Obstetrics and Gynecology Ultrasound

Sara Harvey, MD

Evaluation of Trainees’ Ability to Perform Obstetrical Ultrasound Using Simulation: Challenges and Opportunities

Chalouhi GE, et al. Am J Obstet Gynecol. 2016; 214:525.e1–525.e8

The objective of this study was to test the validity of an obstetric ultrasound simulator (OUS) as a tool for evaluating trainees following structured training compared with using patients as volunteers, which can be a time-consuming process. In France, approximately 150 trainees are evaluated at Paris Descartes University every year, which requires canceling a whole day in the ultrasound department and occupying 6 machines and 12 doctors and midwives to run the evaluation process. Also, 50 to 60 volunteer pregnant women who have already had a normal obstetric ultrasound are consented to participate.

In this study, 29 trainees were randomly selected to undergo the usual formal live examination on a volunteer and then to perform a similar session on the OUS. The live session consisted of 6 original 2-dimensional ultrasound biometric and morphologic images obtained by the candidate, which were printed and stored for later evaluation. In addition, the examiner was asked to subjectively score each student’s dexterity on a scale from 0 to 10. During the virtual examination, the trainee was given 10 minutes to familiarize themselves with the device and then to obtain the same 6 ultrasound images on the pregnant mannequin while the examiner evaluates them, including scoring their dexterity. The stimulator consists of a pregnant mannequin and a computer with a keyboard, mouse, and monitor, as well as a transducer. The pregnant mannequin mimics fetal and maternal anatomy including various positions for the placenta and fetus.

The dexterity scores were comparable (P = 0.31) when evaluated on OUS and on pregnant volunteers. Scores obtained on OUS were higher than those obtained on pregnant volunteers, suggesting that the examination on a simulator might be easier for the trainee. This was felt to be due to 4 issues: candidates were less stressed in the absence of a real patient; simulator alleviates some of the real patient’s characteristics that may work against the operator such as abdominal scars or obesity; intrauterine factors such as fetal positioning and movements can increase the difficulty of a live examination; and images built up from the simulator are not really built by the operator but rather found because they are built within the system. Nevertheless, there was a good correlation between the examiners’ scores on the volunteers (R = 0.873) and on the OUS (R = 0.888), suggesting that evaluation of candidates could be as good on a simulator as on a pregnant volunteer. Some limitations of the simulator were absence of fetal movements during the examination and the absence of interaction with the patient. This could be resolved by improving the quality of simulation systems. The advantages of the OUS include the absence of location and time constraints and not needing to involve volunteers.

Predicting the Risk of Malignancy in Adnexal Masses Based on the Simple Rules From the International Ovarian Tumor Analysis Group

Timmerman D, et al. Am J Obstet Gynecol. 2016; 214:424–437.

A recent meta-analysis concluded that the International Ovarian Tumor Analysis (IOTA) algorithms such as the Simple Rules are the best approaches to preoperatively classify adnexal masses as benign or malignant. This was an international cross-sectional cohort study involving 22 centers to develop and validate a model to predict the risk of malignancy in adnexal masses using the ultrasound features in the Simple Rules. The Simple Rules described in 2008 by the IOTA group are based on a set of 5 ultrasound features indicative of a benign tumor (B-features) and 5 ultrasound features indicative of a malignant tumor (M-features). When using the Simple Rules, tumors are classified as benign if only B-features are observed and as malignant if only M-features are observed. If no features are observed or if conflicting features are present, the Simple Rules cannot classify the tumor. Masses in which the Simple Rules yield an inconclusive result can be classified using subjective assessment by an experienced operator, or given the high prevalence of malignancy in this group, they can all be classified as malignant to increase the sensitivity for ovarian cancer.

