3 Distinct MRI Findings Correspond With PIVS

Semelka RC, Lessa T, et al:
J Magn Reson Imaging; 29 (March): 617-620

As found with CT, MRI also demonstrates features which are distinctive for posttraumatic intrahepatic vascular shunts.

**Objective:** To describe the MRI appearance of posttraumatic intrahepatic vascular shunts (PIVS).

**Design:** Retrospective analysis.

**Participants:** 11 patients with findings of PIVS on clinical interpretation.

**Methods:** MRI was performed on 1.5T or 3T systems using a phased-array torso coil. The standard upper abdominal MRI protocol was performed. Imaging sequences included axial 2D gradient-echo in-phase and out-of-phase, T2-weighted, and axial 3D gradient-echo precontrast and postcontrast fat saturation. The images were reviewed by 4 radiologists. The following observations were recorded: hepatic vessel caliber and pattern of opacification, as well as any hepatic parenchyma enhancement variations. The MRI findings were confirmed in all patients by correlating with other imaging modalities obtained within 6 months of MRI.

**Results:** The imaging findings on MRI studies of the 11 patients were consistent with PIVS. Eight of the 11 patients had a history of previous hepatic injury, including 4 from previous motor vehicle accidents and 4 due to a prior percutaneous liver biopsy. The size of the nidus of shunt communication ranged from 0.3 cm to 3.2 cm. Ten of the shunts were porto-portal, and one was porto-venous. Ten of the shunts were located in the right lobe, and one was located in the left. The afferent and efferent vessels were dilated in 5 of the 11 patients, and consequently, there was a larger nidus in these patients. There was transient increased liver parenchymal enhancement that faded to isointensity with the rest of the liver in all 11 patients. There were no corresponding parenchymal signal abnormalities on the unenhanced images. Six of the 11 patients had small tortuous vascular channels near the shunts. There was early opacification of the efferent vessel during the early arterial and portal venous phase of contrast enhancement in all patients.

**Reviewer's Comments:** The results of this study are useful in demonstrating the MRI features of PIVS. While similar features are seen on CT, MRI may afford better detection of this entity given the routine use of dynamic contrast-enhanced imaging, which may not always be used with CT. One of the limitations reported in this study was the small number of patients, which can be explained, in part, by the rare occurrence of this entity.

**Additional Keywords:** Imaging

**print tag:** () Refer to original journal article.
Degree of MRI Enhancement Differentiates RCC Subtypes

Renal Cell Carcinoma: Dynamic Contrast-Enhanced MR Imaging for Differentiation of Tumor Subtypes — Correlation With Pathologic Findings.

Sun MR, Ngo L, et al.
Radiology; 250 (March): 793-802

There are different enhancement patterns which consequently allow differentiation between clear-cell, papillary, and chromophobe renal cell carcinomas.

Objective: To assess whether the enhancement pattern found on MRI is capable of differentiating between clear-cell, papillary, and chromophobe subtypes of renal cell carcinoma (RCC).

Design: Retrospective analysis.

Participants: 76 men and 36 women with 113 renal masses that had a pathologic diagnosis of RCC.

Methods: Examinations were performed with 1.5T scanners. Imaging sequences included T2-weighted half-Fourier single-shot fast spin-echo, axial dual-echo T1-weighted in-phase and opposed-phase gradient-echo, and 3-D frequency-selective fat-saturated T1-weighted spoiled gradient-echo performed prior to and during dynamic administration of intravenous gadolinium contrast. Dynamic acquisitions were obtained during the corticomedullary and nephrographic phases. Region of interest measurements within the neoplasm and the uninvolved renal cortex on precontrast as well as the enhanced-phase images were obtained. Percentage signal intensity change and tumor-to-cortex enhancement index were calculated.

