Obstetric sonography usually begins with scanning the fetal head (biometry). Ultrasound has been used for more than 30 years to help diagnose fetal brain anomalies. One type of fetal brain anomalies, anencephaly, was the first fetal malformation to be investigated by diagnostic ultrasound. The diagnosis of fetal brain anomalies has a significant impact on the perinatal management of pregnancy. The key issue in fetal brain imaging is accuracy. Although the International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) has issued the guidelines for performing sonographic examinations of the fetal central nervous system (CNS) since 2007, there are many consultants relying on the traditional axial planes to diagnose fetal brain anomalies. The use of 3 axial planes helps in the diagnosis of most, but not all, fetal brain anomalies. In addition, there are some false positive and false negative cases based on only axial planes to diagnose fetal brain anomalies, for example, the diagnoses of dysgenesis of corpus callosum (DGCC). Familiarity with targeted neurosonography is a prerequisite for making accurate diagnoses of fetal brain anomalies.

The introduction of ultrafast acquisition of magnetic resonance imaging (MRI) has ameliorated the problem of artifacts caused by fetal movement. Fetal MRI has evolved into a popular imaging modality in fetuses with suspected brain anomalies. One reasonable assumption why fetal MRI has gained worldwide popularity is the in-charge physician being unable to perform targeted neurosonography. They must resort to fetal MRI to deal with fetuses with suspected brain anomalies.

In this lecture, we will provide a concise demonstration of targeted neurosonography. We also discuss the drawbacks of traditional axial planes to diagnose DGCC or other midline anomalies of the fetal brain. We will try to delineate the timing and indications of fetal MRI in order to get the most information from the MRI for diagnosis of fetal brain anomalies.
Polypoid Lesion Seen on Transvaginal Ultrasonography: How Accurate Is Transvaginal Ultrasonography Compared with Hysteroscopy

Chii-Shinn Shiau
Department of Obstetrics and Gynecology, Chang Gung Memorial Hospital, Taipei, Taiwan

Abnormal uterine bleeding is not an uncommon situation in women of reproductive age and it can be caused by a variety of underlying uterine anomalies. Among benign uterine anomalies, polyps and submucous myomas are the most common anomalies in polypoid endometrial lesions.

Recent advances in ultrasonography and endoscopic technology enable clinician to investigate women of reproductive age presenting with abnormal uterine bleeding. In general, the choice of diagnostic modality should include feasibility, accuracy, versatility, patient preferences, availability of resources, and cost.

Transvaginal ultrasound (TVS) is a useful tool for the diagnosis of uterine abnormalities; however, certain limitations in the diagnosis of small endometrial polyp and submucous myoma remain. It is also difficult to make an accurate diagnosis between endometrial thickening and intracavitary masses. Therefore, current clinical practices still rely on second-stage tests such as saline contrast sonohysterography and office hysteroscopy.

Sonohysterography (SHG) showed superior sensitivity, specificity, and positive and negative predictive values compared with TVS in diagnosing intrauterine lesions. The level of accuracy of SHG in diagnosing polypoid endometrial lesions is comparable to that of outpatient hysteroscopy.

Diagnostic hysteroscopy is the gold standard for the diagnosis of intracavity structural lesions. However, few gynaecologists perform such examinations routinely in the outpatient setting. Hence, it remains the second-stage tests in women with abnormal vaginal bleeding. The prevalence of intrauterine abnormalities of women with abnormal uterine bleeding in diagnostic hysteroscopy was 46.6% and the overall success rate of diagnostic hysteroscopy was estimated at 96.9%.

A systematic review of TVS, SHG, and diagnostic hysteroscopy for the investigation of abnormal uterine bleeding in premenopausal women showed that all three diagnostic tests were moderately accurate in detecting intrauterine pathology. However, SHG and hysteroscopy performed better than TVS in detecting submucous myomas.