Data were recorded in 3 phases from 2002 through 2012 and analyzed on 4848 patients who had at least 1 adnexal tumor selected for surgery. Exclusion criteria included pregnancy at time of examination, refusal of transvaginal examination, decline participation, and surgical intervention at more than 120 days after the ultrasound examination. All patients underwent a standardized transvaginal ultrasound examination by a principal investigator, who was a gynecologist or radiologist with extensive experience. The Simple Rules are based on the presence of ascites, tumor morphology, and degree of vascularity at ultrasonography. Criterion standard was the histopathologic diagnosis of the adnexal mass (pathologist blinded to ultrasound findings). Using the IOTA data from phases 1b and 2, we estimated the risk of malignancy by quantifying the predictive value of each of the 10 features of the Simple Rules and of the type of center in which the patients underwent an ultrasound examination (oncology center vs other hospital). The risk estimates were externally validated on IOTA phase 3 data. The malignancy rate was 43% (1402/3263) in oncology centers and 17% (263/1585) in other centers. The area under the receiver operating characteristic curve on validation data was very similar in oncology centers (0.917; 95% confidence interval, 0.901–0.931) and other centers (0.916; 95% confidence interval, 0.873–0.945). Risk estimates showed good calibration. In all, 23% of patients from the data set had a very low estimated risk (<1%), and 48% had a calculated high risk (≥30%). For the 1% risk cutoff, sensitivity was 99.7%, specificity 33.7%, PPV 44.8%, and NPV was 98.9%. For the 30% risk cutoff, sensitivity was 89.0%, specificity 84.7%, PPV 75.4%, and NPV was 93.9%.

In this study, a method was developed to estimate the individual risk of malignancy in an adnexal mass using the ultrasound features in the IOTA Simple Rules. On prospective validation, the risk estimates showed good ability to discriminate between benign and malignant tumors (area under the receiver operating characteristic curve, 0.917) and good agreement between the calculated risks of malignancy and the true prevalence of malignancy. The Simple Rules when used as originally suggested allow only a categorization of tumors into 3 groups: benign, malignant, or inconclusive. In this study, we show that the Simple Rules can also be used to estimate the risk of malignancy in every adnexal mass and so can be used for individualized patient management. The type of center also needed to be included in our risk estimation, because the risk of a malignant tumor is higher in oncology centers than in others.
Agreement Between Preoperative Transvaginal Ultrasound and Intraoperative Macroscopic Examination for Assessing Myometrial Infiltration in Low-Risk Endometrioid Carcinoma

Pineda L, et al. Ultrasound Obstet Gynecol. 2016; 47:369–373

Preoperative transvaginal ultrasound (TVS) has been used to assess myometrial infiltration in endometrial cancer with controversial results. Reported sensitivity ranges from 58% to 95%, whereas specificity ranges from 71% to 92% when using definitive histopathologic diagnosis as reference standard. This was a single-center observational prospective study to compare diagnostic performance of preoperative TVS and intraoperative macroscopic examination for determining myometrial infiltration in women with low-risk endometrial cancer and to estimate the agreement between the 2 methods.

This study included 152 eligible women from January 1995 to October 2014 at a single university tertiary center with preoperative diagnosis of well- or moderately differentiated endometrioid carcinoma of the endometrium who underwent preoperative TVS by a single examiner who was aware of the patient’s endometrial biopsy result. The scanning protocol remained the same throughout the entire study period. Depth of myometrial infiltration was estimated subjectively by the examiner as less than 50% or 50% or greater. All women underwent surgical staging, which consisted of total hysterectomy with bilateral salpingooophorectomy and peritoneal cytological washings. Pelvic and para-aortic lymphadenectomy was performed if intraoperative macroscopic examination revealed myometrial infiltration of 50% or greater. For intraoperative macroscopic evaluation, the uterus was removed and sent to the pathologist where it was bivalved and sliced transversely at 5-mm intervals. The cut surfaces were examined by pathologists (who were blinded to the TVS findings) to determine the maximum depth of myometrial infiltration as less than 50% or 50% or greater. Definitive histopathologic assessment was performed by frozen-section technique, which was used as the criterion standard.

Mean age was 60.9 ± 10.2 years, with a range of 32 to 91 years. Definitive histologic diagnosis revealed that myometrial infiltration was less than 50% in 114 women and 50% or greater in 38 women. Sensitivity and specificity of TVS for detecting deep myometrial infiltration were 81.6% and 89.5%, respectively, whereas the respective values for intraoperative macroscopic examination were 78.9% and 90.4% (McNemar test, P > 0.05 when comparing TVS and intraoperative macroscopic examination). Agreement between methods was moderate with κ = 0.54 (95% confidence interval, 0.39–0.69) and percentage of agreement of 82%.