Results: The 113 renal masses were confirmed histopathologically via nephrectomy, partial nephrectomy, or biopsy. There were 75 clear-cell, 28 papillary, and 10 chromophobe RCCs. All lesions demonstrated increased signal intensity on the contrast-enhanced images. The mean percentage signal intensity change for all the neoplasms was approximately 154% and 205% during the corticomedullary and nephrographic phases, respectively. Clear-cell RCCs demonstrated the greatest percentage signal intensity change on the enhanced images, followed by chromophobe and subsequently papillary subtypes. Clear-cell RCCs also demonstrated the largest tumor-to-cortex enhancement index, followed by chromophobe and subsequently papillary subtypes. Clear-cell RCCs demonstrated a decrease in the enhancement index between the corticomedullary and nephrographic phases, while the papillary subtype showed progressive increase in the enhancement index between the two phases. Therefore, the signal intensity changes on corticomedullary phase images allowed differentiation between clear-cell and papillary RCCs. Utilizing a threshold value of 84%, a 93% sensitivity and a 96% specificity were obtained.

Reviewer's Comments: The results of this study are useful in that the degree of enhancement on MRI can help differentiate between RCC subtypes, in particular, between the clear-cell and papillary subtypes. Consequently, this information may assist the clinician in outlining an appropriate treatment regimen. A reported limitation was that this study included only a small number of chromophobe RCCs, which may be in keeping with the overall lower incidence of this subtype.

Additional Keywords: Differentiating Subtypes

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MRI Contrast-Enhancement Patterns Help Show Angiogenic Activity

Value of Dynamic Contrast-Enhanced MRI and Correlation With Tumor Angiogenesis in Bladder Cancer.


The MRI contrast-enhancement patterns of bladder cancers reflect the tumor angiogenic activity and tumor neovascularization, with stronger and faster enhancement associated with a greater likelihood of recurrence.

**Objective:** To determine if dynamic contrast-enhanced MRI is useful in determining the tumor angiogenic activity of bladder neoplasms by correlating with grade, stage, and microvessel density.

**Design:** Prospective analysis.

**Methods:** This study was comprised of 24 patients who underwent dynamic contrast-enhanced MRI within 1 month of their diagnosis of bladder cancer. MR staging was determined as follows: intact T2-weighted hypointense muscle layer without enhancement was stage T1; irregular inner margin of the muscle T2-weighted hypointense line without or with enhancement was stage T2a; disrupted muscle T2-weighted hypointense line and early enhancement without perivesical fat infiltration was stage T2b; lesion with irregular shaggy outer border and streaky areas in the perivesical fat of the same signal as the neoplasm was stage T3b; and adjacent organ or sidewall extension of the same signal as the neoplasm was stage T4. Peak time enhancement was calculated during each of the 5 minutes following contrast administration. The steepest slope of the contrast-enhancement curve was used to measure the tissue perfusion rate. Areas with the highest microvessel density expressed immunostaining with factor VIII-related antigen-specific polyclonal antibodies.

**Results:** Pathologic staging revealed urothelial cancer in all patients. Six patients were stage T1, 6 were stage T2a, 2 were stage T2b, and 10 were stage T3. There were no stage 4 lesions. MRI correctly staged 13 patients, overstaged 3, and understaged 8 patients. There was no statistically significant difference between the T stage and the microvessel density. There was a positive correlation between the steepest slope of the time-intensity curve, maximal enhancement at 1 minute, and microvessel density. There was also a positive correlation between the steepest slope of the time-intensity curve ratios, maximal enhancement at 1 minute, and histological grade. There was a statistically significant difference between those with and those without recurrence with regard to the maximal enhancement at 1 minute and maximal enhancement at 2 minutes. During the 4-year follow-up, 80% of cases with recurrence and 100% of cases without recurrence were correctly classified with MR. The bladder neoplasms that showed stronger and faster MR contrast enhancement had a higher rate of angiogenesis and were consequently more likely to have local recurrence.