In many circumstances, TVS and hysteroscopy are likely to be complementary diagnostic modalities and can be utilized sequentially or in combination.
New Advances in Breast Ultrasound

Mein-Kai Gueng, MD¹ Yi-Hong Chou, MD² Chui-Mei Tiu, MD²
¹Department of Radiology, Taichung Veteran General Hospital, ²Taipei Veteran General Hospital

Breast ultrasound was first used in the early 1950s, because of the poor image quality at that time, the use of breast US has been restricted to differentiation of cysts versus solid masses. The use of US has changed dramatically throughout the past decades, the improvements in the spatial and contrast resolution of breast sonography have allowed the detection and characterization of subtle breast lesions. Although it became regarded as a possible means of distinguishing between benign and malignant lesions, diagnostic ultrasound is still not a perfect science. There are still limitations of conventional grayscale ultrasound imaging, the advances in technology have allowed us to continue to improve image quality, disease diagnosis and optimal patient care. Recent advances in breast ultrasound technology include tissue harmonic imaging, compound imaging, elastography US imaging, extended field-of-view imaging, three-dimensional (3D) ultrasound, automated full-field breast ultrasound, computer-aided diagnosis (CAD) in breast sonography, color Doppler ultrasound, intravenous contrast agents, lymphosonography, interventional ultrasound and high intensity focused ultrasound (HIFU). The advanced breast ultrasound technologies are used as auxiliary tools in breast diseases, it not only improves diagnosis power but also contributes in treatment.

Ultrasonography in Pelvic Floor Dysfunction: Clinical Practice

Jenn-Ming Yang
Department of Obstetrics and Gynecology, Taipei Medical University-Shuang Ho Hospital

Pelvic floor dysfunction is a common health problem causing considerable inconvenience to many women. A thorough evaluation, including physical examination, imaging studies, and urodynamic investigation of pelvic floor structures, is crucial for appropriate management of pelvic floor dysfunction. Ultrasonography has the advantages of non-invasiveness, reproducibility, non-radiation exposure, and less expensiveness. For exploring the complex nature of pelvic floor dysfunction, it is more convenient and helpful to do transvaginal, introital, and transperineal ultrasonography at the same time by using endovaginal probe. With the usage of high-resolution transducer, pelvic floor structures can be demonstrated clearly on ultrasonography. Three-dimensional technique provides simultaneous demonstration of different spatial orientation of pelvic floor structures. Color and power Doppler mapping not only can reveal the vascular flows of pelvic organs, but also can demonstrate the urinary flow.

Ultrasonography has dual functions in the management of pelvic floor dysfunction: diagnosis and intervention. Ultrasonography may help to recognize the anatomic characteristics, to explore the pathophysiologic mechanism, and to assist in the surgical management of pelvic floor dysfunction with possibly minimum invasiveness. Moreover, it can serves as a biofeedback tool in pelvic floor muscle reeducation.

Key words: interventional ultrasonography; pelvic floor dysfunction, three-dimensional ultrasonography.
Aneuploides Screening

Hsiao, Ching Hua
Taipei City Hospital, Women and Children Campus

2nd Trimester genetic sonogram:

The best estimates of both the positive and negative likelihood ratios for each of the common markers of trisomy 21 are sonographic marker, it include nuchal fold, short humerus, short femur, hydronephrosis, Echogenic focus of heart, echogenic bowel, major defect. Prevalence of major and minor abnormalities or markers in the second trimester scan in trisomy 21 and chromosomally normal fetuses in the combined data of two major series by Nyberg and Bromley et al. From these data the positive and negative likelihood ratios (with 95% confidence interval) for each marker can be calculated.

1st Trimester combined screening:

Prospective studies, in more than 100,000 pregnancies, including more than 500 fetuses with trisomy 21, have demonstrated that screening by a combination of fetal NT and first trimester maternal serum biochemistry can identify 85–90% of fetuses with trisomy 21 for a false positive rate of 5%. In trisomy 21 pregnancies at 11–13+6 weeks, the maternal serum concentration of free $\beta$-hCG is higher (about 2 MoM) and PAPP-A is lower (about 0.5 MoM) than in chromosomally normal fetuses.

