The use of CT should be subject to more intense scrutiny because alternative approaches are available which avoid the radiation exposure that CT imparts. Concerns about its cancer-inducing potential are increasing.

Referring physicians, radiologists and the public in the United States have all embraced CT because of its diagnostic incisiveness for an expanding array of clinical conditions. It has become ubiquitous as a major component of diagnosis in outpatient clinics, hospital inpatient services, and emergency room facilities. Yet, because it deposits radiation in significant doses, especially for those receiving repetitive CT exams, concern about its cancer-inducing potential has become increasingly widespread and insistent. It now behooves the radiology community to husband this resource, using it wisely instead of exuberantly. In some conditions, CT has been utilized perhaps too liberally, such as for ureteral stone detection and monitoring, and its use should now be subject to more intense scrutiny because alternative approaches which avoid the radiation that CT imparts is available. (Reviewer-).

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Keywords: CT, Radiation Dose, Cancer Concerns

Print Tag: Refer to original journal article
CT vs MRI -- Both Assess Aggressiveness of Pancreatic Cysts

Comparative Performance of MDCT and MRI With MR Cholangiopancreatography in Characterizing Small Pancreatic Cysts.

Sainani NI, Saokar A, et al:

AJR Am J Roentgenol 2009; 193 (September): 722-731

MRI is better than CT in the morphologic assessment of small pancreatic cysts, although the 2 imaging modalities are comparable in characterizing lesion aggressiveness.

Objective: To compare CT with MRI-MR cholangiopancreatography (MRCP) in characterizing small pancreatic cysts and in predicting their aggressiveness.

Design: Retrospective analysis.

Participants: 30 patients with a total of 38 pathologically proven pancreatic cysts measuring ≤3 cm were identified. All patients had undergone CT and MRI within 90 days of each other and had histopathologic analysis performed within 6 weeks of imaging. No patient had acute pancreatitis or prior pancreatic surgery.

Methods: CT examinations were performed on multidetector scanners (MDCT). Seventeen patients underwent dual-phase enhanced studies comprised of pancreatic and portal venous phases acquired with scan delays of 40 and 70 seconds, respectively. The remaining 13 patients underwent examinations during the portal venous phase. MRI examinations were performed on 1.5T scanners. Sequences included T2-weighted fast spin echo (FSE), T1-weighted spoiled gradient echo, in-phase and out-of-phase, half-Fourier single-shot FSE, thick-section 2D MRCP, and thin-section 3D MRCP. Of the 30 patients, 24 subsequently had fat-suppressed fast spoiled gradient images acquired following the dynamic administration of intravenous gadolinium contrast. These images were acquired during the arterial, portal venous, and equilibrium phases at 20, 70, and 180 seconds, respectively. Images were reviewed by 2 radiologists. The lesions were first classified as either mucinous or nonmucinous, and subsequently they were classified as benign or malignant.

Malignant features included thick wall, thick septations, mural nodule, pancreatic duct >8 mm, vascular encasement, local lymphadenopathy, and metastases.

Results: There were 38 pancreatic cysts that measured ≤3 cm, and they consisted of 14 side-branch intraductal papillary mucinous neoplasms (IPMNs), 12 mixed side-branch and main duct IPMNs, 6 mucinous cystic neoplasms, and 6 nonneoplastic cysts. They varied in their aggressiveness from benign to high-grade dysplasia, although none were invasive. MRCP was more sensitive than MDCT in detecting morphologic features, such as thin septa and mural nodules, Both CT and MRI were more accurate in classifying lesions as mucinous or nonmucinous than in arriving at a specific diagnosis. Both CT and MRI were comparable in categorizing cystic pancreatic lesions into aggressive and nonaggressive groups.

Reviewer’s Comments: The results of this study are useful in demonstrating that, while MRI is better than CT in the morphologic assessment of small pancreatic cysts, the 2 imaging modalities are comparable in characterizing lesion aggressiveness. Consequently, either modality can be used to classify these lesions into benign or potentially malignant categories. Limitations reported in this study included the small sample size as well as the lack of histopathologic confirmation in 9 patients. (Reviewer-John C. Sabatino, MD).

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Keywords: Small Pancreatic Cysts, Imaging, Predicting Behavior

Print Tag: Refer to original journal article
Gd-BOPTA-enhanced MR cholangiography is unique in diagnosing acute cholecystitis in that it provides functional assessment comparable to HIDA scintigraphy and anatomical evaluation where the latter does not.

**Objective:** To determine if Gd-BOPTA-enhanced MR cholangiography is feasible in diagnosing acute cholecystitis.

**Design:** Prospective analysis.

**Participants:** 11 patients who presented with right upper quadrant pain and equivocal physical examination and/or ultrasound findings.

**Methods:** All patients underwent Gd-BOPTA-enhanced MR cholangiography. The control group consisted of 15 patients without right upper quadrant pain who had undergone routine Gd-BOPTA-enhanced liver MR for evaluation of chronic liver disease or hepatic or pancreaticobiliary lesions. MR examinations were performed on a 1.5T system. Contrast-enhanced MR cholangiography images were acquired 90 minutes after the injection. Images were reviewed by 2 radiologists. The study group images were analyzed for the following: calculi within the gallbladder and cystic duct, gallbladder dilatation >40 mm, gallbladder wall thickening >3 mm, and pericholecystic fluid. Contrast-enhanced MR cholangiography images were analyzed for gallbladder wall enhancement and presence of contrast within the biliary tree and gallbladder. The control group images were analyzed for the presence of contrast within the biliary tree and gallbladder.

**Results:** In the study group, T2-weighted images demonstrated gallstones in 72%, gallbladder dilatation in 63%, gallbladder wall thickening in 63%, cystic duct obstruction due to stones in 63%, and pericholecystic fluid in 54%. Contrast-enhanced MR cholangiography images demonstrated significant gallbladder wall enhancement in 10 of the 11 patients. In 9 of the 11 patients, all contrast-enhanced MR cholangiography images showed contrast within the biliary tree and not within the gallbladder, either due to obstructing cystic duct calculi, infundibular stones obstructing the cystic duct, or multiple calculi filling the gallbladder. Non-filling in the last 2 patients was either due to gallbladder perforation or acalculous cholecystitis. Acute cholecystitis was confirmed at surgery in 10 of the 11 patients and was confirmed by cholecystostomy and culture results in the remaining patient.

**Conclusions:** Contrast-enhanced MR cholangiography is able to show non-filling of the gallbladder in patients with acute cholecystitis similar to HIDA scintigraphy.

**Reviewer’s Comments:** The results of this study demonstrate that MRI with the use of hepatobiliary contrast agents, such as Gd-BOPTA, can provide functional findings similar to HIDA scintigraphy and anatomical findings similar to ultrasound in patients with acute cholecystitis. Therefore, theoretically, it can provide the combined information of the other 2 modalities in a single examination. However, limitations related to availability, costs, and patient MR-compatibility issues may preclude a more universal acceptance of this application. One of the limitations reported in this study was the small sample size. (Reviewer-John C. Sabatino, MD).