Although the agreement between preoperative TVS and intraoperative macroscopic examination for detecting deep myometrial infiltration was only moderate, both methods had similar accuracy when compared with frozen-section histology. Preoperative TVS might reasonably be proposed as a method for assessing myometrial infiltration as an alternative to intraoperative macroscopic examination. A limitation of this study is that it did not assess whether preoperative ultrasound can predict the cases for which lymphadenectomy would not be necessary. Also, some TVS examinations were performed within 1 week after the endometrial biopsy, which can limit image interpretation. Another drawback is the length of the study period because diagnostic performance of TVS as significantly increased in the past 20 years.

Disinfection of Transvaginal Ultrasound Probes in a Clinical Setting: Comparative Performance of Automated and Manual Reprocessing Methods

Buescher DL, et al. Ultrasound Obstet Gynecol. 2016; 47:646–651

This was a prospective randomized controlled clinical study comparing standard disinfection method for transvaginal ultrasound probes in Germany with an automated disinfection method in a clinical setting. Currently, it is common practice in Germany to use impregnated wipes for manual disinfection of transvaginal sonography probes despite the recommendations for automated techniques from a national level.

The study included patients undergoing routine ultrasound examination for a prenatal check-up or for annual screening and did not suffer from a serious infection. Patients were assigned randomly to 1 of 2 rooms, with each room allocated to 1 disinfection technique. In the 1 group, disinfection was performed automatically with the Trophon EPR, which is an automated high-level disinfection (complete elimination of all microorganisms in or on an instrument, except for a small number of bacterial spores) system that disinfects the entire transducer, including the handle, with hydrogen peroxide in a 7-minute cycle. In the second group, the transducers were disinfected manually on the body only with Mikrozid Sensitive ready-to-use impregnated wipes using quaternary ammonium compounds for more than 60 seconds according to the manufacturer’s instructions. The transducer handle was not treated in order to assess the risk of contamination for nondisinfected handles.

In each group, 120 microbial samples were collected from ultrasound transducers before and after disinfection with either an automated method or the manual method. Samples were then analyzed for microbial growth, and isolates were identified to species level. Automated disinfection had a statistically significant higher success rate of 91.4% versus 78.8% for manual method (P = 0.009). The risk of contamination was increased by 2.9-fold when disinfection was performed manually. Microbial analysis revealed 36 different species of bacteria. The 240 samples collected on the transducer handles showed that the risk of microbial contamination of the probe handle after nondisinfection was significantly higher than in the disinfected group.

The study emphasizes the advantages of automated disinfection compared with a manual method, thus increasing patient safety. The higher efficacy of automated disinfection may be attributed to superior disinfecting agents and inconsistent human performance with manual treatment. Another limitation of the study was that only bacterial contamination, and not viral contamination, was examined.

Prenatal Diagnosis of Congenital Heart Defects: Accuracy and Discrepancies in a Multicenter Cohort

Van Velzen, CL, et al. Ultrasound Obstet Gynecol. 2016; 47:616–622

An accurate prenatal diagnosis of congenital heart defect (CHD) is important for several reasons, including determination of immediate postnatal treatment and determining the location and timing of delivery. The objective of this multicenter cohort study was to evaluate the accuracy of prenatal diagnosis of cardiac defects at the fetal medicine units of 3 tertiary care centers in the Netherlands.

Over 10 years (2002–2011), 708 cases with CHD by fetal echocardiography were reviewed to determine the accuracy of the prenatal diagnosis. All cases had prenatal and postnatal data available with the final prenatal cardiac diagnosis compared with postnatal
anatomy as demonstrated by echocardiography, findings during catheter intervention or surgery when applicable, or postmortem examination by a pathologist in cases of neonatal death or termination of pregnancy. Cases of trisomy 13 or 18 were excluded from the analysis, as the aneuploidy itself would have a much greater impact on the outcome than the associated CHD. To determine false-negative cases, the study evaluated whether the mothers of all infants with a postnatal diagnosis of CHD had undergone fetal echocardiography in one of their tertiary care centers. All cases were allocated to 1 of 3 categories according to the level of agreement between the prenatal and postnatal diagnoses: correct, excluding small septal defects; discrepant, prenatal differed from postnatal resulting in different surgical intervention, but the severity of the defect and long-term prognosis remained the same; no similarity, prenatal and postnatal diagnoses and prognosis were completely different and/or led to a different surgical intervention.