**Reviewer's Comments:** The results of this study are useful in demonstrating parameters obtained at dynamic contrast-enhanced MRI of bladder cancer that can be correlated with tumor angiogenesis. The microvessel density correlated with the steepest slope of the time-intensity curve and maximal enhancement at 1 minute. One of the limitations reported in this study was the small sample size.

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CT Beak Sign, Fat Notch Sign Indicate Adhesive Band SBO

Small-Bowel Obstruction From Adhesive Bands and Matted Adhesions: CT Differentiation.
Delabrousse E, Lubrano J, et al:
AJR Am J Roentgenol; 192 (March): 693-697

Several useful CT findings help distinguish between small bowel obstruction caused by adhesive bands versus matted adhesions.

**Objective**: To determine if CT can differentiate between adhesive bands versus matted adhesions as causes of small bowel obstruction (SBO).

**Design**: Retrospective analysis.

**Participants**: 67 patients with surgically proven adhesive SBO.

**Methods**: In accordance with surgical criteria, adhesive bands were defined as adhesive structures that were single, >1 cm long, and <1 cm in diameter. Matted adhesions included adhesive structures that were dense, multiple, <1 cm long, and >1 cm in diameter. SBO was caused by adhesive bands in 46 patients and by matted adhesions in 21 patients. Examinations were performed with a 64-MDCT scanner at 70 to 90 seconds following intravenous contrast administration. Oral contrast was not given. Images were reviewed by a gastrointestinal radiologist. Simple adhesive SBO was defined as a single abrupt transition zone between dilated proximal and collapsed distal small bowel loops. A closed-loop adhesive SBO demonstrated 2 adjacent transition zones, C-shaped bowel, and radial distribution of mesenteric vessels. The location of the obstruction as being within the abdomen or pelvis as well as the presence of a whirl sign and “small bowel feces sign” were also recorded. The beak sign (found at the transition point) and a “fat notch sign” (corresponds to lateral compression by an extraluminal band) were also evaluated.

**Results**: 60 patients had a history of previous abdominal surgery. However, surgical history was not found to be statistically more significant in SBO from adhesive bands than from matted adhesions. Closed-loop SBO occurred in 28% of patients with adhesive bands as the cause for the SBO and in none of the obstructions caused by matted adhesions. The whirl sign and fat notch sign were also only seen in some of the patients with SBO caused by adhesive bands. The beak sign had a higher incidence in patients with adhesive bands. In contrast, the small bowel feces sign was more commonly seen in SBO caused by matted adhesions. Matted adhesions were also more commonly located in the pelvis than were adhesive bands. Ischemia and necrosis had a higher incidence in patients with SBO caused by adhesive bands.

**Reviewer’s Comments**: The results of the study illustrate some CT features to help distinguish between adhesive bands and matted adhesions as the cause for SBO. One of the limitations reported in this study was that it only included those patients who had undergone surgery for a high-grade SBO.

**Additional Keywords**: CT

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Emphysema Complicates CT Assessment of UIP, NSIP

Usual Interstitial Pneumonia and Nonspecific Interstitial Pneumonia With and Without Concurrent Emphysema: Thin-Section CT Findings.

Akira M, Inoue Y, et al:
Radiology; 251 (April): 271-279

Emphysema influences the ability of CT to distinguish between usual versus nonspecific interstitial pneumonia. Traction bronchiolectasis is the CT feature that best differentiates these conditions in patients with emphysema.

Objective: To evaluate the ability of CT to distinguish between usual interstitial pneumonia (UIP) and nonspecific interstitial pneumonia (NSIP) and to determine the effect of emphysema on the ability of CT to distinguish between the two conditions.

Design: Retrospective.

Participants: 42 patients with UIP and 54 patients with NSIP. The diagnosis of UIP and NSIP was made by surgical lung biopsy.