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Keywords: Acute Cholecystitis, Diagnosis

Print Tag: Refer to original journal article
Increased attenuation of ascites can be seen on subsequent CT examinations following prior intravenous contrast administration and does not represent hemoperitoneum or infection.

**Objective:** To determine the frequency and importance of delayed contrast enhancement of ascites on CT examination.

**Design:** Retrospective analysis.

**Methods:** Of 132 patients assessed, all had ascites and underwent repeated CT examinations within 7 days of each other. At the initial examination, 112 patients received intravenous (IV) contrast material (study group), and 20 did not (controls). Indications for the initial and follow-up CT examinations included evaluation for abscess or infection, possible neoplasm, and abdominal pain. CT examinations were performed with multidetector systems. A total of 269 CT scans were performed and subsequently reviewed. Attenuation measurements were obtained from 3 locations. If the CT attenuation of ascites increased by at least $>10$ HU and also by $\geq 2$ times the standard deviation of the 3 attenuation measurements, then delayed enhancement was considered to be present. The amount of ascites was recorded as follows: small is $<3$ cm, moderate is 3-6 cm, and large is $>6$. In addition, if there was mass-effect with rounded convex borders with the adjacent structures signifying loculation, this was also recorded.

**Results:** 15 patients in the study group demonstrated delayed enhancement of ascites (range, 10-25 HU). The time between the CT scans ranged from approximately 3 hours to 2.5 days. This change in attenuation of the ascites did not occur $>3$ days after the initial study. The degree of delayed enhancement of ascites was greatest in patients who were scanned $<1$ day after the initial contrast enhanced scan. Of this group, 63% of patients had delayed enhancement of ascites. Meanwhile, of patients scanned 1 to 2 days after the initial contrast-enhanced scan, only 18% had delayed enhancement of ascites. Besides the shorter interval follow-up time between scans, other common characteristics of the patients with the greatest degree of delayed enhancement included higher serum creatinine, peritoneal carcinomatosis, and loculation of the ascites.

**Reviewer’s Comments:** The results of this study provide some insight for the increased attenuation of ascites encountered in patients shortly after contrast-enhanced CT. While clinically important causes of increased attenuation of ascites, such as hemorrhage and infection, should always be considered, one should also take a step back and entertain the possibility that it may be related to a recent contrast-enhanced CT. One of the limitations reported in this study was the retrospective design, which consequently made it impossible to have set time intervals for the follow-up imaging. (Reviewer-John C. Sabatino, MD).

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Keywords: Ascites, Imaging, Delayed Enhancement

Print Tag: Refer to original journal article
64-MDCT Detects MI With High Degree of Sensitivity

Myocardial Ischemia in Acute Coronary Syndrome: Assessment Using 64-MDCT.
Nagao M, Matsuoka H, et al:
AJR Am J Roentgenol 2009; 193 (October): 1097-1106

Objective: To evaluate 64-MDCT for its ability to characterize myocardial ischemia (MI) in the setting of acute coronary syndrome (ACS).

Participants: 35 patients who had ACS, including 24 who had an acute MI (AMI) and 11 who had unstable angina pectoris (UAP).

Methods: High-risk patients who were admitted within 24 hours after the onset of symptoms were excluded. All patients underwent both coronary CT angiography (CTA) within 2 days and invasive coronary angiography within 1 week of symptoms. On both invasive coronary angiography and coronary CTA, a stenosis of ≥75% was considered to be significant. All CTAs were performed with retrospective ECG gating and a slice width of 0.625 mm. Approximately 40 to 60 mL of nonionic contrast (320 mg I/mL) was injected at 4 mL/second. Horizontal long-axis, vertical long-axis, and short-axis images of the left ventricular myocardium in end-diastole and end-systole were created. Color scales of the myocardium were created where blue and light green represented areas of hypoenhancement (blue, 20-40 HU; light green, 40-60 HU). Areas of hypoenhancement were also characterized as transmural or subendocardial. Culprit lesions on invasive coronary angiography were determined by analysis of stenosis, location of asynergy by ECG, and location of ST-segment elevation if present.

Results: Significant stenosis on coronary CTA matched that of culprit lesions on invasive coronary angiography in 29 of 32 patients with ACS (91%), in 21 of 24 with AMI (88%), and in 8 of 8 with UAP (100%). Myocardial imaging in systole demonstrated hypoenhancement in territories of the culprit lesions in 29 of 32 patients with ACS (91%), in 23 of 24 patients with AMI (96%), and in 6 of 8 patients with UAP (75%). In general, greater hypoenhancement was seen at systole compared with diastole. The transmural degree of hypoenhancement in systole correlated with MI-induced damage as assessed by troponin, CK, and CK-MB laboratory values.

Conclusions: 64-MDCT myocardial imaging can detect ischemia with high sensitivity.

Reviewer’s Comments: The authors have demonstrated that combining analysis of coronary stenoses with myocardial hypoenhancement increases the utility of coronary CTA to assess myocardial ischemia. (Reviewer-Vineet R. Jain, MD).

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Keywords: Acute Coronary Syndrome, Myocardial Ischemia, CT

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Precise data indicate that patients with non-small cell lung cancer who demonstrate higher tumor perfusion are more sensitive to chemoradiation therapy and that findings on the perfusion CT predict initial tumor response.

**Objective:** To evaluate perfusion CT's ability to determine prognosis of patients with non-small cell lung cancer (NSCLC) after chemoradiation therapy.

**Design:** Prospective.

**Participants:** 123 patients with advanced lung cancer who had not undergone prior chemotherapy or radiation therapy. All patients had the longest diameter of tumor measure >3 cm.

**Methods:** Preliminary noncontrast CT was performed to localize the tumor. Subsequently, perfusion CT was performed utilizing a 20-mm scanning range and 50 mL of nonionic iodinated contrast (iophexol 300 mgm/mL) injected at 4 mL/second. The scanning delay was 10 seconds. Subsequently, a chest CT was performed using another 50 mL of contrast injected at 3 mL/second, employing 1.25-mm slice thickness. Images were reviewed on a separate workstation. Each functional map was evaluated on a 4-point scale on which 0 and 1 were non-diagnostic due to failure or severe respiratory or other artifact. Perfusion parameters were calculated by the manufacturer's software. Arterial input was measured by a region of interest (ROI) placed in an area of the aorta or major branch of the aorta according to tumor location. An ROI was also placed in the center of the tumor, avoiding necrotic areas, atelectasis, vasculature, and calcification. Perfusion parameters were measured, including the permeability/surface area product (rate of contrast leakage into the extracellular space). After 2 cycles of chemotherapy or prior to end of radiation therapy, follow-up perfusion CTs were performed.

