

Diffusion-Weighted MRI Can Detect Nonpalpable Undescended Testes

Diagnostic Performance of Diffusion-Weighted MRI in the Detection of Nonpalpable Undescended Testes: Comparison With Conventional MRI and Surgical Findings.

Kantarci M, Doganay S, et al:

AJR Am J Roentgenol 2010; 195 (October): W268-W273

Diffusion-weighted imaging can complement conventional MRI findings in identifying and locating nonpalpable undescended testes.

Objective: To determine if diffusion-weighted MRI has a role in identifying and locating nonpalpable undescended testes.

Design: Retrospective analysis.

Participants/Methods: This study was comprised of 36 boys with undescended testes. The patients underwent preoperative MR imaging examinations with a 1.5-T system. Sequences included axial and coronal fat-suppressed turbo spin-echo T2-weighted, axial and coronal T1-weighted, and axial single-shot spin-echo echo-planar diffusion-weighted imaging (DWI) sequence performed with b-values of 50, 400, and 800 s/mm². Images were reviewed by 2 radiologists with 13 and 5 years experience in interpreting abdominal MRI. The presence or absence as well as the location of the undescended testes were recorded. The DWI as well as the conventional MR images were reviewed alone and subsequently in combination. The location of the testes was classified into 1 of 3 anatomic regions: intracanalicular being close to and below the internal ring, low intra-abdominal being close to and above the internal ring, and high intra-abdominal being >3 cm from the internal ring. On conventional MR images, elliptical areas in the aforementioned locations that were hypointense on T1-weighted and hyperintense on T2-weighted images were recorded as testes. All the patients underwent laparoscopic exploration within 2 weeks of the preoperative MR study, and the location as well as the appearance was recorded.

Results: At laparoscopy, 50% of the testes were intracanalicular in location. The combination of DWI and conventional MRI was the most sensitive and most accurate technique in the depiction and localization of the nonpalpable undescended testes as compared to DWI or conventional MRI alone. The sensitivities of the 2 observers for these techniques were 91% and 88%, 88% and 82%, and 85% and 85%, respectively. There was an intraabdominal atrophic testis at laparoscopic orchiectomy that was not detected by either observer. There was also a false-positive where an infected lymph node was misidentified as a testis.

Conclusions: Use of DWI with a high b value yields information that complements conventional MRI findings, improving identification and location of nonpalpable undescended testes. The authors recommend the use of conventional MRI in addition to DWI to increase the preoperative sensitivity and accuracy of identifying and locating nonpalpable testes.

Reviewer's Comments: The results of this study are useful in demonstrating that DWI can supplement conventional MRI evaluation of patients with nonpalpable undescended testes. The high cellularity of the testes leads to the restricted water motion that is exploited by the DWI. A limitation noted in this study was the small sample size. (Reviewer-John C. Sabatino, MD).

Keywords: Undescended Testes, Diffusion-Weighted MRI

Print Tag: Refer to original journal article

MRI or EUS -- Which More Accurately Predicts Malignancy?

Comparison of MRI and Endoscopic Ultrasound in the Characterization of Pancreatic Cystic Lesions.

Kim YC, Choi JY, et al:

AJR Am J Roentgenol 2010; 195 (October): 947-952

MRI and endoscopic ultrasound are comparable in the characterization of cystic pancreatic lesions and prediction of malignancy.

Objective: To determine if MRI and endoscopic ultrasound (EUS) are comparable in characterizing cystic pancreatic lesions and predicting malignancy.

Design: Retrospective analysis.

Participants/Methods: There were 50 patients, 26 men and 24 women; 21 patients had a cystic pancreatic lesion and 29 had solid lesions. The lesions were initially detected on CT or ultrasound and the patients subsequently underwent both MRI and EUS within one month of each other and of surgery. All lesions had pathological confirmation, and were morphologically characterized as round or lobulated, sharply demarcated, with a smooth wall, and having a cystic component comprising >50% of the lesion area. The cystic lesion types were as follows: intraductal papillary mucinous neoplasms, serous cystadenoma, solid pseudopapillary neoplasm, mucinous cystic neoplasm, and dermoid cyst. The solid lesion types included adenocarcinoma, solid pseudopapillary neoplasm, and neuroendocrine neoplasm. The examinations were performed with a 1.5-Tesla MR system. Imaging sequences included breath hold dual fast gradient-recalled echo T1-weighted, respiratory triggered breath hold T2-weighted single-shot turbo spin-echo, and breath hold 3-dimensional fat-suppressed gradient-recalled echo images. Three-dimensional fat-suppressed gradient-recalled echo images were obtained during dynamic administration of intravenous gadolinium contrast. Hepatic arterial, portal venous, and equilibrium phases were obtained. 2D thick-slab single-shot turbo spin-echo as well as 3D MR cholangiopancreatography T2-weighted sequences were obtained. The MR images were reviewed by 2 radiologists. They recorded if the cystic lesion was round or lobulated, sharply demarcated, with a smooth wall, and had bright signal on T2-weighted images. They also evaluated the lesions for the presence of septa, mural nodules, communication with the main pancreatic duct, and main pancreatic duct dilatation. The EUS were reviewed by a single gastroenterologist.

Results: There were 21 cystic pancreatic lesions that measured between 2 and 10 cm; 18 of 21 were found in the body. There was no difference in sensitivity between MRI and EUS in characterizing septa, mural nodules, communication with the main pancreatic duct (MPD), and MPD dilatation. There was also no statistically significant difference in the prediction of lesion malignancy between the 2 modalities.

Conclusions: MRI and EUS are comparable in the characterization of cystic pancreatic lesions and prediction of malignancy.

Reviewer's Comments: The results of this study are useful and demonstrate that MRI and EUS are comparable in the characterization of cystic pancreatic lesions, as well as in predicting malignancy. Therefore, due to the inherent limitations of CT, either can be used as a second-line modality in the characterization of these lesions. One of the limitations reported in this study was small sample size. (Reviewer-John C. Sabatino, MD).

Keywords: Pancreatic Lesions, Malignancy, MRI, Endoscopic Ultrasound

Print Tag: Refer to original journal article



Small Solid Pseudopapillary Neoplasms Have Very Different Imaging Characteristics

Small (≤ 3 cm) Solid Pseudopapillary Tumors of the Pancreas at Multiphasic Multidetector CT.

Baek JH, Lee JM, et al:

Radiology 2010; 257 (October): 97-106

Small solid pseudopapillary neoplasms of the pancreas tend to be purely solid, with sharp margins and gradual enhancement as opposed to larger lesions, which are cystic and solid with heterogeneous enhancement.

Objective: To determine if there are different imaging findings of small solid pseudopapillary neoplasms of the pancreas compared to larger lesions at multiphasic multidetector CT.

Design: Retrospective analysis.

Participants/Methods: There were 42 patients with solid pseudopapillary neoplasms of the pancreas who had preoperative multiphasic multidetector CT. The lesion location breakdowns were as follows: 6 in the head, 4 in the neck, 6 in the body, and 26 in the tail. They ranged in size between 1.0 and 14.6 cm. CT examinations were performed during the unenhanced, pancreatic, and hepatic venous phases. The images were reviewed by 2 abdominal radiologists. The lesions were analyzed and the features recorded included the following: shape, location, diameter, solid and cystic components, border and margin, calcification, pancreatic duct dilatation, parenchymal atrophy, enhancement pattern, and lesion attenuation on the unenhanced, pancreatic, and hepatic venous phases. Typical solid pseudopapillary neoplasms were defined as a mass that had at least 3 of the following features: a thick fibrous capsule, solid and cystic components, peripheral calcification, and hypodense compared to the gland on pancreatic phase images. Atypical solid pseudopapillary neoplasms were defined as a mass that had any of the following features: mainly solid or mainly cystic, ill-defined margin, dense internal calcification, or hyperdense compared to the gland on pancreatic phase images. Atypical lesions measuring >3 cm were classified as large, and those ≤ 3 cm were classified as small.

