) List frequent or important extrafetal conditions potentially encountered during fetal MRI examinations. 2) Apply pattern-recognition guide of these processes during imaging interpretation.

ABSTRACT
An adequate evaluation of the pregnancy with fetal MRI will include not only assessment of the fetus. Major structures that will be analyzed and that could clearly affect the outcome of the pregnancy include the cervix, the placenta and the umbilical cord. In addition, congenital and acquired uterine and other maternal conditions could be encountered. Along the course of this presentation we will review extrafetal anatomic variants and pathologic conditions following a case-based format.

RC713B  Fetal GU Imaging

Participants
Ann M. Johnson, MD, Philadelphia, PA, (johnsona@email.chop.edu) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Understand MRI techniques to characterize complex GU abnormalities in the fetus. 2) Recognize patterns of abnormality to diagnose complex fetal GU abnormalities.

RC713C  Fetal Chest Anomalies

Participants
Teresa Victoria, MD, PhD, Philadelphia, PA, (victoria@email.chop.edu) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) To discuss the most common fetal lung masses. 2) To identify imaging algorithms and patterns that can be helpful in reaching a diagnosis.

ABSTRACT
The Role of Urethral Sphincter Dysfunction and Funneling Change in Indicating the De Novo SUI in Severe Anterior Vaginal Wall Prolapse Women Before Pelvic Floor Rehabilitation

PURPOSE
Patients with severe anterior vaginal wall prolapse are inclined to demonstrate de novo stress urinary incontinence (SUI) after pelvic floor rehabilitation. The aim of our study was to investigate the role of urethral sphincter dysfunction and funneling change of urethrovesical junction in predicting de novo SUI preoperation.

METHOD AND MATERIALS
47 patients with severe anterior vaginal wall prolapse but without complaining of SUI were enrolled. Preoperatively static and dynamic MRI examination of pelvic floor were performed with prolapse reduction. Urethral sphincter dysfunction was indicated when widen of the proximal urethra and funneling at the urethrovesical junction was observed. Urethral mobility was defined by rotation of urethra. Vesical neck movement was evaluated by its distance to pubococcygeal line (PCL). A published levator ani muscle (LAM) scoring system was used to characterize morphological changes of LAM and divided the severity of injury into three categories as none, minor and major. Primary outcome was de novo SUI at 1 year postoperative follow-up by an experienced gynecologist.

RESULTS
Of the 47 patients, 5 cases (10.6 %) demonstrated de novo SUI postoperatively. Urethral sphincter dysfunction and funneling were present in all of de novo SUI patients whilst only 7.14% in continent patients. De novo SUI patients were having more minor but not major LAM defects than continent patients, both in pubo-rectal muscle (minor 40.0% vs. 21.4%, major 60.0% vs. 50%; P=0.06) and ilio-coccygeal muscle (minor 80.0% vs. 33.3%, major 20.0% vs. 19.0%; P=0.33). The value of vesical neck downward movement measured in de novo SUI patients was more than in continent patients (23.4±16.4 vs. 19.9±11.4, P=0.06) though without significant difference. Urethral mobility was equally active in de novo SUI patients and continent patients (50.8±32.4 vs. 50.4±26.1, P=0.46).

CONCLUSION
The urethral sphincter dysfunction and funneling can be treated as a practical indicator of de novo SUI preoperation for patients with severe anterior vaginal wall prolapse, especially when combined with more minor LAM injury and more active vesical neck downward movement.

CLINICAL RELEVANCE/APPLICATION
Severe anterior vaginal wall prolapse women with urethral sphincter dysfunction and funneling change during MR examination have higher risk of developing de novo SUI, we suggest counselling such women for concomitant Pelvic rehabilitation and anti-incontinent surgery.

Diagnostic Accuracy of Abnormal Placentation on MRI Correlated with the Surgical Findings

PURPOSE
The purpose of this study was to assess the preoperative diagnostic accuracy of abnormal placentation by MRI.

METHOD AND MATERIALS
Forty-one gravid women with placenta previa or low-lying placenta who underwent MRI were retrospectively assessed. Their mean
age was 34 years old (22-42). We compared 5 MR findings and the prevalence of abnormal placentation. The MR findings that we assessed were 1) heterogeneous signal intensity within the placenta, 2) dark intraplacental bands on T2WI, 3) focal uterine bulging, 4) focal interruptions in the myometrial wall and 5) flow voids in the placenta. The numbers of dark intraplacental bands on T2WI were also counted.