**Results:** Of 123 patients, 84 (68.2%) had initial moderate or good image quality of the perfusion CT. Of these patients, 22 were subsequently analyzed, and all had NSCLC, received interim chemotherapy and/or radiation therapy, and had moderate or good image quality of the follow-up perfusion CT. Patients were either classified as responders or nonresponders based on whether there was follow-up tumor shrinkage. Patients who responded had significantly greater blood flow than those who did not. The median progression-free survival period was 4.7 months for those who had an increased permeability/surface area product compared with 19.0 months for those who had a decreased one. The median overall survival period was 10.6 months for those who had an increased permeability/surface area product compared with 19.3 months for those who had a decreased one.

**Conclusions:** Perfusion CT is useful in predicting initial tumor response and prognosis in patients with NSCLC treated with either chemotherapy or radiation therapy.

**Reviewer's Comments:** The authors have demonstrated that there is a potential for perfusion CT to be clinically useful in tailoring treatment strategies for individual patients with NSCLC. (Reviewer-Vineet R. Jain, MD).

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Keywords: Non-Small Cell Lung Cancer, Prognosis

Print Tag: Refer to original journal article
Lateral CXR Provides No New Info in TB Screening

*Tuberculosis: Value of Lateral Chest Radiography in Pre-Employment Screening of Patients With Positive Purified Protein Derivative Skin Test Results.*


In a pre-employment screening exam for tuberculosis, adults with positive PPD skin tests who undergo chest radiography (CXR) need only obtain a posteroanterior CXR and not the additional lateral CXR.

**Objective:** To evaluate whether a lateral chest radiograph (CXR) adds any significant information to the posteroanterior (PA) CXR in patients being evaluated for a positive purified protein derivative (PPD) skin test result.

**Participants:** 875 adults with positive PPD skin test results during pre-employment screening.

**Methods:** Two radiologists interpreted the follow-up PA and lateral CXRs independently and were blinded to the original CXR reports. Each CXR was evaluated for findings suggesting acute or chronic tuberculosis (TB). Findings of chronic TB included calcified granulomas and lymph nodes, apical pleural thickening, fibrosis, and nodules. Initially, the PA CXRs were analyzed alone. Subsequently, both the PA and lateral CXRs were analyzed with specific attention to any findings that could be seen on the lateral CXR that were not observed on the PA CXR.

**Results:** Of 875 subjects, 91 (10.4%) had positive findings suggesting possible exposure to TB. All of these cases were for chronic TB, and findings included calcified granulomas or lymph nodes, apical pleural thickening, fibrous scarring, and noncalcified nodules. No subject had radiographic findings suggesting active TB. All abnormalities were seen on the PA CXR. Of these 91 subjects, 16 (18%) also had an abnormality seen on the lateral CXR. None of the patients with a normal PA CXR had an abnormality seen on the lateral CXR. In no case did the addition of the lateral CXR alter the decision made on the PA CXR.

**Conclusions:** The lateral CXR does not yield any significant additional information regarding findings relating to potential TB in patients with positive PPD skin test results in a pre-employment screening. Eliminating the lateral CXR reduces the radiation exposure, reduces the cost, and results in better utilization of resources via a reduction in the time spent by the technologist and radiologist in obtaining and interpreting the images.

**Reviewer’s Comments:** The authors note that their results may not be applicable to children and adolescents or to patients with HIV as TB often presents as adenopathy in these cohorts. The only thing I question in this study is whether some of the findings the authors describe on CXR can really be attributed to chronic TB. For example, neither apical pleural thickening nor noncalcified nodules are necessarily due to chronic TB. However, this comment does not take away from the objective or conclusions of this study. (Reviewer-Vineet R. Jain, MD).

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Keywords: Tuberculosis, Positive Skin Test, Lateral Chest X-Ray

Print Tag: Refer to original journal article
Combined endovascular therapy and open techniques can improve patient outcome in cases of acute superior mesenteric artery occlusion.

**Background:** The mortality rate associated with acute ischemia caused by superior mesenteric artery (SMA) occlusion is as high as 93%. Delay in diagnosis is the main reason for such a high mortality. One technical advance that has improved the diagnostic workup of these patients has been multidetector CT angiography (CTA) performed with high-resolution reconstructions. Endovascular therapy for acute occlusions elsewhere in the body is widely practiced but is rare for acute SMA occlusion.

**Objective:** To report the authors’ experience with endovascular therapy for the treatment of SMA occlusion.

**Methods:** A 3-year retrospective review was performed demonstrating 61 patients with acute SMA occlusion at the authors’ institution. The overall in-hospital survival rate was 48%. In 21 of these patients, several different endovascular treatments were performed.

**Results:** Of the 21 patients, 10 had acute embolic SMA occlusion (mean age, 78 years, mean symptom duration, 29 hours). Aspiration embolectomy was performed in 9 patients, with 7 having satisfactory results. Residual clot was treated by thrombolysis in 5 of these patients. Of these 10 patients with acute embolic SMA occlusion, 8 had laparotomy, and 3 needed bowel resection. One patient who had a saddle embolus in the aorta and SMA died after angiography and open SMA embolectomy. The in-hospital survival rate was 90%. The remaining 11 patients had acute thrombotic SMA occlusion. These patients were younger (mean age, 68 years), had longer symptom duration (mean, 96 hours), and had atherosclerotic disease. Among these 11 patients, 7 had laparotomy, with antegrade stenting in 7 patients and retrograde stenting in 3. Four of 11 patients required bowel resection. The in-hospital survival rate was 82%.

**Reviewer's Comments:** This report reveals high survival rates and low complication rates in endovascular therapy for acute SMA occlusion. In the author's institution, endovascular therapies have become the first-line therapy, especially since CTA is usually sufficient for screening. Most acute occlusions are located in the main trunk of the SMA, which can be easily diagnosed with CTA. Endovascular revascularization can be the preferred technique if there is bowel infarction or perforation since the placement of surgical arterial grafts in these situations leaves the patient prone to graft infection. Visceral revascularization should be performed before laparotomy and resection to give the anastomosis the best chance to heal. The patient should be transferred to a place where both endovascular and open surgical therapy can occur. If the physical exam is uneventful or if there is no suspicion of peritonitis, then angiography can be performed first. If there is peritonitis, then laparotomy with stapling off of necrotic segments should be performed first. (Reviewer-Sharon Gonzales, MD).

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Keywords: Superior Mesenteric Artery Occlusion, Endovascular Therapy

Print Tag: Refer to original journal article
Before ablation of a classic osteoid osteoma, obtaining a positive biopsy is not necessary.

**Background:** Osteoid osteomas are being treated with radiofrequency ablation or laser photocoagulation rather than open surgery. Other bony lesions may mimic osteoid osteoma, so many operators prefer to take a biopsy of the lesion before ablating it.