The prenatal diagnosis was correct in 82.1% of cases and discrepancies present in 9.9%. In 8.1%, there was no similarity, with disagreement between prenatal and postnatal diagnoses significantly more in cases presenting with a normal 4-chamber cardiac view than those with an abnormal 4-chamber view (5.5% vs 1.9%). A common misinterpretation occurred between unbalanced atrioventricular septal defects versus hypoplastic left heart syndromes. Trisomy 1, extracardiac anomaly, or high maternal body mass index were also present in many cases of disagreement.

This study demonstrated that in experienced hands the accuracy of fetal echocardiography is as high as 92%, which includes discrepancies that did not lead to a different treatment or prognosis. The size of the study allowed the accuracy of fetal echocardiography to be used in prenatal counseling.

Lung B-Line Artefacts and Their Use

Dietrich CF, et al. J Thorac Dis. 2016; 8:1356–1365.

Bedside ultrasound is increasingly used for routine diagnosis and monitoring of pleural and pulmonary pathology. One ultrasound finding on thoracic ultrasound that has been the subject of numerous papers is the B-line artifact (BLA, synonymous with the comet-tail artifact). The authors performed a state-of-the-art review of the significance of the BLA, supplemented by their own anecdotal observations.

BLA is an ultrasound finding that can be seen with cardiogenic and noncardiogenic pulmonary edema, pneumonia, lung trauma and interstitial disease. Because BLA is a nonspecific finding, and can even be seen in a minority of normal subjects, the clinical picture must be taken into account when determining the significance of BLA in a given patient. In patients with pulmonary edema, the density of BLAs correlates with extravascular lung water, and can be used for real-time bedside monitoring of response to therapy. In patients with interstitial lung disease, the distance between adjacent BLAs correlates with severity of disease. BLA is not associated with chronic obstructive pulmonary disease (COPD); therefore, the presence of BLA in a decompensating COPD patient suggests a concomitant superimposed condition, as opposed to COPD exacerbation. The authors note their as-yet unpublished observations that multiple technical considerations (e.g., transducer type and frequency, harmonic imaging, compound imaging) can influence the presence and appearance of BLA, and they indicate that further research is required to elucidate the influence of these factors. This review is concise yet comprehensive, and contains numerous excellent illustrations.

Biopsy of Parotid Masses: Review of Current Techniques

Haldar S, et al. World J Radiol. 2016; 8:501–505.

Approximately 75% of parotid tumors are benign, however imaging features are not reliable for differentiating benign from malignant lesions, and preoperative tissue sampling is often requested before deciding whether and how to perform surgery. The authors performed a literature review, including a meta-analysis of 12 studies in which fine needle aspiration cytology (FNAC) and core biopsy (CB) sampling techniques were compared. FNAC has 89% specificity and 85% accuracy in expert hands; however, the rate of nondiagnostic FNAC is substantially higher at nonspecialized centers that may lack optimal radiologic and/or cytologic expertise. Additionally, newer immunohistochemical techniques cannot be performed on material obtained with FNAC. CB has 96% sensitivity and 100% specificity, which does not vary between institutions, with a low complication rate (1.6%). Although tumor seeding was not documented, the authors acknowledge that seeded tumor may present clinically as long as 20 years after it occurs.

The authors predict that CB will supplant FNAC as the technique of choice for presurgical tissue sampling of parotid lesions in the near future.

Routine Ultrasonography Surveillance of Native Kidneys for Renal Cell Carcinoma in Kidney Transplant Candidates

Klein JA, et al. Clin Transplant. 2016; 30:946–953.

Patients with end-stage renal disease are at increased risk for development of renal cancer, in particular patients with acquired cystic

Abdomen

Ronald H. Wachsberg, MD

Admission Inferior Vena Cava Measurements Are Associated With Mortality After Hospitalization for Acute Decompensated Heart Failure

Cubo-Romano P, et al. J Hosp Med. 2016; 10.1002/jhm.2620.

Decompensated Heart Failure

After Hospitalization for Acute

Ronald H. Wachsberg, MD

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Cardiography can be used in prenatal counseling. This study demonstrated that in experienced hands the accuracy of fetal echocardiography is as high as 92%, which includes discrepancies that did not lead to a different treatment or prognosis. The size of the study allowed the accuracy of fetal echocardiography to be used in prenatal counseling.