Results: There were 20 typical solid pseudopapillary neoplasms, and 22 atypical solid pseudopapillary neoplasms. All of the typical lesions were large, measuring >3 cm. There were 12 small and 10 large atypical lesions. The majority of the atypical lesions had the following CT features: solid, unencapsulated, and no calcification. The small atypical solid pseudopapillary neoplasms were usually solid with a sharp margin as well as without ductal dilatation or atrophy of the gland. These small lesions also showed weak enhancement during the pancreatic phase with gradually increasing enhancement during the hepatic venous phase. Meanwhile, the typical solid pseudopapillary neoplasms were all >3 cm, well-defined, solid and cystic lesions that had heterogeneous enhancement. The large atypical lesions were either calcified solid masses or large cystic lesions.

Conclusions: The imaging features of small and large solid pseudopapillary tumors differ from each other, and small solid pseudopapillary tumors frequently appear as purely solid tumors with a sharp margin and gradual enhancement.

Reviewer's Comments: The results of this study are useful in demonstrating that small solid pseudopapillary neoplasms have very different imaging characteristics. These lesions are usually solid masses with weak enhancement during the pancreatic phase with gradually increasing enhancement during the hepatic venous phase. Consequently, these small lesions have the potential to be confused with adenocarcinomas. One of the limitations reported in the study was the possibility of interpretive bias as both reviewers were aware of the presumptive diagnosis of solid pseudopapillary neoplasms prior to the data review. (Reviewer-John C. Sabatino, MD).

Keywords: Pancreas, Imaging Findings, Small Neoplasms

Print Tag: Refer to original journal article

Percutaneous Liver Biopsy Has Higher Yield, Fewer Complications

Single-Institution Results of Image-Guided Nonplugged Percutaneous Versus Transjugular Liver Biopsy.

Hardman RL, Perrich KD, Silas AM:

Cardiovasc Intervent Radiol 2010; October 21 (): epub ahead of print

Both transjugular and percutaneous liver biopsy techniques are efficacious and safe, although the percutaneous route has a higher biopsy yield.

Background: Patients with ascites or a coagulopathy are typically referred for transjugular liver biopsy due to the high risk of bleeding complications. However, the transjugular approach is technically more difficult, has lower biopsy yields, and may result in complications from the remote transjugular approach. The percutaneous hepatic biopsy tract may be plugged with thrombolic agents to prevent subcapsular hemorrhage.

Objective: To review patients who received a percutaneous or transjugular liver biopsy with additional focus on a crossover group of patients who were changed to percutaneous biopsy.

Design/Methods: This is a retrospective study of 238 patients who received either a transjugular or percutaneous liver biopsy. Patients were typically referred for transjugular biopsy in the setting of relative contraindications to percutaneous biopsy such as thrombocytopenia, coagulopathy, and ascites. Of 67 patients initially referred for transjugular biopsy, 31 were changed to percutaneous biopsy (crossover group).

Results: A sufficient sample was obtained in all but 3 (91.9% success) of the transjugular biopsies and all but 4 (98.0% success) of the percutaneous biopsies. Two of the biopsies resulted in inadequate samples in the crossover group (93.5% success). In the transjugular group, there were 3 complications (8.3%) with 1 (2.8%) major complication, a subcapsular hematoma requiring embolization. In the percutaneous group, there were 10 complications (5.9%) with 3 of them classified as major: 2 subcapsular hematomas requiring embolization and 1 death within 24 hours after the procedure. In the crossover group, there were 4 complications (12.9%). Patients with ascites who underwent transjugular biopsy had a higher complication rate than those who had a percutaneous biopsy procedure (18.2% vs 11.5%).

Conclusions: The limitations of this study include a relative small sample size, retrospective study design, and potential selection bias in the crossover group. A slightly higher complication rate was seen in patients with ascites who underwent a transjugular biopsy procedure versus the percutaneous procedure. The authors concluded that both transjugular and percutaneous liver biopsy techniques are efficacious and safe, although the percutaneous route has a higher biopsy yield.

Reviewer's Comments: The transjugular biopsy procedure is non-targeted and is often performed in conjunction with pressure measurements. Percutaneous biopsy procedures are often targeted, require less technical expertise, and yield better samples. There is an inherent difference in the 2 patient populations, making a side by side comparison of procedural safety difficult. Patients reassigned to the percutaneous group did not have complication rates significantly different than the transjugular biopsy group; however, sample size was small and reassignment criteria were not objectified. (Reviewer-Waseem A. Bhatti, MD).

Keywords: Biopsy, Ascites, Liver Tumors

Print Tag: Refer to original journal article

Current Diagnostic CT Criteria for Bronchomalacia Not Correct

Bronchial Collapsibility at Forced Expiration in Healthy Volunteers: Assessment With Multidetector CT.

Litmanovich D, O'Donnell CR, et al:

Radiology 2010; 257 (November): 560-567

Healthy people demonstrate a wide range of central airway collapsibility that often exceeds the current diagnostic threshold of bronchomalacia, which is a 50% reduction of the cross-sectional luminal area of the central airways during a forced expiration.

Background: Tracheobronchomalacia is excessive expiratory collapse of the central airways and can be a cause of chronic cough as well as other respiratory symptoms.

Objective: To evaluate the normal range of expiratory collapsibility of the main bronchi and bronchus intermedius as seen on CT.

Participants: 51 volunteers (25 men and 26 women) who were between ages 25 and 75 years (average, 50 ± 15 years), did not have any respiratory symptoms or history of respiratory disease, and were not cigarette smokers were evaluated.

Methods: All CTs were performed on a 64-MDCT scanner. A low-dose technique was employed using 80 mA, 120 kVp, and 0.625-mm collimation. The field of view was centered on the main airways. Images were obtained from 2 cm above the aortic arch to 2 to 3 cm below the carina. Images were reconstructed at 0.625-mm section thickness with 0.625-mm reconstruction intervals. Two sets of images were obtained: one at end inspiration and one during forced expiration. On each set of images, the coronal and sagittal diameters and luminal cross-sectional area of the right main bronchus, left main bronchus, and bronchus intermedius were obtained. Because the bronchi course obliquely to the axial plane, post-processing of the axial images was performed to get true coronal and sagittal reconstructions. The luminal cross-sectional area was obtained by manually tracing the airway borders.

Results: For the right main bronchus, the average cross-sectional area decreased from 158.8 mm² ± 36.5 at end inspiration to 52.5 mm² ± 34.9 during forced expiration yielding an average expiratory reduction of 66.9% ± 19.0 (range, 15.3% to 94.9%). For the left main bronchus, the average cross-sectional area decreased from 119.2 mm² ± 29.5 at end inspiration to 46.0 mm² ± 23.0 mm² during forced expiration, yielding an average expiratory reduction of 61.4% ± 16.7 (range, 4.3% to 87.2%). For percentage of collapse in both the right main bronchus and left main bronchus, the average percentage of expiratory collapse was significantly higher in the sagittal dimension than the coronal dimension (average, 34.6% and 23.2% greater, respectively, *P* < 0.001 for each). If the current criterion of 50% reduction in cross-sectional luminal area of the bronchus is used for the diagnosis of bronchomalacia, 73% of the volunteers exceeded this threshold.