**Objective:** To report the authors’ experience comparing 2 biopsy needles for sampling osteoid osteoma.

**Methods:** A retrospective review was performed showing 117 cases of presumed osteoid osteoma. In 65 patients, a 14-gauge Bonopty biopsy needle was used. In 43 patients, an 11-gauge Laurane biopsy needle was used. Biopsy was performed before laser ablation.

**Results:** Of the 108 patients treated, treatment success (minimal or no pain) was seen in 94% at 6 months and in 95% at 24 months. Bone samples from the central lucent area were obtained in 100% of the Laurane group and in 87.7% of the Bonopty group. Overall, biopsy results showed osteoid osteoma in 72% of the cases. In the Bonopty group, the biopsy was positive in 66.1%, and in the Laurane group, the biopsy was positive in 81.4%. There was no difference in symptomatic outcome between those who had positive biopsies compared to those with negative biopsies.

**Reviewer’s Comments:** Even if the classic clinical and radiologic signs mesh (a round or ovoid well-defined lucency with a central calcification), biopsies are still performed before ablative treatment in some centers. In this institution, the positive result for the Bonopty needle was low (66%) compared to the 81% positive rate of the Laurane needle. The authors believe that the difference may be secondary to caliber rather than design. In the literature, there is a large percentage, as high as 27%, of nondiagnostic biopsies, both surgical and percutaneous, of osteoid osteoma. In the age of CT and MRI, they believe a biopsy prior to treatment of a classic lesion is not essential. Other lesions may be differentiated by location (chondroblastomas in epiphyseal regions) and irregularity (osteoblastoma). It is convenient to just treat these lesions with ablation after even a nondiagnostic biopsy. A mimic lesion for which an accurate sample is helpful prior to laser ablating the area is in a Brodie abscess. In any case, the literature has shown that there is no statistically significant difference in the clinical outcome after adequate treatment, regardless of diagnostic or nondiagnostic biopsy. The large percentage of negative biopsies remains unexplained, but it may be of concern only if there is recurrence or if the lesion is not strongly characteristic of osteoid osteoma. (Reviewer-Sharon Gonzales, MD).

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Keywords: Osteoid Osteoma, Bone Biopsy Needle

Print Tag: Refer to original journal article
Varicose veins caused by GSV reflux can be treated by radiofrequency ablation, endovenous laser ablation, or foam sclerotherapy. As the patient ages, he or she is usually more suited to foam sclerotherapy.

**Background:** To treat varicose veins (VV) caused by great saphenous vein (GSV) reflux, several new nonsurgical endovascular techniques are available, including radiofrequency ablation (RFA), endovenous laser ablation (EVLA), and foam sclerotherapy (FS).

**Objective:** To evaluate all VV patients seen during a 2-year interval in 1 vascular center to determine who would be suitable candidates for these new endovascular techniques.

**Methods:** All patients evaluated for VV had a Doppler study. A reflux duration of 0.5 seconds after manual calf compression was considered significant. Next, the patients were analysed for suitability. The suitability criteria for catheter procedures were based on GSV diameters. GSVs with diameters ranging from 3 to 12 mm were suitable for RFA. Those with diameters >3 mm were suitable for EVLA, and those with diameters <1 cm were suitable for FS. To ensure suitability for RFA and EVLA, a straight segment of GSV ranging from 15 to 20 cm just below the saphenofemoral junction and a GSV diameter >3 mm at the knee (to allow cannulation) were required. Those veins unsuitable for catheter procedures had significant tortuosity, intraluminal thrombus, or lateral varicose veins. To be eligible for FS, the GSV could be tortuous and have a diameter <10 mm, but it could not be too shallow.

**Results:** Of 577 legs analyzed, 77% had primary GSV reflux. Of these, 73% were suitable for at least 1 endovenous procedure. In the remaining 25% of patients with GSV reflux caused by recurrent disease, 73% of the legs with VV caused by recurrent disease were able to be treated with at least 1 of the endovenous procedures. As patient age increased, a lower proportion of patients could be treated by either RFA or EVLA, whereas the proportion of patients suitable for FA remained the same across all age groups. This finding is more pronounced in patients with recurrent VV: FS is more suitable as patients get older.

**Reviewer’s Comments:** The results of this study show that most patients are suitable for at least 1 type of endovenous treatment of their VV (primary GSV reflux, 77% suitable; recurrent disease, 73% eligible), according to manufacturers’ and internationally published guidelines. This study also shows that the older a patient is, the less suitable they are for endovenous therapy in general, even though the suitability for FS did not change over time. As patients become more aware of the different procedures available, it is important to know how many of those patients are suitable for endovenous therapy. Getting a good duplex study is mandatory to evaluate suitability. (Reviewer-Sharon Gonzales, MD).

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Keywords: Varicose Veins, Endovenous Therapy

Print Tag: Refer to original journal article
Among radiologists interpreting breast images, the overall reproducibility for descriptions of breast masses on ultrasound is moderate to good, with the exception of evaluation of lesion margin.

**Background:** Prior studies have noted a lack of reproducibility in the characterization of breast lesions during ultrasound (US) evaluation. In 2003, the Breast Imaging Reporting and Data System lexicon issued by the American College of Radiology sought to standardize US reporting language when describing breast masses. **Objective:** To analyze interobserver evaluation of US features of breast masses as defined by the BI-RADS lexicon. **Design:** Retrospective study. **Methods:** During a 9-month study interval, patients who underwent 14-gauge core needle biopsy for breast masses were identified. For each biopsied mass, a set of 2 orthogonal views were created and reviewed in random order by 5 radiologists with varying degrees of experience in breast imaging. Each reader was provided a copy of the BI-RADS lexicon for US. The radiologists were blinded to clinical information, pathologic results, or correlative findings on mammography. US characterizations documented by the readers included mass shape, orientation, margin, lesion boundary, internal echo pattern, and posterior acoustic features. The radiologists were asked to select the single most appropriate descriptor for each of the categories. Ultimately, a BI-RADS category was assigned for each mass. **Results:** 267 masses in 267 patients were evaluated. When applicable, malignancy was confirmed after surgical excision. Substantial agreement was demonstrated among lesion shape, with round masses associated with the greatest interobserver agreement. Similarly, reader agreement among mass orientation (parallel or not parallel) was associated with a high degree of interobserver agreement. Agreement was less consistent when describing margin assessment. Descriptions of lesion boundary, posterior acoustic features, and echo pattern yielded only moderate interobserver agreement. Regarding the BI-RADS categories, there was only fair interobserver agreement overall, with the poorest agreement among those lesions categorized as BI-RADS 4c. The greatest agreement was among those lesions categorized as BI-RADS 2. Regarding lesion size, overall interobserver agreement was lower for lesions ≤0.7 cm. **Reviewer's Comments:** The poor agreement among the subcategories of BI-RADS 4 may not come as a surprise to most practicing breast imagers. Without clear factors to guide classification, an inherent bias among different radiologists, likely based on personal experience, is inevitable. A notable conclusion of this study is the poor agreement for lesion margins. In light of this conclusion, perhaps this characterization should not be viewed as a very important determining factor when deciding whether to proceed with a biopsy. (Reviewer-Basil Hubbi, MD).