In trisomies 18 and 13 maternal serum free $\beta$-hCG and PAPP-A are decreased. In sex chromosomal anomalies maternal serum free $\beta$-hCG is normal and PAPP-A is low. In paternally derived triploidy maternal serum free hCG is greatly increased, whereas PAPP-A is mildly decreased. Maternally derived triploidy is associated with markedly decreased maternal serum free $\beta$-hCG and PAPP-A. Screening by a combination of fetal NT and maternal serum PAPP-A and free $\beta$-hCG can identify about 90% of all these chromosomal abnormalities for a screen positive rate of 1%, in addition to the 5% in screening for trisomy 21.

1st Trimester combined screening Taiwan experience:

To be present prospective study over 5 year period of 20905 pregnant women carrying 21114 fetuses women, who approached first-trimester screening between 11+0 and 13+6 weeks of gestation in 10 unit centers in Taiwan. There were 20905 cases complete combined test. All of the sonographers were certificated by Fetal Medicine Foundation, and the risk of aneuploides calculated using FMF’s algorithm software. Fetal karyotyping was performed after counsel when the risk was 1 in 300 or over. All of cases were followed up for fetal outcome.
Early Detection of Ovarian Cancer: From Traditional Methods to Contrast-enhanced 3-D Power Doppler Ultrasound and Proteomics

Cherng-Jye Jeng, MD, PhD, MBA
Professor, Department of Obstetrics & Gynecology, School of Medicine, Taipei Medical University

Despite a very high mortality rate, ovarian cancer is a relatively uncommon disease, with an incidence of approximately 50 per 100,000. Statistical estimates show that an effective ovarian cancer screening test will require a minimum positive predictive value (PPV) of 10% and a specificity of greater than 99%, which is unlikely to be achieved by a single test.

Transvaginal sonography plays an important role in the assessment of the morphology of ovarian lesions. However, the accuracy of the technique is limited due to the significant number of false-positive results. Color Doppler imaging and pulsed Doppler spectral analysis enable evaluation of ovarian tumor blood flow, analysis of the distribution of blood vessels, and quantitative measurement of blood flow velocity waveforms. These parameters increase the sensitivity and specificity of ultrasound evaluation of ovarian tumors.

Three-dimensional ultrasound and 3-D power Doppler imaging in patients with "positive" findings on standard ultrasound tests, which encompass annual gray-scale transvaginal sonography followed by transvaginal color Doppler ultrasound in selected cases, represent a novel approach for early and accurate detection of ovarian cancer through screening. Combined evaluations of morphology and neovascularity by 3-D power Doppler ultrasound may improve early detection of ovarian carcinoma. Contrast-enhanced 3-D power Doppler sonography facilitates visualization of adnexal tumor vessels, which may aid in differentiating benign from malignant adnexal lesions.

Microbubble-enhanced transvaginal sonography can enhance the evaluation of ovarian masses by early detection of tumor microvascularity. Eventually, it may be part of the screening protocol to identify ovarian cancer in women found to be at increased risk through serum markers such as proteomics.

The best studied serum biomarker for ovarian cancer, CA-125, is elevated in approximately 80% of women with advanced ovarian cancer but only 50-60% in patients with early-stage disease. Studies show that even when combined with other conventional screening test, such as ultrasound, CA125 fails to reach the specificity needed for a screening test for early detection. The emergence of new technologies, especially in the field of proteomics, offers new hope for an effective screening method to diagnose ovarian cancer at an early stage.
Ectopic Pregnancy: Ultrasound and Medicolegal Implication