Conclusions: Healthy people demonstrate a wide range of central airway collapsibility, which often exceeds a 50% reduction of the cross-sectional luminal area of the right or left main bronchus during a forced expiration.

Reviewer's Comments: The authors have demonstrated that diagnosing bronchomalacia on CT is fraught with error because many normal individuals have a significant decrease in the cross-sectional luminal area of their bronchi normally with a forced expiration. (Reviewer-Vineet R. Jain, MD).

Keywords: Bronchomalacia

Print Tag: Refer to original journal article

Coronary Artery Calcification Predicts Death From Heart Disease

Ordinal Scoring of Coronary Artery Calcifications on Low-Dose CT Scans of the Chest Is Predictive of Death From Cardiovascular Disease.

Shemesh J, Henschke CI, et al:

Radiology 2010; 257 (November): 541-548

An ordinal scoring of the amount of coronary artery calcification on noncontrast chest CTs yields clinically relevant information regarding risk of cardiovascular death.

Objective: To evaluate the usefulness of determining the degree of coronary artery calcification by a visual assessment of low-dose CT scans of the chest in predicting cardiovascular death.

Participants: Prospective cohort of 8782 men and women who underwent low-dose CT screening for lung cancer between June 2000 and December 2005.

Methods: CT scans were performed using a low-dose technique. No contrast was given and ECG gating was not employed. The degree of calcification in the 4 main coronary arteries was assessed. The calcification was graded as absent, mild, moderate, or severe. When less than one third of the length of the coronary artery demonstrated calcification it was graded as mild, when between one third and two thirds of the length of the coronary artery demonstrated calcification it was graded as moderate, and greater than two thirds involvement of the coronary artery was graded as severe. All participants received a coronary artery calcium score ranging from 0 to 12. Patients were followed up until December 31, 2007. The cause of all deaths was coded according to the International Classification of Diseases, 10th revision.

Results: The median follow-up was 72.3 months (range, 0.03 to 91.9 months). Coronary artery calcification was seen in 59% of participants and there was a higher frequency in men than women (69% vs 50%; $P < 0.0001$). In those with detectable calcification, the average coronary artery calcification score increased with age and was higher in men compared with women for each decade. The rate of cardiovascular death increased with increasing coronary artery calcification score. For participants with a score of 0, it was 1.2%. For a score of 1 to 3, it was 1.8%. For a score of 4 to 6, it was 5.0%. For a score of 7 to 12, it was 5.3%. A coronary artery calcification score of at least 4 was a significant predictor of death due to cardiovascular disease (odds ratio [OR], 4.7; 95% confidence interval [CI], 3.3, 6.8; $P < 0.0001$). When adjusting for patient age, sex, and pack years of smoking, the coronary artery calcification score was still significant (OR, 2.1; 95% CI, 1.4, 3.1; $P = 0.0002$).

Conclusions: An assessment of the amount of calcification on nongated noncontrast CT scans of the chest provides important prognostic information regarding cardiovascular death.

Reviewer's Comments: Despite limitations of lack of Framingham risk score data and data on rate of myocardial infarction, which the authors acknowledge, this study very nicely demonstrates that heavy coronary artery calcification yields important clinical information. However, I question the authors' assertion that quantitative assessment of the extent of coronary calcification should be made on all CT scans of the chest without further study as to what this potentially could lead to. (Reviewer-Vineet R. Jain, MD).

Keywords: Coronary Artery Calcification, Cardiovascular Death

Print Tag: Refer to original journal article

Thoracic Aortic Calcification Predicts Future Cardiovascular Disease Events

Cardiovascular Disease: Prediction with Ancillary Aortic Findings on Chest CT Scans in Routine Practice.

Gondrie MJ, Mali WP, et al:

Radiology 2010; 257 (November): 549-559

A derived prediction model incorporating ancillary aortic findings detected on routine diagnostic CT images complements established risk scores and may help to identify patients at high risk for cardiovascular disease.

Objective: To evaluate ancillary aortic findings seen on chest CT in its ability to predict cardiovascular disease.

Participants: 817 patients underwent chest CT for clinical indication. Patients who received a diagnosis of primary lung cancer or widespread metastatic disease were excluded because it was felt that ancillary findings would not likely alter management in these patients. Patients whose CTs were performed for cardiovascular disease were excluded because aortic findings in these patients would not necessarily be ancillary.

Methods: Only patients who had CTs with IV contrast were included. All of the CTs were evaluated for aortic pathology in only the axial plane. Calcifications of the aorta were scored in the ascending aorta, descending aorta, and great arteries branching from the aortic arch. Plaques and irregularity were scored in the ascending aorta and descending aorta. The descending thoracic aorta was considered elongated if it deviated from its normal course by more than its own diameter. The calcification scores in each part of the aorta were dependent upon the number of foci of calcification seen. The plaque and irregularity scores were dependent upon the number of image sections in which plaque and irregularity was seen. The number of fatal and nonfatal cardiovascular disease events was recorded for an average of 17 months with a maximum follow-up of 48 months. These cardiovascular disease events included coronary heart disease, heart failure, peripheral arterial disease, aortic aneurysm, cerebrovascular disease, and nonrheumatic valvular disease.

Results: The average age of the patients was 62 years and 57% patients were male. The prevalence of calcification was 23%, plaque was 27%, and irregularity was 6% in the ascending aorta and the prevalence of calcification was 49%, plaque was 74%, and irregularity was 45% in the descending thoracic aorta. Overall, 50% of patients had calcifications in the great arteries off of the aortic arch. Aortic elongation was present in 7% of patients. Regarding the cardiovascular disease events, the proportions were higher in older patients (average age 69 years), male patients (61%), and for all types of aortic abnormality. Each aortic abnormality was highly predictive. The prediction model incorporating thoracic aortic calcification sum score was chosen due to its good performance (c index, 0.72; goodness-of-fit $P = 0.47$) and because this model is also applicable to CT scans of the chest performed without intravenous contrast.

Conclusions: A derived prediction model incorporating ancillary aortic findings detected on routine diagnostic CT images complements established risk scores and may help to identify patients at high risk for cardiovascular disease.

Reviewer's Comments: This nice study demonstrates that prominent calcification of the thoracic aorta is associated with a higher risk of having a future cardiovascular event. These results are similar to what is seen with coronary artery calcification. (Reviewer-Vineet R. Jain, MD).

Keywords: Aortic Calcification, Cardiovascular Disease

Print Tag: Refer to original journal article

Does Embolization Successfully Treat Aneurysmal Bone Cyst?

Successful Treatment of Aneurysmal Bone Cyst of the Hip in a Child By Selective Transcatheter Arterial Embolization.

Rossi G, Angelini A, et al:

J Vasc Interv Radiol 2010; 21 (October): 1591-1595

Preoperative embolization for aneurysmal bone cysts may delay or obviate the need for surgical therapy.

Discussion: Aneurysmal bone cysts are found in long bones in the first 2 decades of life. When they are located next to the growth plate, they can cause skeletal deformities. It is rare to find these bone cysts in children aged <6 years; in these younger kids, there is a higher incidence of recurrence. The traditional treatment for aneurysmal bone cysts is curettage and en bloc excision, but less invasive treatments have gained favor.