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Keywords: Breast Masses, BI-RADS, Interobserver Agreement

Print Tag: Refer to original journal article
Background: When evaluating a patient with a prior history of breast cancer, regional lymph node recurrence is associated with a poor prognosis. The desire for improving an otherwise poor prognosis for patients presenting with lymph node recurrence has led researchers to explore early detection of regional lymph node recurrence.

Objective: To assess the utility of ultrasound (US) surveillance of lymph node recurrence for breast cancer patients who have already undergone breast surgery.

Methods: During a 1.5-year retrospective study interval, patients were identified who underwent breast US and were known to have a history of breast cancer. Only patients who had been treated with lumpectomy, mastectomy, or a combination thereof were included. The women underwent US examination of the bilateral axillae and supraclavicular lymph node areas routinely. If recurrence was diagnosed on US, additional studies such as PET, CT, whole-body bone scan, or MRI were performed to evaluate for distant metastases. On US, a suspicious lymph node was described as round or irregular in shape, eccentric cortical thickening, replaced fatty hilum, or marked hypoechogenicity. Final diagnosis was determined based on pathologic results, imaging studies, or clinical follow-up.

Results: 3982 examinations were performed in 1817 patients. Of these patients, 3.0% had suspicious lymph nodes on follow-up imaging. Of the total patients, 1.7% were true-positive for recurrence, and of these true-positive patients, 15.4% had palpable lymph nodes. The mean diameter of true-positive lymph nodes was 12.8 mm, and the median time after surgical treatment was 42 months. Moreover, distant metastases were found in 62% of patients proven to have lymph node recurrence and in only 2.3% of those without lymph node recurrence. The overall sensitivity and specificity of lymph node US in all the women studied were 76.9% and 98.7%, respectively. The positive predictive value was 55.6%, and the negative predictive value was 99.5%.

Reviewer's Comments: This is a powerful heavily referenced study which may have implications on widespread practice. Clearly, the authors demonstrate excellent data for the detection of lymph node recurrence in those with a history of breast cancer. Based on data such as this, there may come a day when US screening of axillary and supraclavicular lymph nodes in patients with a history of breast cancer may become routine. (Reviewer-Basil Hubbi, MD).

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Keywords: Breast Cancer, Lymph Node Recurrence, Early Detection

Print Tag: Refer to original journal article
Any noticeable interval growth of a breast lesion after benign concordant MRI-guided breast biopsy will likely occur >6 months after initial biopsy.

**Background:** To determine if lesion sampling with MRI-guided biopsy of the breast was adequate, it is often necessary to perform a follow-up MRI. Given the conspicuity of a suspicious lesion based on its *in vivo* enhancement characteristics, specimen MRI is not effective in assessing proper sampling.

**Objective:** To assess the utility of follow-up MRI for confirming a benign pathology after MRI-guided biopsy.

**Design:** Retrospective study.

**Methods:** During a retrospective 54-month study interval, women were identified who had benign pathology after MRI-guided breast biopsy. All patients had undergone a follow-up MRI within 12 months of the biopsy. Cases with high-risk lesions and cases which were thought to be discordant were excluded from the study set. All image-guided biopsies were performed via MRI guidance with a 9-gauge vacuum-assisted biopsy device. A titanium marker was placed in the targeted area after each biopsy. Data were collected, including patient age, MRI lesion characteristics, personal or family history of breast cancer, histology of biopsy, and date of follow-up MRI studies, including the interval between biopsy and follow-up. Reports of follow-up MRI studies were reviewed, and the previously targeted lesion was characterized as stable, enlarged, decreased, or resolved.

**Results:** Of all lesions that underwent MRI-guided vacuum-assisted biopsy, 32.6% were included in the study, yielding a total of 177 lesions in 172 women. Average time to MRI follow-up was 24 months. Of the targeted lesions, 55.4% were masses, with the remaining fulfilling the criteria as nonmasses. Most targeted lesions were <1.0 cm in size. On initial follow-up imaging, only 5% of the lesions had enlarged, and the remaining lesions were described as stable, decreased in size, or resolved. Of those lesions that underwent a second biopsy, 24% yielded cancer. All lesions that had decreased in size on follow-up studies were confirmed as benign by continued follow-up imaging. Any increase in lesion size was not seen before 6 months.

**Reviewer’s Comments:** This study is a nice summary in a small patient population. The most notable information gleaned from the data is that follow-up MRI prior to 6 months after biopsy may be of limited to no value. (Reviewer-Basil Hubbi, MD).

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**Keywords:** MRI-Guided Biopsy, Follow-Up

**Print Tag:** Refer to original journal article
Ultrasound has proven itself to be an excellent first-line diagnostic test for abdominal pain in children suspected of having ileocolic intussusception.

**Background:** Prior studies have reported that abdominal ultrasound (US) has a high specificity in pediatric populations for the detection of ileocolic intussusception when used in conjunction with plain film and enema. **Objective:** To evaluate the diagnostic accuracy of abdominal US as a primary examination in the pediatric patient population. **Methods:** During a 7-year study interval, 814 US examinations of the abdomen were performed as a first-line screening examination for intussusception for all children younger than age 10 years. During the stated study period, the examinations were performed by sonography technicians supervised by pediatric radiologists during daytime hours. During after-hours and weekend shifts, residents and emergency radiologists performed and interpreted these examinations. The results of the examinations were reviewed and correlated with clinical records. True-positive designations were given to those cases for which the diagnosis was subsequently confirmed on enema or surgery. True-negative designations were given to patients who had received another diagnosis for the reported abdominal pain, had an enema that revealed no abnormality, or did not return for additional treatment after being discharged. **Results:** 13.8% of patients included in the study were positive for intussusception. Of these, 86% were determined to be true-positive cases of intussusception as assessed on US and subsequent enema. Of the total examinations performed, 85.9% were interpreted as negative. Of these, 3.6% still underwent subsequent enema that confirmed the US findings in 93% of cases. The overall sensitivity of US for the diagnosis of ileocolic intussusception was 97.9%, and the specificity was 97.9%. The positive predictive value was 86.6%, and the negative predictive value was 99.7%. **Reviewer’s Comments:** Here is a definitive study in validating the use of US for the diagnosis of ileocolic intussusception in children younger than age 10 years. The large group of patients studied gives great power to this study with respect to previous analyses. The safety and efficacy of US has proven itself on numerous occasions. However, the interesting fact about what has been reported here is that many of the studies were performed by rather inexperienced sonographers, such as residents, and yet the results showed similar efficacies with studies performed by more experienced individuals. (Reviewer-Basil Hubbi, MD).