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Patients with end-stage renal disease are at increased risk for development of renal cancer, in particular patients with acquired cystic
kidney disease secondary to dialysis. However, there is no universal recommendation for cancer screening in this patient population.

The authors performed a retrospective study of 2642 patients listed for renal transplant. The patients underwent renal ultrasound during initial evaluation, and then annually while awaiting transplant.

In 145 patients (5.4%), a mass was identified, of which 71 (49%) were malignant. There was a significantly higher rate of malignancy in men and African-Americans. Only 8 of 71 patients with renal malignancy had metastatic disease at the time of diagnosis, consistent with the well-known tendency of renal malignancy in dialysis patients to be less aggressive. Median time from transplant listing to renal cell carcinoma detection was 2 years.

The authors concluded that renal malignancy in patients with end-stage renal disease listed for transplant can be diagnosed at a curable stage by surveillance ultrasound screening, which they suggest should be performed biennially.

**Musculoskeletal Ultrasound and other**

**Yoshimi Endo, MD**

**Three-dimensional Ultrasonography for Visualization of Muscular Anomalies in Type VI and VII Radial Polydactyly**

Saito S, et al. *Skeletal Radiol.* 2016;45:541–547.

This technical report describes the clinical applications of 3-dimensional (3D) ultrasound for preoperative planning in infants with radial polydactylies. In this group of patients, knowledge of intrinsic muscle anomalies is important before reconstructive surgery, and recent advances with high-frequency ultrasound transducers may allow adequate preoperative evaluation without the need for sedation.

After preliminary studies on volunteers confirmed the feasibility of 3D ultrasound and high spatial resolution of imaging of the thenar muscles, 5 hands of 5 patients (aged 7 months to 2 years), one with type VI (radial polydactyly with metacarpal duplications) and 4 with type VII (radial polydactyly with triphalangism) radial polydactyly were scanned as part of the study. The scan consisted of a transverse sweep of the palm at 3 mm/s by an electronically controlled mover, with images acquired at 0.2-mm intervals used to produce volume data. An 18-MHz linear array transducer was used.

In 1 of the patients with type VII radial polydactyly, 3D ultrasound revealed an absent abductor pollicis brevis muscle. The other 3 patients with type VII polydactyly had no muscle abnormality on preoperative ultrasound. In the patient with type VI radial polydactyly, 3D ultrasound revealed malpositions of the abductor pollicis brevis, flexor pollicis brevis, and adductor pollicis muscles. All of these findings were confirmed by surgery.

The authors showed that 3D ultrasound can aid in preoperative planning for radial polydactyly surgeries by identifying any intrinsic muscle abnormalities. The lack of dynamic information of the muscles, the fact that the subject had to remain completely still during the 15-second scan time, and limited information on false-positive and false-negative results are limitations cited by the authors.

**Subluxation of the Peroneus Long Tendon in the Cuboid Tunnel: Is It Normal or Pathologic? An Ultrasound and Magnetic Resonance Imaging Study**

Stone TJ, et al. *Skeletal Radiol.* 2016;45:357–365.

The purpose of this ultrasound and magnetic resonance imaging scan study was to assess the position of the peroneus longus (PL) tendon relative to the cuboid tunnel and whether it changes between dorsiflexion and plantarflexion.

Dynamic ultrasound on 20 feet of 10 asymptomatic volunteers demonstrated that the PL was positioned plantar to the cuboid tuberosity, “subluxing” at the entrance of the cuboid tunnel, with the ankle in full dorsiflexion. The PL tendon reduced into the tunnel, entering the cuboid tunnel at the proximal aspect of the tunnel in all feet with plantarflexion.

Retrospective review of 55 ankle magnetic resonance imaging scans (34 scanned in dorsiflexion and 21 scanned in plantarflexion based on the type of coil used) showed that in plantarflexion the PL coursed anterior to the cuboid tuberosity in 52.38% and plantar to the cuboid tuberosity in 9.52%, whereas in dorsiflexion, it coursed anterior to the cuboid tuberosity in 17.65% and plantar to the tuberosity in 61.76%. This difference in location of the PL between the ankles scanned in dorsiflexion and plantarflexion was statistically significant.

The authors conclude that PL “subluxation” plantar rather than anterior to the cuboid tuberosity during dorsiflexion should be considered a normal position-dependent phenomenon rather than pathology.