Methods: CT scans were performed with 1.5-mm collimation at 15-mm to 20-mm intervals in full inspiration. The CT images were evaluated independently by 2 chest radiologists. CTs were assessed for reticulation (irregular linear opacity), ground-glass opacity, consolidation, nodules, honeycombing, and traction bronchiectasis, and bronchiolectasis. The amount of emphysema was also assessed. Emphysema was defined as decreased attenuation, usually without walls, and nonuniform distribution causing destruction of pulmonary parenchyma. A confident diagnosis of UIP was made if there was reticulation, extensive honeycombing, minimal ground-glass opacity, and a peripheral and basal predominance of findings. A confident diagnosis of NSIP was made if there was no or minimal reticulation and no honeycombing but there was extensive ground-glass opacity, traction bronchiectasis, and basal predominance with subpleural sparing.

Results: The diagnosis made by the radiologist was correct 71% of the time (UIP, 55%; NSIP, 83%). The sensitivity and specificity of CT for UIP was 55% and 63%, respectively, with an accuracy of 59%. The corresponding sensitivity and specificity of CT for NSIP was 63% and 55%, respectively. In patients with superimposed emphysema, the diagnosis made by the radiologist was correct 44% of the time (UIP, 50%; NSIP, 36%). The sensitivity and specificity of CT for UIP in patients with superimposed emphysema was 50% and 36%, respectively, with an accuracy of 44%. The corresponding sensitivity and specificity of CT for NSIP in patients with superimposed emphysema was 36% and 50%, respectively. In patients with superimposed emphysema, traction bronchiolectasis was the CT characteristic that best helped differentiate UIP from NSIP.

Conclusions: Superimposed emphysema influences the ability of CT to distinguish between UIP and NSIP.

Reviewer's Comments: The authors note that there was likely a selection bias in this study because only patients with biopsy proven interstitial lung disease were included. Patients with very typical findings of UIP on CT very often do not undergo biopsy, and therefore, this study was likely biased toward less typical findings.

Additional Keywords: CT

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Pulmonary cement embolism occurred approximately 25% of the time after percutaneous vertebroplasty for osteoporotic compression fractures and occurred in distal subsegmental pulmonary arteries.

**Objective:** To analyze pulmonary cement embolism occurring after percutaneous vertebroplasty (PVP) on CT.

**Design:** Prospective study.

**Participants:** 75 patients who had PVP for osteoporotic vertebral compression fractures (VCFs) and underwent a post-procedural CT scan. A total of 78 PVP sessions were performed.

**Methods:** The PVP was undertaken in either the radiology or orthopedics department. Liquid and powder polymethyl methacrylate was often mixed with cefazolin. The cement was injected into the anterior third of the affected vertebral body, and the injection was stopped if the cement filled the fracture gap, extended to the posterior quarter of the vertebra, extravasated into the epidural space, or extravasated into the foraminal vein and inferior vena cava. The radiologists usually used a unipedicular approach, and the orthopedic surgeons usually used a bipedicicular approach. After PVP, a non-contrast CT was performed with 0.67-mm section thickness at 0.33-mm increments. A chest radiologist evaluated each CT for pulmonary cement embolism. Pulmonary cement embolism was distinguished from a calcified granuloma by a branching course within the expected course of pulmonary arterial vasculature, the calcification was not larger than the proximal pulmonary artery, and it was new if prior CTs were available. Paravertebral venous leakage of cement was also evaluated for on each CT.

**Results:** 18 of 78 sessions (23%) resulted in pulmonary cement emboli. Eight had a single embolus, and the remaining cases had multiple emboli, including one patient with 20 cement emboli. The largest cement embolism was seen in a fourth-order (subsegmental) pulmonary artery and was 4 mm in diameter. None of the patients demonstrated CT findings of pulmonary infarction. No patient was clinically symptomatic. Cement leakage into the inferior vena cava was the only risk factor which had a statistically significant association with pulmonary cement embolism.

**Conclusions:** Pulmonary cement embolism after PVP for osteoporotic compression fractures occurred 23% of the time and occurred in distal subsegmental pulmonary arteries.