RESULTS

All patients had C-section. Eight patients were identified with placenta accreta, one was placenta increta and one was placenta percreta, pathologically. Three cases which had a defect of the myometrium after the placental removal and one case which the placenta attached firmly to the myometrium (PA). MR findings 1)-5) had sensitivity of 0.642, 0.857, 1, 0.571, and 0.703, specificity of 0.562, 0.545, 0.552, 0.769 and 0.6, and negative predictive value (NPV) of 0.89, 0.894, 1, 0.857, and 0.904, respectively. The average numbers of “dark bands” on T2WI were 0.69 with PA(-) and 2.93 with placenta accreta, increta or percreta (+).

CONCLUSION

Of the five MRI findings, the dark intraplacental bands on T2WI had the highest sensitivity and the focal uterine bulging had the highest specificity. Higher numbers of dark intraplacental bands on T2WI could indicate abnormal placentation. When a number of evaluated MRI findings increases the risk of abnormal placentation also increases.

CLINICAL RELEVANCE/APPLICATION

Patients with two or more of our evaluated five findings were considered as a high risk group when they were delivering. Radiologists should be careful not to overlook our evaluated findings.

SST05-04 Abnormalities of the Yolk Sac and Its Association with First Trimester Abortion

Friday, Dec. 2 11:00AM - 11:10AM Room: E351

Participants
Krishnarjun Peethambaram, MBBS, Davangere, India (Presenter) Nothing to Disclose
Parthasarathy K R, MBBS, MD, Bangalore, India (Abstract Co-Author) Nothing to Disclose
Kishan A. Bhagwat, MBBS, MD, DAVANGERE, India (Abstract Co-Author) Nothing to Disclose
Reddy Priyatham Tulasi, MBBS, Davangere, India (Abstract Co-Author) Nothing to Disclose
Shashikiran B R, MBBS, Davangere, India (Abstract Co-Author) Nothing to Disclose
Naveen Rathod, Gulbarga, India (Abstract Co-Author) Nothing to Disclose

PURPOSE

To determine all the sonological abnormalities of the yolk sac and establish their association with adverse perinatal outcomes in the first trimester.

METHOD AND MATERIALS

The study involves the prospective analysis of 578 pregnant women, who came for first trimester scan (5th to 13th week gestational age). All examinations were performed with GE Voluson 730 expert ultrasound equipment in a 5-9mHzendocavity 3D probe (GE healthcare, Milwaukee, WI). The gestational sac measurements were taken along with the CRL (crown rump length), yolk sac diameter and FHR (fetal heart rate). All 578 cases were divided into the control group (normal yolk sac) and the study group (abnormal yolk sac) and subjected to statistical analysis. The primary outcome measure was the abortion rate between the two groups.

RESULTS

Out of the 578 cases, 104 had abnormal yolk sacs. The study group was divided into the patients who had a normal or uneventful outcome of pregnancy and patients who had an abnormal outcome (embryonic demise, anembryonic pregnancy). Out of the 104 cases of abnormal yolk sac, 54 patients were associated with first trimester abortion and 50 patients had an uneventful pregnancy. The statistical analysis demonstrated a sensitivity of 94.9%, specificity of 61.9% and chi-square statistic of 80.2131. The p value is <0.00001, which shows that the results are significant. The overall abortion rate with abnormal yolk sacs was 51.9%. The outcome of pregnancy was also studied with respect to the sonological abnormality of the yolk sac. Absent and calcified yolk sacs always lead to abortion. Large and small yolk sacs had a 40-50% abortion rate. Irregular yolk sacs had a 25% abortion rate. But echogenic and persistent yolk sacs had an overall abortion rate of only 9%.

CONCLUSION

Evaluating the yolk sac should be an integral part of the overall first trimester sonological examination as it can be used to anticipate the course of pregnancy.

CLINICAL RELEVANCE/APPLICATION

Importance of the size, shape and internal contents of the yolk sac can predict embryonic death or abnormalities in the first trimester.

SST05-05 Predibirth Software Prospective Study: The Interest of the Virtual Trial of Labor (VTOL)

Friday, Dec. 2 11:10AM - 11:20AM Room: E351

Participants
Olivier Arni, MD, PhD, Clermont Ferrand, France (Presenter) Nothing to Disclose
Lucie Cassagnes, MD, Clermont-Ferrand, France (Abstract Co-Author) Nothing to Disclose
Jean-Christophe Maran, PhD, MA, Creteil, France (Abstract Co-Author) Nothing to Disclose
Dominique Musset, MD, Clamart, France (Abstract Co-Author) Nothing to Disclose
PURPOSE

The aim of this study was to evaluate the diagnostic interest of computerized virtual trial of labor from 482 finite elements reconstruction of the maternal pelvis and fetus from magnetic resonance imaging data sets, followed by 3D childbirth simulation.