**Sonographic Evaluation of Athletic Pubalgia**

Morley N, et al. *Skeletal Radiol.* 2016;45:689–699.

This review article describes the scanning technique of the pubic symphysis and the sonographic appearance of normal anatomy, as well as pathologic conditions associated with athletic pubalgia.

Structures inserting on the pubic symphysis region, including the rectus abdominis-adductor aponeurosis and the peripubic ligaments, are evaluated in longitudinal and transverse planes. The inguinal region for identifying inguinal and femoral hernias, and the hip joint to look for acetabular labral tears, should be included as part of the routine evaluation.

Rectus abdominis-adductor longus injury can present as a focal anechoic defect at the pubis in cases of tear and tendon hypoechogenicity, thickening, and loss of normal fibrillary echo texture in cases of tendinosis.

Avulsion of the inguinal ligament can occur as a full-thickness or partial-thickness tear. Adjacent soft tissue injury such as hematoma may be seen.

Subchondral plate irregularity, spurring, pubic symphysis effusion, or diastasis of the symphysis may be signs of osteitis pubis. Focal cortical discontinuity represents a stress fracture; stress response without frank fracture may go undetected on sonography.

Dynamic maneuvers and the incorporation of Valsalva can help diagnose inguinal and femoral hernias. Symptomatic osteitis pubis can be treated by injecting anesthetic and/or steroid under ultrasound guidance.

The authors state that athletic pubalgia can be well assessed under ultrasound; it is inexpensive and quick relative to magnetic resonance imaging, and the use of dynamic maneuvers and graded compression allows direct correlation with the site of pain.

**Which Imaging Modality Is Most Effective for Identifying Pseudotumours in Metal-on-Metal Hip Resurfacings Requiring Revision: Ultrasound or MARS-MRI or Both?**

Matharu GS, et al. *Bone Joint J.* 2016;98-B:40–48.
The purpose of this retrospective study was to compare the diagnostic accuracy of ultrasound alone, metal artifact reduction magnetic resonance imaging (MARS-MRI) alone, and the 2 combined for identifying pseudotumors in patients with metal-on-metal hip resurfacings (MoMHRs). Although early detection of pseudotumors is believed to improve outcome after revision surgery, the best imaging modality for surveillance is currently still under debate.

Forty MoMHRs in 39 patients who underwent both ultrasound and MARS-MRI examinations within 3 months of each other and revision surgery within 1 year of the imaging studies were included in the study. A single radiologist identified a pseudotumor as a cystic, solid, or mixed mass in continuity with the hip joint, and the volume and location of each were documented, blinded to the surgical findings.

The incidence of pseudotumors intraoperatively was 82.5%. The agreement with intraoperative findings was 82.5% for ultrasound alone, 87.5% for MARS-MRI alone, and 92.5% for the 2 combined. Ultrasound and MARS-MRI alone had similar sensitivities (90.9% and 93.9%) and positive predictive values (88.2% and 91.2%), but MARS-MRI had higher specificity (57.1% vs 42.9%) and negative predictive value (66.7% vs 50.0%). When the 2 were combined, the sensitivity and negative predictive value both reached 100%.

The authors conclude that, although the choice of imaging modality for evaluating patients with MoMHRs partly depends on financial constraints and available expertise with ultrasound, combination of ultrasound and MARS-MRI is most effective in detecting and excluding pseudotumors.

**Inefficacy of Ultrasound-Guided Local Injections of Autologous Conditioned Plasma for Recent Epicondylitis: Results of a Double-blind Placebo-controlled Randomized Clinical Trial With one-year follow-up**

Montalvan B, et al. *Rheumatology (Oxford)*. 2016;55:279–285.

This single-center, randomized, double-blind, placebo-controlled study aimed to evaluate the efficacy of 2 intratendinous injections of platelet-rich plasma (PRP) for tennis elbow (TE) compared with control saline injection. Platelet-rich plasma is thought to stimulate healing of tissues including muscles and tendons because of concentrated growth factors, and prior studies have suggested that PRP is superior to bupivacaine or glucocorticoid injection for TE.

Fifty patients with symptoms of TE for no longer than 3 months were randomized into either the PRP group or the saline group. In both groups, the needle was placed longitudinally along the extensor tendon origin under ultrasound guidance until it contacted bone, and the needle was dissected through the area if tendon fissuring was found. Patients in both groups received 2 procedures during a 4-week span and were monitored at baseline and at 1, 3, 6, and 12 months. Three patients in each arm were either lost to follow-up or withdrew.