**Reviewer's Comments:** This is a very interesting observation which may have significant clinical ramifications. If a calcification is seen in a pulmonary artery, it may erroneously be considered a focus of chronic venous thromboembolism in a patient who has undergone vertebroplasty in the past.

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Dual-Source CT Improves Image Quality Without beta -Blockade

Dual-Source Versus Single-Source Cardiac CT Angiography: Comparison of Diagnostic Image Quality.

Donnino R, Jacobs JE, et al:
AJR Am J Roentgenol; 192 (April): 1051-1056

Coronary CT angiography (CTA) performed with a dual-source CT scanner has significantly less motion artifact compared with a single-source CT scanner, regardless of heart rate.

**Objective:** To compare single-source CT with dual-source CT for cardiac CT angiography.

**Design:** Retrospective study.

**Participants:** 339 single-source CT scans and 126 dual-source CT scans were performed for clinical indication. Both the single-source CT and dual-source CT used a 64-MDCT scanner. If the calcium score was high in a given case, the coronary CT angiogram was not performed. Contrast was injected at 4 mL/second to 6 mL/second followed by a saline bolus flush of 40 mL to 50 mL. Retrospective ECG gating was employed. 0.4 mg of sublingual nitroglycerin was given prior to most examinations. Patients who underwent single-source CT received a beta -blocker if their initial heart rate was >60 bpm. Regardless of heart rate, patients undergoing dual-source CT did not receive a beta -blocker. The coronary artery segments were evaluated using the reconstruction phase with the least artifact. All CTs were evaluated on a separate workstation using multiplanar and maximum-intensity-projection reformatted images. Image quality was graded as 1 (no artifact), 2 (artifact which did not prevent evaluation of luminal stenosis), and 3 (severe artifact). Artifact was also characterized as due to motion, calcification, or large body habitus (quantum mottle).

**Results:** Artifact was present in 39.8% of examinations with single-source CT and 29.4% of examinations with dual-source CT. Motion artifact was significantly higher in the single-source CT group (15.9%) than in the dual-source CT group (4.8%). Artifact due to calcification or large body habitus (quantum mottle) did not differ significantly between the 2 types of CT scanners. Severe artifact due to calcification was higher in the single-source CT group (13%) than in the dual-source CT group (3.2%). The mean heart rate in the single-source CT group was 59.4 bpm compared with 68.6 bpm in the dual-source CT group. This was an expected finding since the patients did not receive a beta -blocker prior to the examination in the dual-source CT group. The higher the heart rate in both groups, the greater the degree of motion artifact. Nonetheless, there was less motion artifact with dual-source CT compared with single-source CT for all heart rates.

**Conclusions:** Dual-source CT has better image quality than does single-source CT due to less motion artifact, regardless of heart rate.

**Reviewer’s Comments:** The authors have nicely demonstrated how heart rate is not as crucial to control in a coronary CT angiogram if a dual-source CT scanner is being used.

**Additional Keywords:** Image Quality

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Single-Step Percutaneous Cystgastrostomy Increases Success

Percutaneous Cystgastrostomy as a Single-Step Procedure.
Curry L, Sookur P, et al:
Cardiovasc Intervent Radiol; 32 (March): 289-295

Single-step percutaneous cystgastrostomy has a high technical success rate for pancreatic pseudocysts in the lesser sac.

**Background:** Pancreatitis can lead to the development of pseudocysts. If they are in the lesser sac and are at least 6 cm in diameter, then chronic drainage until collapse of the cavity is indicated. This can be performed surgically, endoscopically, or percutaneously. When performed endoscopically, cystgastrostomy is the passage of a double pigtail drainage tube through the stomach wall into the pseudocyst, leaving one pigtail in the cyst and one in the stomach. The percutaneous method usually involves several procedures and placement of a percutaneous transgastric tube that goes through to the pseudocyst.