METHOD AND MATERIALS

482 pregnant women were enrolled in this prospective study (NATVISTA study). A pelvimetry with MRI on every pregnant woman on 4 maternity centers over a 6 months duration of study. Both fetus and pelvis were segmented for 3D vectorial reconstruction with Predibirth (Babyprogress - France) software. Favorability of childbirth was estimated using the percentage of possibility to deliver regarding tested possibilities for fetal engagement, descent and rotation for each variety of presentation tested. Childbirth was defined with a percentage of fetal head compression along the birthcanal.

RESULTS

Of the 482 pregnant women tested, the mean MAGNIN score was 23. The positive predictive value of predibirth was 96 %, the negative predictive value was 97 %, the false positives rate was 4 %, the false negatives rate was 2%. Maternal satisfaction using virtual trial of labor was 93%. Caregivers satisfaction using virtual trial of labor was 90%. Compared to obstetrical decisions based on pelvimetry, the VTOL improved of 80 % birth predictions. The overall cesarean section rate didn't change (from 28 % before VTOL to 27 % with VTOL), but the emergency C-section rate dropped drastically (from 16 % before VTOL, to 3 % after VTOL).

CONCLUSION

VTOL with Predibirth software is a new and promising tool to detect labor dystocia and seem to be a significant improvement over pelvimetry to decrease biomechanical risks during childbirth.

CLINICAL RELEVANCE/APPLICATION

VTOL may soon change obstetrical decisions at the time of Childbirth

SST05-06 Utility of Diffusion-Weighted MR Imaging in the Diagnosis of Morbidly Adherent Placenta

Friday, Dec. 2 11:20AM - 11:30AM Room: E351

Participants

Anna Ellemierre, MD, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Tom Winter, Salt Lake Cty, UT (Abstract Co-Author) Nothing to Disclose
Susanna I. Lee, MD, PhD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Daniel S. Hippe, MS, Seattle, WA (Abstract Co-Author) Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company
Manjiri K. Dighe, MD, Seattle, WA (Presenter) Research Grant, General Electric Company

PURPOSE

Rising incidence and potential for catastrophic surgical outcomes underscore the need for sensitive prenatal diagnosis of morbidly adherent placenta (MAP). As such, ambiguous US findings often necessitate MRI. By better defining the border between placenta and myometrium, we hypothesized that diffusion-weighted imaging (DWI) may be a useful adjunct to traditional prenatal MRI.

METHOD AND MATERIALS

Following IRB approval, 2 radiologists blinded to history and pathology retrospectively reviewed MR images (1.5T) from singleton pregnancies with and without pathologically-proven MAP. T2W only and T2W+DWI images were reviewed in separate sessions 2 weeks apart to avoid recall bias, with normal and MAP randomized within and between sessions. Reviewers completed questionnaires regarding placenta/uterus features, MAP presence and diagnostic confidence. MR findings were compared to pathology results with Chi-squared tests, interreader agreement was evaluated with Cohen's kappa and diagnostic accuracy was compared with the sign test.

RESULTS

In total, 17 patients (mean gest 27w4d) were reviewed (indications: suspected MAP 14/17, fetal anomaly 2/17, abd pain 1/17). Typical MR criteria were reported more frequently with pathologic MAP: loss of retroplacental T2 dark zone (T2W, p=0.008) and dark/thick interplacental bands (T2W+DWI, p=0.032). Compared with T2W only, addition of DWI significantly increased interreader agreement (p=0.045) and tended to increase sensitivity (69% vs. 94%, p=0.25) but decrease specificity (56% vs. 39%, p=0.5) for MAP. Although readers reported increased diagnostic confidence with DWI in 65%, explicit confidence ratings (p=0.7) and diagnostic accuracy (p>0.99) did not change.

CONCLUSION

MAP is a potentially life-threatening condition that requires increased clinical and radiographic sensitivity to optimize management. Small sample size (due to low incidence), inexperience with DWI interpretation in pregnancy, and poor resolution of DWI are limitations of our study. Trends toward increased sensitivity and improved interreader agreement suggest that DWI may complement traditional MRI evaluation of MAP but more experience and sequence improvement are necessary to improve diagnostic accuracy.

CLINICAL RELEVANCE/APPLICATION

DWI in conjunction with traditional prenatal MRI may aid in evaluation of MAP, a potentially life-threatening condition that requires extensive surgical planning and patient counseling.