Chin-Yuan Hsu
Mackay Memorial Hospital, Taipei, Taiwan

Ectopic pregnancy is a common condition with the immediate risk of life-threatening hemorrhage and subsequent risks of infertility and recurrence. Early diagnosis has led to the development of innovative surgical and nonsurgical options. Transvaginal sonography is now the imaging modality of choice for the diagnosis of ectopic pregnancy with overall reported sensitivities of >90%. Specific sonographic criteria exist for the diagnosis of tubal and non-tubal pregnancies including cervical and caesarean section scar pregnancies. Diagnosis is based on the visualization of an ectopic mass rather than the inability to visualize an intra-uterine pregnancy. The choice of treatment, including expectant, medical, and surgical approaches, depends on ectopic location, symptoms, gestational age, and future fertility desires. Goals are to make the diagnosis of ectopic pregnancy early and provide the most effective and least invasive procedure while sparing future fertility when desired.

Chronic Pelvic Pain

Yiu-Tai Li
Kuo General Hospital

Chronic pelvic pain is a common and significant disorder of women. It is estimated to have a prevalence of 10% in women and is a frustrating condition for both patients and physicians. It significantly reduce a woman’s quality of life. Chronic pelvic pain is not a disease, but a syndrome that results from a complex interaction between reproductive tract, gastrointestinal system, urological organs, musculoskeletal system and psychoneurological system. The history and physical examination are essential in evaluating a woman with chronic pelvic pain and must emphasize all of the possible systems potentially involved in chronic pelvic pain, not only the reproductive system. Laboratory and imaging studies should be selectively used. Traditional management to this disorder have been surgical, such as direct visualization by laparoscopy, although long-term success rates have been disappointing. In addition, it is possible that some patients who undergo laparoscopy for chronic pelvic pain may not have had an adequate evaluation to exclude musculoskeletal or urological causes for pain that are amenable to nonsurgical treatment. Fortunately, the chronic pelvic pain often can be managed so those patients attain normal or near-normal levels of functions. An integrated multidisciplinary approach to diagnosis and treatment is essential to achieve the great success.
MRI and CT in the Diagnostic Work Up of Pelvic Pain

Chiu Ying-Chun
Department of Radiology, Tri-Service General Hospital

Introduction: Most women experience pelvic pain at some time during their lives. Pelvic pain must be diagnosed accurately if the pelvic pain is to appropriately treated. Although ultrasound (US) is the primary imaging modality of choice in the radiologic evaluation of the female patient with acute pelvic pain, the role of computed tomography (CT) and magnetic resonance (MR) imaging in the evaluation of abdominal and pelvic pain continues to expand. CT and MR imaging enables assessment of the entire pelvis within several minutes and provides high sensitivities and specificities without user dependent. Besides, MR imaging has a high contrast resolution, and the administration of contrast agents is not mandatory.

Content:
(1) CT and MR imaging technique
(2) Introduction of normal pelvic anatomy in CT and MR imaging
(3) Gynecologic causes of pelvic pain
(4) Non-gynecologic causes of pelvic pain

Conclusion: Describe the CT and MRI findings in pelvic pain and provide useful information for patient evaluation and treatment.

Integrated Imaging Pictures of a Huge and Lethal Pyometra—A Rare Case with Diffuse Superficial Extension Squamous Cell Carcinoma of the Cervix

Tzu-I Wu, AS Chao
Chang Gung Memorial Hospital

Background: Accumulation of a very large amount of purulent material in uterine cavity is rare and carries significant morbidity and mortality in the elderly women with underlying diseases. Materials and methods: We report a case of unruptured pyometra in a menopaused woman for the very unusual clinical course, imaging pictures, bacteriology and the underlying cause. The size of the uterus was an enormous size under ultrasound and computed tomography (CT) imaging. Results: Lethal septic shock happened while doing the drainage of the uterus which contained 1200 ml pus. Heavy growth of Staphylococcus epidermis was cultured on blood culture. Histopathological examination was characterized by diffuse pattern of squamous cell carcinoma in situ extended over the whole endometrium and fallopian tubes with focal invasion of squamous cell carcinoma into the myometrium. Conclusion: The integrated imaging examinations have an important role in making diagnostic work-up of cervical malignancy.