Objective: To present the case of a 5-year-old with an aneurysmal bone cyst who was treated successfully with 2 sessions of embolization. **Case Report:** A 5-year-old girl with a pathologic fracture in her left femoral neck through what her doctors thought was a unicameral bone cyst, but the cystic lesion became bigger after 5 months. The patient was scheduled for preoperative treatment with arterial embolization. The embolization was performed with NBCA glue and lipiodol. Gradual symptom relief occurred and surgery was delayed. After a second embolization, the patient showed complete pain relief and was able to participate in daily activities. The serial radiographs taken post-procedure demonstrated gradual resolution of lesion and bone formation.

Reviewer's Comments: Pathologically, an aneurysmal bone cyst is a tumor-like lesion with blood-filled spaces and connective tissue with osteoclasts, giant cells, and osteoid tissue. It is usually found in patients who are aged >8 years. Obtaining tissue samples is paramount because of the possibilities including unicameral bone cyst, fibrous dysplasia, fibromas, osteblastomas, and sarcomas. Biopsy in this case was delayed because unicameral bone cysts usually heal well within 6 weeks. Aneurysmal bone cysts and unicameral bone cysts are difficult to differentiate once there are fractures involved because there is interference with blood, fibrin, and granulation tissue. Pathological fracture is not common in aneurysmal bone cysts in 10% to 11% of cases. In this case, the patient's aneurysmal bone cyst was cured after 2 embolizations. Other treatments such as curettage, cement, sclerosants, etc, have multiple complications including femoral head osteonecrosis, fracture, growth injury and arrest, infection, damage to a nerve, and pulmonary embolism. Wide resection and radiation therapy are not recommended for benign lesions in children. The above therapies have a 59% recurrence rate, particularly for aneurysmal bone cysts. Multiple procedures are usually necessary because these types of lesions frequently have multiple collateral pathways. Embolization of the feeding vessels of a tumor has been shown to reduce intraoperative blood loss as long as the operation is performed before collateral supply is reestablished. Even though in this patient embolization was performed as a preoperative treatment, it proved to be the definitive therapy, causing resolution of the cyst without extensive damage to the growth plate. (Reviewer-Sharon Gonzales, MD).

Keywords: Aneurysmal Bone Cyst, Embolization, Preoperative Therapy, Pediatric Bony Lesions

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SPI Cannot Be Used to Reliably Predict Sac Growth or Regression

Intraoperative Sac Pressure Measurement During Endovascular Abdominal Aortic Aneurysm Repair.

Ishibashi H, Ishiguchi T, et al:

Cardiovasc Intervent Radiol 2010; 33 (October): 939-942

Aneurysmal sac measurements can aid in showing the success of endovascular stent deployment, but not the eventual outcome.

Background: Endovascular abdominal aortic aneurysm repair (EVAR) has become a standard procedure to repair abdominal aortic aneurysm (AAA). EVAR is performed primarily to decrease the pressure of the aneurysm sac and exclude the sac from the central circulation so it does not rupture. The relationship between sac pressure and postoperative shrinking of the sac is unclear.

Objective: To measure the aneurysm sac pressure directly during the EVAR procedure.

Methods: Intraoperative sac pressure was measured during EVAR in 47 consecutive AAA repairs. The authors used Zenith and Excluder grafts. Aneurysmal sac pressure was measured from a micro catheter at 3 time points: after main body deployment, after all leg deployment, and after balloon dilation. Follow-up of the EVAR procedure was performed via CT scan at designated time points after the procedure.

Results: The difference between AAA and aneurysmal sac pressure during systole is the sac pressure index (SPI). SPI was 0.87 after main body deployment, 0.63 after leg deployment, and 0.56 for the final value. The pulse pressure in the sac measured 82 mm Hg before deployment and dropped to 55 mm Hg after deployment of main body. It dropped to 23 mm Hg after leg deployment and it dropped to 16 mm Hg after completion of the procedure. The SPI of the Zenith stent graft was not statistically different from the Excluder stent graft. Type I endoleaks occurred in 15% of the patients. There was no significant difference between the final SPI or pulse pressures in those patients where the AAA decreased versus those where there was no shrinkage.

Conclusions: Sac pressure measurement was useful for instant hemodynamic evaluation of the EVAR procedure, especially in Type I endoleaks. However, on the basis of this small study, the SPI cannot be used to reliably predict sac growth or regression.

Reviewer's Comments: The primary goal of AAA repair is to avoid rupture of the AAA. EVAR is performed to exclude the aneurysm sac from the systemic circulation, thus decreasing the pressure in the aneurysm. Evidence of the sac shrinking, as seen on a post-procedure follow-up cat scan, is the hallmark of clinical success. In this study, the pressure in the aneurysm sac decreased significantly by EVAR, mainly during systole. The drop in pressure was not as significant in diastole. These investigators believe that the SPI is useful for evaluating the changing pressure effects during the EVAR procedure. The Zenith and the Excluder stent grafts are made of different materials; however, they performed similarly when the SPI was measured. This study did not show any significant difference between the SPI of the AAAs that decreased in diameter and those that did not. The authors surmise that aneurysmal sac pressure measurements with a catheter during the procedure are useful in immediate evaluation, especially to determine if Type I endoleaks are repaired successfully. The final measurement of pressure in the sac cannot be used to reliably predict outcome. (Reviewer-Sharon Gonzales, MD).

Keywords: AAA Monitoring, EVAR, Pressure Measurements, Endovascular Stents, Monitoring

Print Tag: Refer to original journal article

Combine Shield Drapes, Leaded Glasses to Decrease Operator Lens Dose

Comparing Strategies for Operator Eye Protection in the Interventional Radiology Suite.

Thornton RH, Dauer LT, et al:

J Vasc Interv Radiol 2010; 21 (November): 1703-1707

The combination of shielding drapes and leaded glasses provides significant dose rate reductions compared to using either alone.

Background: Data from Chernobyl proposed a dose-effect threshold of <1 Gy for cataract formation. However, recent literature suggests that the risk of cataracts increases in a linear manner with radiation dose with no apparent threshold, making eye protection in the interventional suite important for the physician operator.

Objective: To evaluate the impact of common radiation-shielding strategies, used alone and in combination, on scattered dose to the operator's eye.

Methods: Fluoroscopy was performed at a phantom patient's upper abdomen with a phantom operator positioned at the neck, upper abdomen, and groin. The phantom operator had a solid-state dosimeter position in the location of the right eye. Operator lens radiation dose rate was recorded with and without a leaded table skirt, nonleaded and leaded eyeglasses, disposable tungsten-antimony drapes, and suspended and rolling transparent leaded shields. Lens dose rate measurements were also obtained during digital subtraction angiography (DSA) with the operator positioned at the patient's groin.

Results: Unleaded glasses convey no significant dose rate reduction. Use of leaded glasses alone reduced the lens dose rate by a factor of 5 to 10; scatter-shielding drapes alone reduced the dose rate by a factor of 5 to 25. The use of both implements together resulted in a reduction of dose rate by a factor of ≥ 25 . When a suspended shield was the only barrier, lens dose was routinely undetectable. The lens dose rate associated with acquiring hand-injected DSA images without protection was 8 times higher than the dose obtained during low-dose fluoroscopy.

Conclusions: The combination of shielding drapes and leaded glasses provided significant dose rate reductions compared to using either alone. Ceiling suspended lead shields were the most effective in reduced lens dose rate.