The pain score on visual analog scale significantly decreased in both groups between the follow-up periods, but there was no statistically significant difference in the degree of improvement in the pain scores between the 2 groups. In addition, there was no statistically significant difference in improvement of the Roles-Maudsley score for pain on isometric contraction of 2 extensor muscles.

The study concludes that 2 intratendinous ultrasound-guided injections of PRP were not more efficacious than injections of saline for treatment of TE. There was significant improvement in pain parameters with PRP, but not significantly more than saline.

**Diagnostic Accuracy of Lung Ultrasound for Interstitial Disease in Patients With Connective Tissue Diseases: A Meta-analysis**

Song GG, et al. *Clin Exp Rheumatol*. 2016;34:11–16.

This meta-analysis reviews the current literature on the diagnostic accuracy of lung ultrasound (US) for assessing connective tissue disease-related interstitial lung disease (ILD) using high-resolution computed tomography (HRCT) as reference. Although the mechanism of their appearance is still debated, B-lines on lung US are markers of thickened subpleural interlobular septae and are thought to correlate with CT signs of fibrosis.

Eight published studies comparing US to HRCT, involving a total of 349 patients, fulfilled the inclusion criteria for the meta-analysis. When the data were pooled, the sensitivity and specificity of lung US were 91.5% and 81.3%, respectively, and the positive likelihood ratio, negative likelihood ratio, and diagnostic odds ratio were 4.100, 0.176, and 34.73, respectively.

Analysis of the correlation coefficients showed significant correlation between B-line scores on lung US and HRCT Warrick scores, with a correlation coefficient of 0.783 and $P < 1 \times 10^{-9}$. Summary receiver operating characteristic curves were subsequently generated, which yielded an area under the curve of 0.915, indicating a high diagnostic accuracy.

The authors conclude that lung US has high diagnostic accuracy, correlates well with HRCT for the detection of ILD, and may be an additional option for assessing those suspected of connective tissue disease–related ILD. Given the small number of included studies, further studies with larger population samples are needed.

**Ultrasound Stratification of the FDG-Avid Thyroid Nodule**

Beech P, et al. *Clin Radiol*. 2016;71:164–169.

The goal of this study was to assess the utility of ultrasound in the risk stratification of a thyroid nodule that is 2-[18F]-fluoro-2-deoxy-D-glucose (FDG) avid on positron emission tomography. Although the incidence of malignancy in an FDG-avid thyroid nodule has been reported to be as high as 63%, increased FDG uptake is not specific for malignancy as infectious and inflammatory entities can also result in high FDG uptake.

Forty-eight FDG-avid thyroid nodules in 47 consecutive patients who were subsequently evaluated under ultrasound and were subjected to ultrasound-guided fine-needle aspiration were included in this retrospective study. Marked hypochochogenicity, irregular margins, micocalcifications, marked hypervascularity, and taller length than width were considered suspicious sonographic features, whereas purely cystic or spongiform appearance was considered not suspicious.

Twenty-four of the 48 nodules had no suspicious features on ultrasound, whereas the other 24 had at least 1 suspicious feature. In the first group, 22 had benign cytology while 2 were indeterminate. Among the 24 nodules with at least 1 suspicious feature, 5 were malignant, 7 were indeterminate, and 12 were benign. The absence of any suspicious feature had a strong association with benign cytology ($P = 0.009$). When the individual suspicious features were analyzed separately, marked hypochochogenicity ($P = 0.02$), irregular margins ($P = 0.009$), and taller-than-wide morphology ($P = 0.04$) had the strongest association with malignant cytology.

The study concludes that the incidence of malignancy in FDG-avid thyroid nodules is low in the absence of suspicious ultrasound
features; ultrasound can help risk-stratify these thyroid nodules and potentially obviate the need for fine-needle aspiration. The main limitation of the study was the small sample size, and the authors acknowledge the need for a larger study to validate their findings.

**Short-term Follow-up US Leads to Higher False-Positive Results Without Detection of Structural Recurrences in PTMC**

Yoon JH, et al. *Medicine (Baltimore)*. 2016;95:e2435.