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Keywords: Pediatric Ileocolic Intussusception, Diagnosis, US

Print Tag: Refer to original journal article
Most patients with hypoglycemic encephalopathy who demonstrate diffusion abnormalities on MRI have a very poor prognosis. Those without bilateral symmetric involvement have a better prognosis.

**Objective:** To describe the patterns of hypoglycemic encephalopathy (HE) on diffusion-weighted imaging (DWI) and to determine how the findings relate to clinical outcome.

**Participants:** 17 consecutive patients diagnosed with HE who demonstrated signal changes on DWI.

**Methods:** All subjects were imaged on the day of admission using a 1.5T scanner. The studies included standard T2 fast spin echo (FSE) or fluid-attenuated inversion recovery (FLAIR) images and DWI with apparent diffusion coefficient (ADC) maps.

**Results:** 3 nondiabetics with poor oral intake and 14 diabetics were evaluated. Nine patients had overdose of insulin or oral hypoglycemic medications, 4 had poor oral intake, and 1 had idiopathic hypoglycemia. Presentations consisted of coma (n=7), semicoma (n=1), stupor (n=7), and drowsiness (n=2). In all patients, high DWI signal corresponded to reduced ADC (restricted diffusion). Patterns of involvement were gray and white matter (n=8), gray matter only (n=4), and white matter only (n=5). No difference was seen in initial blood glucose levels and diabetes duration between these groups. All patients with basal ganglia (BG) involvement also had cortical gray matter involvement. Twelve patients had cortical involvement, 8 of whom had BG involvement. Most patients with BG involvement included insula, putamen and caudate lobes, but none of these cases involved the thalamus. Cortical involvement was most common in temporal and parietal lobes (9 patients each), frontal lobe (n=8), insula (n=6), and hippocampus and occipital lobe (n=5). In 12 patients, abnormality was also seen on FLAIR and T2. All findings were symmetric except for 1 patient with a unilateral lesion limited to the white matter. Regional white matter involvement included centrum semiovale (n=10), periventricular white matter (n=8), internal capsule (n=5), corpus callosum (n=7), and middle cerebellar peduncle (n=3). Two patients recovered completely after glucose administration (lesion limited to splenium, n=1; single unilateral white matter lesion, n=1). The remaining 15 patients had bilateral involvement, and all had a much poorer outcome (moderate to severe disability, n=1; persistent vegetative state, n=14).

**Conclusions:** HE with DWI abnormalities can occur in gray and/or white matter and is usually symmetric. When symmetric, there is a generally poor outcome.

**Reviewer’s Comments:** It is unfortunate that the authors chose not to include patients with HE whose MRI imaging was negative on DWI. Do such patients recover or is there still a concern of poor prognosis? Clearly, most patients with restricted diffusion have a grave prognosis, unless the involvement is very focal or unilateral. (Reviewer-Yaron Lebovitz, MD).
Pyogenic Spinal Infection -- Focus Follow-Up MRI on Soft Tissues

Utility of MRI in the Follow-Up of Pyogenic Spinal Infection in Children.
Wang Q, Babyn P, et al:

Pediatr Radiol 2009; September 10 (): epub ahead of print

In children who respond clinically to therapy for pyogenic spinal infection, paraspinal and epidural soft tissue findings on MRI correlate well whereas disc and bone changes can worsen but do not indicate poor response.

Objective: To evaluate the efficacy of follow-up MRI for pediatric pyogenic spinal infections.

Participants: 17 pediatric patients (age range, 2 months to 16 years) with pyogenic spinal infections treated during a 9-year study interval and having at least one follow-up MRI examination.

Methods: Clinical and laboratory values were collected. MRI was performed on a 1.5T scanner with sagittal T1, T2-fast spin echo with fat suppression, axial T1 and T2, and fat-suppressed postcontrast sagittal, axial, and coronal T1.

Results: Of the 17 children evaluated, 7 were <3 years old and 10 had ages ranging from 9 to 16 years. All children were treated with intravenous antibiotics, and 2 underwent laminectomy for epidural abscess. Sixteen improved clinically within 1 month. Follow-up MRIs ranged from 2 weeks to 5 years. Three categories of change were found on <4-month follow-up. The first was improvement in bone, disc, and soft-tissue (paraspinal and epidural) appearance (n=8). Clinical and laboratory results were improved as well. The second group had improvement in soft tissue appearance, but greater involvement of bone and/or disc (n=8). Clinical and laboratory results were also improved with these children. The third group demonstrated worsening of bone, disc, and soft-tissue appearance (n=1). Clinical and laboratory results were worsened. Long-term follow-up was available in 10 children. All demonstrated improvement, but residual changes were present in some. At a range of 7 to 33 months, marrow edema, bone enhancement, and abnormal T2 disc signal were seen in 7 patients (persistent disc enhancement in 4). Loss of vertebral height was seen in 3 children at 12 to 33 months. Two children had near-complete destruction of vertebrae requiring spinal fixation. Epidural enhancement persisted in 3 children at 6 to 18 months after baseline. Paraspinal soft-tissue enhancement was seen in 7 children at 6 to 33 months.

Conclusions: Epidural and paravertebral soft-tissue changes on short-term follow-up correlate better with clinical symptoms than do bone and disc changes, which can progress despite clinical improvement. Follow-up MRI is not needed for patients with good clinical response and should be reserved for those without response or for those who are too young for accurate clinical assessment. When short-term follow-up is performed, the focus should be on soft tissue changes, not on bone and disc changes.

Reviewer's Comments: This well-written study has excellent illustrations and much more detail than that provided in this review. Findings were consistent with prior studies on adults, showing that bony and disc changes can worsen despite treatment response. (Reviewer-Yaron Lebovitz, MD).

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Keywords: Pyogenic Spinal Infection, Pediatric, MRI Follow-Up

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Whole-body MRI is superior to 99mTc-MDP scintigraphy in detecting osseous metastases from renal cell carcinoma.

**Objective:** To determine the effectiveness of whole-body MRI compared with bone scintigraphy in detecting osseous metastases from renal cell carcinoma (RCC).

**Design:** Prospective study.

**Participants:** 47 RCC patients were evaluated with both whole-body MRI and nuclear bone scan.

**Methods:** On MRI, metastatic disease was identified as hyperintense lesions on the coronal short tau inversion recovery images, with corresponding hypointensity on coronal T1-weighted images. On 99mTc-MDP scintigraphy, foci of uptake not attributed to benign processes were regarded as metastatic lesions. Sensitivity and specificity values were calculated for both modalities.

**Results:** Utilizing both whole-body MRI and bone scan, 15 patients were found to have osseous metastases. On a per-patient basis, no statistical difference in sensitivities was seen between modalities. However, on a lesion-by-lesion basis, the results differed significantly; sensitivities for whole-body MRI and bone scan in detecting osseous metastases were 94% and 64%, respectively. Of the 47 patients, 33 were also found to have extraosseous metastatic disease that was not revealed by nuclear bone scanning.