Reviewer's Comments: This was a simple but well designed experimental study that should only further emphasize the importance of adequate radiation safety protection in the interventional suite. These barrier devices should be available in every interventional facility. (Reviewer-Waseem A. Bhatti, MD).

Keywords: Radiation Safety

Print Tag: Refer to original journal article

Does Your IR Suite Need Improvement to Increase Resident Participation?

Renewing Focus on Resident Education: Increased Responsibility and Ownership in Interventional Radiology Rotations Improves the Educational Experience.

Kothary N, Ghatan CE, et al:

J Vasc Interv Radiol 2010; 21 (November): 1697-1702

Facets of the changes made in this article can be adopted to enhance resident participation on the interventional service.

Background: Exposure to the field of interventional radiology (IR) is an important part of the radiology residency experience. Although interest in diagnostic radiology residency programs is high, approximately half of the IR fellowship positions in the country are unfilled.

Objective: To enhance the educational experience among residents rotating through IR by encouraging ownership and responsibility.

Design/Methods: This is a retrospective study that evaluates resident survey responses and career decisions before and after changes in the IR curriculum (May 2006). The program size is 32 residents with 8 in each class. Resident evaluations after the changes were compared to previous evaluations. Major areas of change were: increased ownership of cases and hands-on training, increased responsibility, structured didactic curriculum, and infrastructural enhancements to accommodate more resident participation in procedures. Residents were made responsible for pre-procedure workup, made first assistant with an attending in the IR suite, and rounded on patients. Residents also performed consults and were placed on the IR call schedule. A 24-month IR didactic curriculum was devised to improve teaching. Finally, to accommodate these changes, new faculty was hired and 3 new IR suites were built.

Results: In 2009, 3 years after the curricular changes were made, the quality of hands-on training, daily case reviews and consults, didactics, and overall education had improved with 89%, 71%, 65%, and 82% of the residents rating these respective aspects of the training as "above expectations" or "superior" compared with 77%, 23%, 20%, and 60% in 2005 and 2006. Three years after the changes, the impact of these changes on recruitment patterns also showed improvement, with 28.6% of the class of 2010 pursuing a fellowship in IR.

Conclusions: Improvements in the level of resident involvement on the interventional service by increasing patient contact, hands-on experience, improving didactics, and extending on call responsibilities resulted in higher scores on resident evaluations.

Reviewer's Comments: Resident interest in IR varies by person. However, a strong experience in the subspecialty may either confirm or peak interest in the field as a fellowship choice. The institution in this study was able to make infrastructure changes and new hires to accommodate a revamping of their IR curriculum. This may be difficult for smaller programs; however, selected facets of the changes that were made can be adopted to enhance resident participation on the interventional service. (Reviewer-Waseem A. Bhatti, MD).

Keywords: Resident Education, Personnel, Teaching

Print Tag: Refer to original journal article

Imaging Features of Common and Uncommon Male Breast Disease

Imaging Characteristics of Male Breast Disease.

Adibelli ZH, Oztekin O, et al:

Breast J 2010; 16 (September): 510-518

Mammography and ultrasound are essential in evaluating men presenting with breast complaints associated with findings on physical examination.

Background: Clinical concern for male breast disease is a common indication for breast imaging. Understanding the histological differences between the normal male breast and the normal female breast aids in understanding the different imaging presentations.

Objective: To review the mammographic, sonographic, and pathologic appearances of common and uncommon male breast diseases.

Design: Retrospective study.

Participants/Methods: All male patients who underwent breast imaging in a single institution over a 9-year period were identified. Imaging findings as well as clinical and pathologic records were reviewed. All of the patients had first been examined by clinicians and indication for breast imaging was noted.

Results: 164 patients were identified. All patients underwent mammography and ultrasound. Seventy-five patients had undergone biopsy where pathology was available. The normal male breast consists of a small nipple, small areola, and subcutaneous fat with histologic studies demonstrating subareolar ducts similar to those found in sexually immature girls. These ducts may enlarge when stimulated by hormones. The typical male breast contains no lobular elements and therefore lesions of the lobule such as lobular carcinoma or fibroadenoma are extremely rare. In this retrospective review, 147 of the men were diagnosed with gynecomastia. The mean age of those diagnosed with gynecomastia was 44.5 years. Most commonly, the presenting symptom was diffuse breast enlargement and a palpable mass was noted in 31% of patients. Thirteen men were identified as having breast cancer. Age of these patients varied from 38 to 81 years. In total, 85% of these patients presented with a palpable firm mass and 38% had nipple retraction. Mammograms demonstrated 85% of the male breast cancers and 91% of those presented as a mass without calcifications. On ultrasound, male breast cancer presented as a solid mass 92% of the time and the mass was well circumscribed 15% of the time. One patient was diagnosed with fibroadenoma, which presented as a well circumscribed mass. Fibrocystic disease was diagnosed on pathology in 2 patients who had presented with clinical findings compatible with diffuse gynecomastia that had been associated with pain and swelling.

Conclusions: Mammography and ultrasound are essential in evaluating men presenting with breast complaints associated with findings on physical examination.

Reviewer's Comments: The study is a nice summary of the most commonly encountered male breast pathology. Although rare, fibrocystic disease and fibroadenomas have been described in men. The important message in a report such as this is that a firm mass in a male breast that corresponds with a mammographically or sonographically evident mass should never be considered normal and always warrants excision or core biopsy. (Reviewer-Basil Hubbi, MD).

Keywords: Male, Breasts, Male Breast Cancer, Gynecomastia, Mammogram, Ultrasound

Print Tag: Refer to original journal article

FNA Most Useful in Large Tumors or Lymph Nodes That Appear Abnormal

Axillary Ultrasound and Fine-Needle Aspiration in the Preoperative Evaluation of the Breast Cancer Patient: An Algorithm Based on Tumor Size and Lymph Node Appearance.

Mainiero MB, Cinelli CM, et al:

AJR Am J Roentgenol 2010; 195 (November): 1261-1267

Cortical thickness >3 mm and loss of fatty hilum highly correlates with metastatic lymph adenopathy.

Background: Axillary lymph node staging in the setting of invasive breast cancer has been shown to be the most significant prognostic indicator. Other authors have shown that a positive finding on percutaneous lymph node sampling of the axilla obviates the need for sentinel lymph node biopsy and may change the treatment course to include neoadjuvant chemotherapy before surgery.

Objective: To evaluate the performance of percutaneous fine-needle aspiration (FNA) of axillary lymph nodes with respect to variables such as tumor size and lymph node morphology.

Design: Prospective study.

Participants/Methods: Over a 3.5-year prospective period, those patients at a single institution who were diagnosed with invasive breast cancer and were candidates for sentinel lymph node excision were recruited. The patients were evaluated via ultrasound by 1 of 5 radiologists participating in the study. The size and histologic type of the primary tumor were documented. For the purposes of statistical analysis, any case that had originally presented as calcifications or without a distinct mass-like abnormality was categorized as invasive cancer <1 cm in size. After the radiologist evaluated the axillary lymph nodes, the most suspicious lymph node was subjected to FNA. Features that warranted suspicion included cortical thickening and absence of a fatty hilum. If all lymph nodes looked similar, the inferiormost lymph node was considered to be the sentinel node and was targeted for FNA. Cytology reports from the FNA procedures were compared with pathology reports from sentinel lymphadenectomy and axillary lymph node dissections performed at surgery. A cytology result of insufficient or unsatisfactory for evaluation was categorized as negative.