The aim of this retrospective study was to assess the value of annual follow-up neck ultrasound (US) for surveillance in patients treated for papillary thyroid microcarcinomas (PTMCs). Although annual US is generally recommended in patients with differentiated thyroid cancers, frequent surveillance may negatively impact long-term outcome as PTMCs have an indolent clinical course, and tumor recurrence may not affect the overall survival of the patient.

A total of 375 patients who underwent total thyroidectomy with radioactive iodine remnant ablation for PTMC and who underwent clinical follow-up including annual neck US were included in the study. At final follow-up, 1.1% (4/375) had structural recurrence, 0.3% (1/375) had structural persistence, and 1.1% (4/375) had biochemical recurrence, all of which were detected 3 years after the initial treatment.

Thirty-three patients (8.8%) had at least 1 abnormal lesion seen on postoperative surveillance US. Fine-needle aspiration was performed on 28 focal lesions of 25 patients, and metastases were noted in 5 patients. Among the 375 patients, 8.3% had at least 1 false-positive examination on surveillance US.

On multivariate analysis, both the shorter interval of US surveillance and presence of lymph node metastasis were independent predictors affecting the cumulative risk of having a false-positive US result.

The authors conclude that short-term follow-up US can result in higher likelihood of having a false-positive result without detection of clinically meaningful recurrences in patients with PTMCs without biochemical abnormalities.

**Ultrasound Is at Least as Good as Magnetic Resonance Imaging in Predicting Tumour Size Post–Neoadjuvant Chemotherapy in Breast Cancer**

Vriens BE, et al. *Eur J Cancer*. 2016;52:67–76.

The goal of this prospective study was to compare the accuracy of measurements of breast tumor size post–neoadjuvant chemotherapy on ultrasound (US) to that on magnetic resonance imaging (MRI). Although initial publications have reported MRI to be more accurate than US, more recent studies have had conflicting results about the accuracies of MRI and US.

One hundred eighty-two patients enrolled in the INTENS trial who had post–neoadjuvant chemotherapy MRI, US, and histological tumor size available were included. Magnetic resonance imaging estimated tumor size with less than 10-mm discordance in 54%, overestimated by more than 10 mm in 28%, and underestimated tumor size by more than 10 mm in 18%. In contrast, US estimated tumor size within 10 mm in 63%, overestimated by more than 10 mm in 20%, and underestimated by more than 10 mm in 17%.

In hormone receptor–positive tumors, the negative predictive value of both MRI and US was low (26% and 33%, respectively), compared with hormone receptor–negative tumors (58% vs 78%, respectively). The median absolute difference in clinical and pathologic tumor size as a percentage of postchemotherapy pathologic tumor size was 63% for MRI and 49% for US.

The authors conclude that US is at least as accurate as MRI for residual size of the tumors after neoadjuvant chemotherapy. However, the rate of overestimation and underestimation of tumor size remained significant, and negative predictive values of both modalities were low especially in hormone receptor–positive tumors.

**Transfer From Point-of-Care Ultrasonography Training to Diagnostic Performance on Patients—A Randomized Controlled Trial**

Todsen T, et al. *Am J Surg*. 2016;211:40–45.

Focused ultrasonography courses on point-of-care ultrasonography (POCUS) are popular among members of the American College of Surgeons, yet more evidence is needed to assess their effectiveness in training for real clinical settings. The goal of this current study was to investigate the transfer of skills gained by physicians on an abdominal POCUS course to examination of real patients.

Thirty-one nonradiologist physicians with no formal prior training on ultrasound were randomized into either the control group (14 physicians) or the intervention group (17 physicians). Those in the intervention group participated in a 4-hour course consisting of lectures and “hands-on” sessions on POCUS of the gallbladder, kidneys, and aorta and FAST (focused assessment with sonography in trauma). After the course, they scanned 4 real patients, and their interpretations were graded. Those physicians in the control group scanned the same patients but without the 4-hour didactic course.

The objective structured assessment of ultrasound skills score was statistically significantly higher for the intervention group compared with the control group. Those in the intervention group were 3 times as likely to arrive at a correct diagnosis for each subject compared with those in the control group.

The authors conclude that the 4-hour focused ultrasonography course can lead to improved diagnostic performance for those performing POCUS. It is recommended that clinicians receive systematic training before they start to use any new technology, with ultrasonography being an illustrative example.