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PURPOSE

Accurate antenatal diagnosis of placenta accreta remains a challenge. Placental heterogeneity is an MRI feature of placenta accreta which is subjectively determined. The purpose of this study is to evaluate advanced quantitative mathematical algorithms for heterogeneity analysis in order to differentiate placenta accreta from normal placentas objectively.

METHOD AND MATERIALS

We performed retrospective image analysis of 23 cases, with 16 normal cases and 7 cases of placenta accreta based on pathological diagnosis. Sagittal single shot fast spin echo T2-weighted MRI sequences acquired on a GE 1.5 T MRI scanner were analyzed using custom in house software run on a Matlab platform. An ROI of the entire placenta was manually drawn, and confirmed by an experienced radiologist. Placental heterogeneity was quantified with various mathematic algorithms: coefficient of variation, histogram analysis, gray level co-occurence matrices (GLCM), histogram oriented gradients (HOG), random walk analysis, and fractal analysis with box size from 2 to 256. One-tailed unpaired Student’s t test was used to compare the group heterogeneity indices with statistical significance prescribed with p<0.05.

RESULTS

Each algorithm produced a different quantitative measure of image heterogeneity. With a limited sample size, fractal analysis with a box size of 256 provides the highest statistical power for differentiating placenta accreta from normal (p=0.02). The analyses obtained from HOG (p = 0.08) and GLCM (p=0.09) are encouraging, with p values approaching significance. The least statistical power was observed from random-walk, histogram, and co-variance analysis with p = 0.48, 0.34, and 0.16 respectively.

CONCLUSION

Fractal analysis was found to be the most promising objective approach in identifying placenta accreta in the limited sample size we have so far. Work will be continued with further algorithm optimization and increased sample size. Quantitative heterogeneity analysis shows promise in the diagnosis of placenta accreta with MRI.

CLINICAL RELEVANCE/APPLICATION

Quantitative heterogeneity analysis may be used to increase diagnostic certainty in the diagnosis of placenta accreta with MRI.
Regional Placental Bold Changes with Gestational Age in Normally Developing Pregnancies using Long Duration R2* Mapping in Utero

Participants
Manjiri K. Dighe, MD, Seattle, WA (Presenter) Research Grant, General Electric Company
Bhagya Sannanaraja, MD, San Antonio, TX (Abstract Co-Author) Nothing to Disclose
Debosmita Biswas, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Susan McKown, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Jason Cacutt, Seattle, WA (Abstract Co-Author) Nothing to Disclose
J C. Gatenby, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Colin Studholme, PhD, San Francisco, CA (Abstract Co-Author) Nothing to Disclose

PURPOSE
The placenta is a key organ determining healthy fetal development. Pathological development of the placenta has been related to fetal growth restriction and pre-eclampsia (PE). Blood flow in the maternal and fetal regions within the placenta permit the transfer of both oxygen and nutrients to the fetus and the removal of waste products. BOLD MRI can assess tissue oxygenation non-invasively and is based on the magnetic properties of hemoglobin. The purpose of our study was to examine the use of R2* mapping with BOLD MRI in the placenta with the aim of providing a reference for blood oxygenation levels.

METHOD AND MATERIALS
Written informed consent was obtained from pregnant patients with uncomplicated pregnancies. Imaging was performed on a Philips 1.5T scanner, using a 16-channel Torso XL coil. Dual echo EPI BOLD data was collected and repeated in a dynamic acquisition consisting of between 90 and 150 time frames. A set of multiple 3D regions of interest were manually outlined within the placenta on each frame using the segmentation tool in the rview software http://rview.colin-studholme.net. The ROI's were separately adjusted on each frame and each slice to ensure selected voxels fell within the placenta. A total of between 3 and 5 slices clearly in the placenta were marked on each subject. Mean R2* values were then calculated.

RESULTS
The average age of the fetus was 28 weeks 1 day. Average R2* in the placenta was 8.99 +/- 2.21 (range 2.17 to 14.51). There was an increase in the R2* with gestational age. In fetuses with multiple scans performed at different time points, there was an increase in the R2* over time. The average standard deviation in the multiple acquisitions in each patients was 0.75. One outlier was seen with a low R2* and this variability could be due to motion seen in the images in this outlier.

CONCLUSION
Evaluating the R2* in placenta is feasible. The R2* values were seen to increase with gestational age. It will be possible to evaluate the R2* in placenta in patients with intrauterine growth retardation (IUGR) which is expected to be lower than the normal R2*.

CLINICAL RELEVANCE/APPLICATION
Evaluation of the R2* in the placenta with BOLD MRI is feasible and can help in early prediction of placenta dysfunction like in IUGR. Further studies of IUGR patients are needed to access the utility of BOLD imaging in the placenta.