Results: 226 procedures in 224 patients formed the study cohort. Mean age was 56 years and 2 of the patients were men. Mean tumor size was 1.5 cm. Overall, 38% of lymph nodes sampled proved positive for metastatic disease on surgical excision; 59% of these lymph nodes were identified preoperatively. There were no cases with a false-positive result on FNA. Only 6% of FNA results were deemed unsatisfactory for evaluation. The sensitivity of ultrasound-guided FNA for all cases was determined to be 59%. Sensitivity increased with increased tumor size. The sonographic feature most predictive of metastatic disease to the lymph nodes was an absent fatty hilum, a finding only present in 7% of nodes sampled. Cortical thickness was measured as half the short axis length and was considered suspicious when >3 mm. This yielded a sensitivity of 88% and a specificity of 75%.

Conclusions: Ultrasound-guided FNA of the axillary lymph nodes is most useful in the preoperative assessment of patients with large tumors (>2 cm) or lymph nodes that appear abnormal.

Reviewer's Comments: This is a remarkably elegant study with useful information. It is slowly becoming more accepted to survey axillary nodes in the setting of a suspicious breast mass and findings such as these validate this practice. (Reviewer-Basil Hubbi, MD).

Keywords: Breast Cancer, Lymph Nodes, Metastatic Lymphadenopathy

Print Tag: Refer to original journal article

Increased Breast Vascularity, Adjacent Vessel Sign Help Predict Breast Malignancy

Contrast-Enhanced MR Angiography of the Breast: Evaluation of Ipsilateral Increased Vascularity and Adjacent Vessel Sign in the Characterization of Breast Lesions.

Kul S, Cansu A, et al:

AJR Am J Roentgenol 2010; 195 (November): 1250-1254

The adjacent vessel sign is a useful and easy finding which, when present, may be associated with increased malignant potential of breast lesions.

Background: Breast MRI has been lauded for its high sensitivity, yet caution is often suggested as specificity has not been as high as generally desired. More recent research suggests that specificity is not as low as originally published and additional techniques and sequences have been employed in an attempt to increase specificity further. An association has been suggested between ipsilateral increased blood flow and biopsy-proven breast cancer.

Objective: To evaluate the diagnostic performance of MR angiography in distinguishing benign and malignant lesions of the breast.

Methods: Over a retrospective 2-year period, those patients who underwent contrast-enhanced MRI of the breasts after an abnormal clinical, mammographic, or sonographic finding were identified. Those patients with histopathologic results were included. Patients with a history of bilateral breast cancer, a history of radiation treatment, recent breast biopsy with no pathology available, or if only a unilateral MRI was performed were excluded from the study. Routine MR imaging had been performed for all patients. MR angiography images were obtained by subtracting the pre-contrast images from the second phase of the dynamic contrast-enhanced images and subsequently put through a maximum intensity projection algorithm. Two radiologists reviewed the images with focused attention on the index lesion undergoing further characterization based on clinical, mammographic, or sonographic suspicions. As per published technique, the number of vessels that were ≥ 3 cm in length or ≥ 2 mm in diameter were tallied. Five or more of these vessels in either breast indicated high vascularity. If there was a vessel in contact with the index lesion or clearly entering the index lesion, this was registered as an "adjacent vessel sign." These findings were ultimately correlated with histopathologic results and statistical analysis was employed to evaluate diagnostic accuracy.

Results: 102 patients comprised the study set; 49% were diagnosed with malignant tumors. There was statistically increased vascularity associated with the ipsilateral breast in cases where a malignancy was diagnosed. The sensitivity of ipsilateral increased vascularity in indicating malignancy was determined to be 62% with a corresponding specificity of almost 79%. The sensitivity of the adjacent vessel sign in predicting malignancy was determined to be 74% with a specificity of 88.5%.

Conclusions: Both ipsilateral increased vascularity and the adjacent vessel sign were found to be associated with breast cancer in a significant percentage of patients. The adjacent vessel sign is more practical and generally applicable.

Reviewer's Comments: The authors conclude that the adjacent vessel sign is a more accurate predictor of malignancy. Given the techniques described in defining either finding, the utility of the adjacent vessel sign is predicated on the relatively easy and quick way to make this finding. Along with traditional dynamic contrast-enhanced images, diffusion-weighted images, and traditional morphologic evaluation, the addition of these tools will hopefully act to increase specificity of breast MRI further. (Reviewer-Basil Hubbi, MD).

Keywords: Breasts, MRI, Adjacent Vessel Sign

Print Tag: Refer to original journal article

Is Residual Tumor Still Present After Total Removal of the Target Lesion?

Stereotactic Vacuum-Assisted Breast Biopsy Is Not a Therapeutic Procedure Even When All Mammographically Found Calcifications Are Removed: Analysis of 4,086 Procedures.

Penco S, Rizzo S, et al:

AJR Am J Roentgenol 2010; 195 (November): 1255-1260

Upgrade rates are generally higher when only a portion of the targeted calcifications are removed on stereotactic biopsies.

Background: Due to the widespread use of screening mammography and the detection of breast cancers before they are clinically evident, percutaneous image-guided biopsy techniques have increased over the last 2 decades. Stereotactic vacuum-assisted breast biopsy is one of those techniques that may be utilized for findings that are only evident on a mammogram. At times, complete removal of the targeted lesion is achieved.

Objective: To determine if complete removal of the targeted lesion on stereotactic biopsy correlates with complete removal of tumor and whether complete removal of the lesion acts to improve diagnostic accuracy of the procedure.

Design/Methods: Over a 10-year retrospective period, those patients who had undergone stereotactic vacuum-assisted breast biopsy were identified. The patients were categorized into 2 groups, one that correlated with complete removal of the targeted lesion and a second that represented partial removal. Any patient who had a biopsy diagnosis of carcinoma or atypical ductal hyperplasia had been recommended for surgical excision. Cases of radiologic-pathologic discordance were also recommended for surgery. Direct correlation was then made between the final surgical pathologic diagnosis and the stereotactic biopsy diagnosis.

Results: 4047 procedures were reported to have been successfully completed. In 39.4% of patients, the microcalcifications were successfully completely removed. Lesions that were completely excised ranged between 1 to 25 mm. Those that were partially removed measured up to 200 mm in size. Overall, 29.5% of lesions were malignant and 7.2% were atypical or high-risk lesions. Among the cases of complete removal of calcifications with malignant pathology on post-biopsy specimens, 70% had residual malignancy as shown on pathology of the surgically excised specimen. Of those with partial removal of calcifications and a core biopsy diagnosis of ductal carcinoma in situ, 23.0% were upgraded to invasive carcinoma, whereas upgrade only occurred in 5.6% of patients with complete removal of the calcifications.

Conclusions: Vacuum-assisted breast biopsy may not be considered a therapeutic procedure, even in the case of complete removal of microcalcifications. However, a complete removal of microcalcifications may result in low rates of underestimation of malignancy and may consequently increase the diagnostic accuracy of the diagnostic procedure.

Reviewer's Comments: The data from this article corroborate generally accepted current practice. In the setting of malignant pathologic findings on stereotactic core biopsy, all patients should proceed to surgical excision regardless of the percentage removal of the targeted calcifications. The more important message here is the increased upgrade rate when only a certain percentage of calcifications are removed versus when the entire targeted lesion is removed. Accordingly, our practice should bear this in mind when judging radiologic-pathologic concordance. (Reviewer-Basil Hubbi, MD).