**Conclusions:** Overall, whole-body MRI is superior to bone scintigraphy in detecting osseous metastatic RCC. Despite similar specificities between the 2 modalities on a lesion-by-lesion basis, whole-body MRI had a sensitivity of 94%. Although lesions of the face, skull, and thorax can be missed on MRI, the authors maintain that whole-body MRI has significant advantages. In particular, MRI is better at identifying lesions of the spine, which can lead to devastating neurologic impairment and mortality if undetected.

**Reviewer's Comments:** From an academic standpoint, the decreased sensitivity of bone scanning for certain malignancies is already well-documented. Highly aggressive tumors, such as RCC, thyroid carcinoma, and multiple myeloma, are known to produce false-negative bone scans. RCC tends to produce osteolytic bone lesions that often appear “cold” on MDP-bone scans and only appear “hot” if there is reactive bone formation. Cold lesions are easily and often missed. From my experience, regardless of clinical status (bone pain, insufficiency fracture), it is in the patient's best interest to inform the referring physician about the inherent limitations of bone scanning for RCC patients. The authors claim that this is one of the first studies to compare the sensitivities of both modalities in detecting osseous metastases from RCC. In my opinion, the findings presented here should be more implicit. Nonetheless, the validity of the results should serve to ensure the prompt recognition of metastatic RCC through a more appropriate workup. (Reviewer-Rahul Pawar, MD).

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Keywords: Renal Cell Carcinoma, Bone Metastases

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Core Biopsy Optimizes Diagnosis for Pathologic Fractures

Imaging-Guided Percutaneous Biopsy of Pathologic Fractures: A Retrospective Analysis of 129 Cases.
Datir A, Pechon P, Saifuddin A:

AJR Am J Roentgenol 2009; 193 (August): 504-508

Imaging-guided needle core biopsy of pathologic fractures is optimal for lesions with a significant soft-tissue component.

**Objective:** To determine the diagnostic yield of needle core biopsy of pathologic fractures of the appendicular skeleton and to identify factors that contribute to a nondiagnostic biopsy.

**Design:** Retrospective study.

**Participants:** 129 patients presenting with pathologic fractures of the appendicular skeleton were included.

**Methods:** All patients underwent needle core biopsy utilizing either CT, fluoroscopic, or ultrasound (US) guidance. CT or MRI was used to determine the presence of extension into soft tissues. Lesions with a soft-tissue mass measuring <1 cm were biopsied with an 11-gauge or 13-gauge needle. Lesions with a soft-tissue mass measuring >1 cm were biopsied using a 14-gauge needle.

**Results:** The most common locations for pathologic fractures were the femur, humerus, tibia, and pelvis. Ninety-nine cases had a definitive diagnosis (group 1), and 30 cases were diagnosed as indeterminate or nondiagnostic (group 2). CT, fluoroscopy, and US had a diagnostic yield of 75.5%, 66.6%, and 93.7%, respectively. Of the group 1 lesions, 95 had a soft-tissue component measuring an average of 5.77 cm in the anteroposterior dimension. Of the 30 cases in group 2, 27 did not have a soft-tissue component.

**Conclusions:** Needle core biopsy had a diagnostic yield of 77% from the given sample size. Metastatic disease was the most common final diagnosis, and the proximal femur was the most frequent location of pathologic fracture. Lesions with a significant soft-tissue component were more likely to confer a definitive diagnosis from needle core biopsy. Open surgical biopsy is preferable for lesions that are purely osseous or have a very small soft-tissue component.

**Reviewer’s Comments:** Determining the etiology of a pathologic fracture cannot be underestimated. As the authors clarify, erroneously treating a pathologic fracture as a metastatic lesion can be devastating if it is secondary to a primary osseous neoplasm. Historically, open surgical biopsy has been the gold standard for diagnosing the cause of an insufficiency fracture. The complications of open procedures are numerous and even can result in unnecessary limb amputation. The importance of this study is tremendous in that it provides the surgeon with an approximate guideline for determining patients who are optimal candidates for needle core biopsy. Given other variables due consideration, lesions with a soft-tissue component >1 cm may undergo successful needle core biopsy, hence subjecting patients to less risk while optimizing their care. Radiologists are most familiar with imaging-guided techniques -- this is our chance to amplify our role in active patient care rather than serving as pure diagnosticians. (Reviewer-Rahul Pawar, MD).

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**Keywords:** Pathologic Fracture, Needle Core Biopsy, Diagnostic Yield

**Print Tag:** Refer to original journal article
For the clinical diagnosis of Sever disease (calcaneal apophysitis), radiographic confirmation is not necessary.

**Objective:** To determine if radiography, specifically plain films, is necessary in the workup of patients diagnosed with calcaneal apophysitis.

**Design:** Prospective study.

**Results:** 61 patients diagnosed with calcaneal apophysitis were evaluated clinically and radiographically. Clinical diagnosis was considered a positive “squeeze test” of the posterior aspect of the heel. Standard anteroposterior and lateral weight-bearing views were obtained for each patient. Patients who sustained traumatic injuries or had evidence of osteomyelitis, tendonitis, or bursitis were excluded. Radiographic findings were correlated with clinical findings for all cases. **Results:** After reviewing all plain films, only 1 diagnosis was altered based on the radiographic findings. For the remaining cases, despite variable findings (normal, apophyseal sclerosis, or fragmentation), the diagnosis of calcaneal apophysitis was not changed and management remained conservative. Some radiologists use findings such as apophyseal sclerosis or fragmentation as highly suggestive or conclusive evidence for calcaneal apophysitis. Nonetheless, the literature actually supports that these findings are often found in normal subjects and are, in fact, normal variants. In this study, management was altered for only 1 patient based on the finding of a solitary bone cyst within the calcaneus.

**Conclusions:** For most patients diagnosed with calcaneal apophysitis, clinical examination, conservative management, and follow-up are sufficient, but a radiographic workup is unnecessary.

**Reviewer’s Comments:** In my practice, for patients diagnosed with calcaneal apophysitis, plain films are also used to evaluate an overwhelming number of cases. As per my discussions with referring physicians, the rationale seems to stem from the need to exclude other diagnoses, such as osteomyelitis and fracture. We are now in an age during which the public is becoming more aware of the risks associated with radiology, namely ionizing radiation. Furthermore, children are far more susceptible to the stochastic risks conferred from radiation. As with many other clinical diagnoses, this study reinforces yet another example of the excessive and liberal use of radiology. I strongly agree with the author that a meticulous history and clinical examination are sufficient to rule out other etiologies of heel pain in the pediatric patient. Instances in which calcaneal apophysitis may not be the correct diagnosis may require a radiologic workup. In my opinion, this would be a more judicious use of our expertise – something even patients and their families would appreciate in the long run. (Reviewer-Rahul Pawar, MD).