Keywords: Breasts, Stereotactic Biopsy, Breast Calcifications

Print Tag: Refer to original journal article



MRI Patterns Correlate to Underlying Etiologies in Muscular Diseases

Morphologic Imaging in Muscular Dystrophies and Inflammatory Myopathies.

Degardin A, Morillon D, et al:

Skeletal Radiol 2010; 39 (December): 1219-1227

In dystrophic myotony type 1, fatty atrophy occurs primarily in the medial gastrocnemius and anterior tibialis.

Objective: To characterize the patterns of muscle involvement on MRI and CT in patients with muscular dystrophies or idiopathic inflammatory myopathies.

Participants/Methods: 35 patients were included in this retrospective study, 31 of whom had MR imaging performed and 4 of whom had CT imaging performed. Eight patients had dystrophic myotony (DM), 15 had limb-girdle muscular dystrophy, 3 had Becker muscular dystrophy, and 9 had idiopathic inflammatory myopathies. The degree of fatty infiltration was graded based on T1 imaging and on CT when MR was not available. The degree of involvement was classified as normal, mild (traces of increased T1 signal), moderate (<50% of the muscle demonstrates increased T1 signal), and severe (>50%).

Results: In the 4 patients with DM type 1, fatty atrophy occurred primarily in the medial gastrocnemius and anterior tibialis. In 2 of 4 patients with DM type 2, fatty deposition involved the pelvis and hip musculature. In 2 of the 3 patients with Becker muscular dystrophy, fatty involvement was noted in the adductors, gluteus maximus, and hamstrings. Muscle involvement varied by type of limb-girdle muscular dystrophy. Of the 4 cases of sporadic inclusion body myositis, 2 patients had predominantly distal involvement and 2 had asymmetric deposition of fat. Muscle involvement was mainly proximal and symmetric in the 1 case of dermatomyositis and 4 cases of polymyositis.

Conclusions: There tends to be sparing of the posterior tibialis muscle in DM 1. In Becker muscular dystrophy, there tends to be early involvement of the gluteus maximus muscle. Proximal and symmetric muscle involvement was seen in dermatomyositis and polymyositis.

Reviewer's Comments: The utility of MR imaging in the work-up of muscular dystrophies and inflammatory myopathies has generally been to help guide biopsy. In this study, the authors attempt to make a case for using MR in helping to reach a precise diagnosis. Unfortunately, while certain trends were noted, the number of patients in each category is simply too small to generate strict diagnostic criteria. The best we can do is to cautiously suggest that certain patterns of fatty atrophy are more suggestive of one type of muscular dystrophy or inflammatory myopathy over another. (Reviewer-John Hochhold, MD).

Keywords: Muscular Dystrophy, Inflammatory Myopathy, MRI

Print Tag: Refer to original journal article

Fatty Atrophy Quantified by Chemical-Shift Imaging

Using Chemical-Shift MR Imaging to Quantify Fatty Degeneration Within Supraspinatus Muscle Due to Supraspinatus Tendon Injuries.

Gokalp G, Yildirim N, et al:

Skeletal Radiol 2010; 39 (December): 1211-1217

Chemical-shift MRI can quantify the extent of fatty atrophy in the supraspinatus muscle following supraspinatus tendon injury.

Objective: To use chemical-shift MRI to quantify fatty degeneration of the supraspinatus muscle.

Participants/Methods: 41 subjects with suspected rotator cuff tear or impingement were included in this study. All patients underwent MR arthrography on a 1.5-T magnet. Supraspinatus tendon abnormalities were classified as normal, tendinosis, partial tear, or complete tear. To quantify fat accumulation, regions of interest were drawn over the supraspinatus muscle and over air on both in-phase and out-of-phase sequences. Signal intensity (SI) values were measured. The SI suppression ratio and SI index were then calculated.

Results: The supraspinatus tendon was normal in 10 patients, partially torn in 13, and completely torn in 11. Seven patients demonstrated tendinosis. The median SI suppression ratio was -3.5%, -13.5%, -30.7%, and -43.75% in the normal, tendinosis, partial tear, and full tear groups, respectively. The median SI index was 0.75%, 10.0%, 26.5%, and 41.0% in the normal, tendinosis, partial tear, and full tear groups, respectively.

Conclusions: The extent of fat accumulation in the supraspinatus muscle corresponds with the degree of supraspinatus tendon pathology.

Reviewer's Comments: Chemical-shift imaging in this study is used to look for fatty atrophy in the supraspinatus muscle following tendinous injury. This is analogous to use of chemical-shift imaging when looking for microscopic fat in the workup of adrenal lesions. The authors demonstrate that there is a significant increase in the amount of fat in the supraspinatus muscle, and that the extent of fat increases with the severity of tendinous injury. The study is well structured, and the findings are interesting. Follow-up studies, correlating fatty atrophy with clinical parameters and surgical outcomes, are warranted to determine the usefulness of this information to referring physicians. (Reviewer-John Hochhold, MD).

Keywords: Rotator Cuff, Fatty Atrophy, Chemical-Shift Imaging, MRI

Print Tag: Refer to original journal article

Taking a Closer Look at Meniscal Cysts

New Observations on Meniscal Cysts.

Anderson JJ, Connor GF, Helms CA:

Skeletal Radiol 2010; 39 (December): 1187-1191

Most intrameniscal cysts are intermediate in signal intensity on proton density and T2-weighted sequences, whereas the overwhelming majority of parameniscal cysts demonstrate signal intensity as bright as fluid.

Objective: To determine the incidence of meniscal cysts and associated abnormalities of the knee on MRI.

Methods: The authors conducted a retrospective review of 2095 knee MRIs performed over a 22-month period at their institution. Parameniscal cysts were defined as parameniscal areas of fluid signal intensity with a connection to the adjacent meniscus. Intrameniscal cysts were diagnosed when areas of increased signal intensity on proton density or T2-weighted sequences were identified in an enlarged meniscus with expanded contours. Size, location, and intensity for each cyst were noted, as was presence of a discoid meniscus or meniscal tear.

Results: 167 meniscal cysts were identified in 161 patients: 69 cysts were located in the lateral meniscus and 98 were in the medial meniscus. Of cysts, 97 (57.8%) were associated with a meniscal tear. In 100 of 104 parameniscal cysts, the signal intensity was iso-intense to fluid. However, in 63 isolated intrameniscal cysts, only 14 were iso-intense to fluid. The remainder demonstrated intermediate signal intensity.

Conclusions: Meniscal cysts occur more commonly in the medial meniscus. The majority of meniscal cysts have an associated meniscal tear. Most intrameniscal cysts are intermediate in signal intensity on proton density and T2-weighted sequences, whereas the overwhelming majority of parameniscal cysts demonstrate signal intensity as bright as fluid.

Reviewer's Comments: The sample size in this retrospective study is large. Unfortunately, only approximately 55% of patients with a diagnosis of meniscal cyst underwent arthroscopy, which is a limitation of this study. There is a discrepancy between this study, which reports that meniscal tears accompany meniscal cysts close to 60% of the time, and previous studies, which reported values of >90%. The authors suggest that, by adhering to a strict definition of a meniscal tear as extending to the articular surface, they likely excluded intrasubstance or horizontal cleavage tears that other studies would have counted. Ultimately, this study emphasizes the association of meniscal cysts with meniscal tears, but it may not be as strong as previously described. Another take-home point is that intrameniscal cysts are often intermediate in signal intensity. (Reviewer-John Hochhold, MD).

Keywords: Meniscal Cyst, Meniscal Tear, Knee MRI

Print Tag: Refer to original journal article

Incidental Findings May Be Beneficial in Imaging Research

Incidental Findings in Imaging Research: Evaluating Incidence, Benefit, and Burden.

Orme NM, Fletcher JG, et al:

Arch Intern Med 2010; 170 (September 27): 1525-1532

A high frequency of incidental findings are noted on research studies, especially those involving CT of the body and MRI of the head.

Background: In the course of imaging research, incidental findings (IFs) are encountered.

Objective: To detect the frequency of IFs arising from multiple research studies, to estimate the frequency with which clinical action is taken for IFs, and to examine the benefit or harm to subjects from identifying and working up IFs.

Design: Retrospective study. **Materials:** 1823 radiology examinations billed to research grants from January 2004 to March 2004, of which 1426 were suitable.

Methods: Reports were reviewed for each research examination, with IFs, imaging modality, and body region noted. Medical records were reviewed through February 2007 to obtain information regarding clinical action performed, such as further testing, imaging, referrals, invasive procedures, initiation of therapy, and surgical intervention. An expert panel of 6 physicians and 3 bioethicists devised a ranking for benefit/burden of clinical action precipitated by the IF: clear benefit, clear burden, potential benefit, potential burden, or unclear. Physicians also ranked the medical gravity of the IF.

Results: 40% of research imaging studies had at least 1 IF, with frequency increasing with age. IFs were most frequent in CT of the abdomen/pelvis and thorax, with frequencies of 61% and 51%, respectively. Most common abdominal/pelvic IFs were aortoiliac calcifications, diverticulosis, and renal cysts. Ultrasound and nuclear medicine produced IFs 9% and 4% of the time, respectively. Within modalities, differences between body regions were significant only in plain film radiography (thoracic >> extremity, $P=0.02$). Of 1426 patients, 35 (2.5%) had a resultant clinical action: 71 imaging studies in 32 subjects, 16 additional tests or procedures, 27 subspecialist referrals, 5 noninvasive tests, 6 invasive procedures, 8 surgeries, 2 radiofrequency ablations (renal and liver tumors), and 2 medical treatments (antifungal agents and antitussive drugs). No clinical investigation resulted from body MRI, ultrasound, plain film radiography, or nuclear medicine. Abdominopelvic CT had 17 IFs that received action (9.2%), including ovarian/adnexal masses ($n=9$), as did 5 indeterminate lung nodules on chest CT. Six cases provided clear medical benefit, and 24 were unclear. Two cases had potential medical burden, and 3 had clear medical burden. There were no deaths or postsurgical complications.

Conclusions: Studies at high risk of revealing IFs are identified, which can help inform researchers and institutional review boards regarding frequency of IFs and subsequent actions. Prompt expert review of research studies can identify a small number of IFs that will benefit those subjects.

Reviewer's Comments: This is an important paper in a very hot area of discussion. Many times, the consequence of finding an IF has not been well thought out in the research protocol, in spite of their potential to have profound medical, legal, and financial implications. As this paper shows, the incidence of IFs is very high, although most do not require a clinical action, and only a select few patients benefit from their discovery. (Reviewer-Lionel S. Zuckier, MD).

Keywords: Incidental Findings, Imaging Research

Print Tag: Refer to original journal article

Responses to Mo-99 Shortages in Nuclear Medicine

Short- and Long-Term Responses to Molybdenum-99 Shortages in Nuclear Medicine.

Ballinger JR:

Br J Radiol 2010; 83 (November): 899-901

Limited responses may alleviate some Mo-99 shortages, but long-term plans are required to permanently address the situation.

Molybdenum-99 (Mo-99), the parent of Tc-99m, is primarily produced at only 5 ageing nuclear research reactors, all of which are at the end of their useful lifespan. In the last 3 years, there has been a series of problems at the 2 reactors that together produce 70% of the world supply of Mo-99, including an extended period in 2010 when neither was operating. Most Mo-99 is produced by fission of highly enriched U-235 targets within a nuclear reactor. Because of increasing security concerns, U-235 is being phased out over the next few years. Use of low enrichment U-235 will require larger space for the number of targets to be irradiated and a higher volume of waste generated by the process. Current production of Mo-99 generators takes several days, leading to decay of more than half of Mo-99. The 5 research reactors send raw materials to only 4 sites that can extract and purify Mo-99, which is then sent on to only 5 plants where generators can be manufactured. The first short-term response is to substitute alternative radiopharmaceuticals for those based on Tc-99m, ie, Tl-201 thallous chloride or the PET agent Rb-82 for the Tc-99m-based cardiac perfusion radiopharmaceuticals. Additionally, F-18-fluoride has been used for bone scintigraphy as an alternative to Tc-99m MDP. The problem with many of these replacements is that there is not sufficient capacity on PET cameras. Nuclear medicine studies can be replaced with non-nuclear imaging modalities. Here too, there is a question of capacity. The schedule of nuclear medicine departments can be optimized to include days and weekends when Mo-99 is available. A long-term response would include providing and imaging radiopharmaceuticals over weekends. Generators should be produced on Sunday for use the following day, to minimize decay over the weekend. New SPECT reconstruction techniques can also recover sufficient information for imaging with fewer counts. We need to build new reactors; there are plans to replace 3 reactors in Europe and to upgrade the University of Missouri research reactor. New methods are being explored to produce Mo-99 in novel ways.

Conclusions: While there have been shortages in the past year, the clinical importance and public profile of nuclear medicine has been strengthened by the crisis. Both short- and long-term strategies discussed in this article can be used to mitigate problems in Mo-99 availability.

Reviewer's Comments: Just as our review in July 2009 represented a warning shot regarding the then looming shortages of Mo-99, I am hopeful that this article will represent a denouement to recent shortages of Tc-99m, especially now that the reactor at Chalk River (Canada) is up and running. Has the industry learned a lesson from this painful period? (Reviewer-Lionel S. Zuckier, MD).

Keywords: Molybdenum-99, Shortage, Nuclear Reactor

Print Tag: Refer to original journal article

Age Distribution Among Specialty Boards Is Lacking

Age Discrimination in All Medical Specialty Board Memberships, Including Radiology.

Stephen R. Baker, MD:

-Special Presentation

All medical specialty boards have women members represented proportionate to their percentages in the population of each specialty. However, such inclusiveness does not extend to the age of their members.

The 24 medical specialty boards, including the American Board of Radiology, are similar to each other with respect to gender and age diversity. All of these boards have women members represented proportionate to their percentages in the population of each specialty. However, such inclusiveness does not extend to the age of their members. Rather, in this regard, exclusivity and homogeneity predominate the boards' rosters. The mean age is 58 years, with only 1 individual aged >70 years among 425 board members of the various specialties. In addition, only 7 subjects are aged <45 years, with only 1 aged <40 years, and he is neither an MD or a PhD. Nearly 300,000 of 950,000 physicians in the United States are aged 30 to 45 years, but only 6 are on 1 of these 24 boards. Issues facing first-time board test takers are many. Perhaps the most important is the cost of the board examination in light of the high and increasing average indebtedness.

Reviewer's Comments: In that vein, differential costing of the initial exam and maintenance of certification should be examined with the thought in mind of balancing expenditures with income. For that matter to be truly engaged, presence on boards of younger members should be considered. (Reviewer-).

Keywords: Board Membership

Print Tag: Refer to original journal article