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Keywords: Heel Pain, Calcaneal Apophysitis

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Chondroblastomas must be surgically treated. Recurrence is highest for purely epiphyseal lesions, and proximal femoral and tarsal involvement portends poorer outcomes.

**Objective:** To determine factors that promote recurrence of chondroblastomas in children.

**Design:** Retrospective study.

**Methods:** 87 patients were analyzed in this study from a sample size spanning 55 years. All chondroblastomas were histologically proven diagnoses with special attention given to determine the presence of cystic components. Lesion recurrence was thoroughly examined with respect to histology, lesion location, and subsequent intervention.

**Results:** The average age at diagnosis was 12.5 years. Most patients presented with either pain, limp, or swelling. On the whole, chondroblastomas were located within the epiphyses, although some lesions crossed the growth plate or were purely metaphyseal. The long bones were overwhelmingly involved, with the proximal tibia and proximal femur being the most commonly affected parts of the appendicular skeleton. The tarsal bones were among the least affected. Follow-up ranged from 4 to 300 months (average, 62.5 months). Overall, 32% of patients went on to develop “fair” or “poor” outcomes clinically and anatomically. Taking into account the frequency of involvement, the tarsal bones and proximal femur were most affected by recurrence (100% and 37%, respectively). These locations were also associated with the poorest clinical conditions.

**Conclusions:** The authors indicate that their study is the first to detail the prognostic factors of chondroblastomas in pediatric patients with open physes. Recurrences were not influenced by gender, age, or type of treatment. However, the highest recurrence rates were associated with lesions that were purely epiphyseal, farthest from active physes, within the proximal femur, and within the tarsal bones. In some literature, claims have been made that cystic components within chondroblastomas increase recurrence. However, the authors of this study failed to demonstrate such an association.

**Reviewer’s Comments:** For the surgeon, preserving the integrity of the growth plate in a growing child is of paramount importance. Damage to the active physes can have significant consequences, including limb length discrepancy, joint instability, pain, and premature arthropathy requiring arthrodesis or joint replacement. Sailhan and colleagues have compiled one of the largest retrospective reviews of chondroblastomas to date, making important revelations along the way. For the radiologist, recognizing that chondroblastomas should be included in the differential diagnosis of epiphyseal lesions in a child is an important finding. This article serves to heighten our awareness as to the locations and conditions under which recurrence is increased and as to which anatomic locations confer the highest risk of adverse clinical outcomes. Active discussion with referring physicians who may be unaware of such information is critical to ensuring prompt and vigilant care for such patients. (Reviewer-Rahul Pawar, MD).

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**Keywords:** Chondroblastoma, Pediatric Bone Lesions

**Print Tag:** Refer to original journal article
Add Lidocaine to Reduce Pain of Lymphoscintigraphy Injections


Stojadinovic A, Peoples GE, et al:

Lancet Oncol 2009; 10 (September): 849-854

The addition of lidocaine into the radiocolloid injection reduces pain of large-volume lymphoscintigraphy in patients undergoing sentinel lymph node mapping for breast cancer.

Objective: To investigate 2 strategies for reducing pain, adjusting pH, and adding 1% lidocaine to the radiocolloid injection for patients undergoing sentinel lymph node (SLN) mapping for breast cancer.

Methods: Patients were randomly assigned to receive (1) standard topical 4% lidocaine cream and radiocolloid injection (standard care); (2) placebo cream and radiocolloid injection plus bicarbonate; (3) placebo cream and radiocolloid injection plus 1% lidocaine; and (4) placebo cream and radiocolloid injection plus bicarbonate and 1% lidocaine.

Results: With approximately 30 patients in each of group, the demographic and clinical features of the groups were similar. Rates of SLN identification were 96% for standard of care, 97% for sodium bicarbonate, 90% for 1% lidocaine, and 90% for bicarbonate plus lidocaine (differences not significant). The mean pain rating was 17.5 for the standard of care group, 15.4 for the bicarbonate group, and 4.6 for the lidocaine-only group, and 3.4 for the lidocaine plus bicarbonate group.

Conclusions: The addition of lidocaine results in a large reduction of pain without adversely affecting success of SLN identification.

Reviewer's Comments: It is heartening to see a well-designed study appearing in a top-tier oncology journal. The strengths of this paper include the rigorous randomized double-blinded study design, adequate statistical power, comparable study groups, and multiple injecting physicians. While the study was performed rigorously, I wonder whether the reviewers were lacking perspective in that the authors were not asking the more basic and relevant question of whether the unusually large injection volume (4 mL) used in this protocol was needed. Indeed, we inject 0.1 mL of volume intradermally, which we find to be a relatively well-tolerated and successful protocol. The authors acknowledge that the large volume may have been a factor in the pain, and they sidestep the issue by stating that they were studying the effect of lidocaine in patients administered this large volume. I question the relevance of the study and, instead, suggest that it would be more prudent to study the question of injection volumes and resultant efficacy and pain. One other issue I would like to add is the decrease in identification of SLNs in the 2 groups administered lidocaine (90% versus 96 or 97%). While not statistically different, this may depend on the power of the study. Larger groups may validate this difference, suggesting a 2.5- to 3-fold higher rate of nonvisualization when lidocaine is administered. (Reviewer-Lionel S. Zuckier, MD).

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Keywords: Lymphoscintigraphy, Injection Pain, Lidocaine

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Endoscopic ultrasonography is only moderately accurate in diagnosing lymph node metastases from rectal cancer.

**Objective:** To determine the accuracy of endoscopic ultrasound (EUS) in diagnosing lymph node metastases from rectal cancer.

**Design:** Meta-analysis.

**Methods:** The authors selected studies that included EUS studies confirmed by surgical histology. Only studies with sufficient data to construct a 2 x 2 table (to calculate true positive, false negative, false positive, and true negative) were included. Pooled estimates were used to calculate sensitivity, specificity, likelihood ratios, and diagnostic odds ratios. EUS studies were grouped into 3 time periods (1986-1994, 1995-2000, and 2001-2008).

**Results:** The initial search yielded 3610 potential articles; the refined search identified that all pooled estimates, calculated by random-effects and fixed-effects models, were similar. The sensitivity of EUS did not increase with more recent time periods. The specificity of EUS did improve with time. For the most recent time period, EUS had a sensitivity of 70.9% and a specificity of 78.6%. Publication bias calculated using Harbord-Egger bias indicator gave a value of -0.47, indicating that there was no publication bias.

**Conclusions:** Although EUS is an important tool for rectal cancer staging, both the sensitivity and specificity of EUS are only moderate.

**Reviewer's Comments:** Accurate pre-treatment lymph node staging is integral to optimal rectal cancer treatment. One limitation of this study is that the accuracy of fine-needle aspiration was not determined. In addition, this study did not directly compare the results of EUS with other modalities such as CT and MRI. (Reviewer-Todd M. Tuttle, MD).

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Keywords: Rectal Cancer, Nodal Invasion, Endoscopic US

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