**Objective:** To report experience with percutaneous transgastric cystgastrostomy in a single-step procedure.

**Methods:** 12 patients over the course of 5 years were referred for drainage of an uninfected pseudocyst in the lesser sac. Two patients had >1 cyst. Each patient was followed up via CT every 3 months, or sooner if needed. The mean cyst size was 12 cm x 14 cm.

**Results:** All 12 patients were successfully treated, and 4 required 2 stents. Seven patients had resolution of the pseudocyst with endoscopic removal or spontaneous migration of the stent. In one of these patients, jejunal loops were traversed, but the patient did well, the cyst resolved, and the stent passed spontaneously. In 2 other patients, the stent remained in place for a year, and the pseudocyst resolved. Three of 12 patients had postprocedural complications, including infection of the cyst and incomplete drainage and resolution. In 1 other patient, there was incomplete drainage necessitating a percutaneous drain placement. In the last patient, the stent migrated into the cyst, therefore another procedure to snare and reposition the tube was performed.

**Reviewer's Comments:** Internal drainage of pancreatic pseudocysts has been the main form of treatment to prevent complications of pseudocyst rupture. Surgical means have been used since 1920, but for the last 2 decades, less invasive methods have been used. No randomized study has been done to determine which method is better, but the sicker patients have been treated mostly via endoscopic or percutaneous means because these procedures do not require general anesthesia. The single-step method decreases the length of hospital stay and cost of the procedure. The small gauge of the needle decreases the risk of bleeding, as opposed to the knife used endoscopically. This method should not be used for pseudocysts that are not in the lesser sac. The authors advocate percutaneous drainage of pancreatic pseudocysts via the single-step method because of the decreased risk and high success rate.

**Additional Keywords:** Cystgastrostomy

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Two Cases of Tumor Seeding Encountered After RFA in the Lung

Two Cases of Needle-Tract Seeding After Percutaneous Radiofrequency Ablation for Lung Cancer.
Hiraki T, Mimura H, et al:
J Vasc Interv Radiol; 20 (March): 415-418

Tumor seeding along the tract of a radiofrequency ablation needle is possible, even with ablation of the tract.

**Background:** Radiofrequency ablation (RFA) for lung cancer is an effective treatment modality associated with a low mortality rate (0.4%). The most common complications occur early, but the later complications (needle-tract seeding or recurrence) are not well reported as of yet.

**Objective:** To report 2 cases of needle-tract seeding after RFA for the treatment of lung cancer. On routine follow-up CT in both cases, the needle-tract nodule was found along the path of the electrode as a constantly enlarging nodule.

**Case 1:** A 70-year-old man underwent left upper lobectomy for adenocarcinoma. He also was treated with external beam radiation and systemic chemotherapy. Seventeen months later, 3 nodules appeared in both lungs that were treated with RFA using a single electrode. All 3 tumors were biopsied before RFA. The electrode was removed without tract ablation. Four months later, a small nodule was seen along the path of the needle, as well as progression of the ablated tumor.

**Patient 2:** A 79-year-old woman underwent right upper lobectomy for adenocarcinoma. Twenty-two months later, a 10-mm nodule was noted in the right lower lobe, which was thought to be a metachronous dual cancer. The nodule was not biopsied but was treated with RFA using a single electrode probe. At 7 months follow up, a 3-mm nodule was found along the tract. Follow up continued, and at 29 months, the nodule had increased to 10 mm, and it was seen to be PET-positive.

**Reviewer's Comments:** Tumor seeding from RFA done to treat liver tumors has an incidence of 0.2% to 0.9%. There has only been one other report of needle-tract seeding after lung RFA. Those authors suggested that tumor seeding may have been associated with the preprocedural biopsy, the lack of cauterization of the electrode tract, and the highly aggressive nature of the tumor (poorly differentiated adenocarcinoma). In the cases reported here, one patient had moderately differentiated adenocarcinoma, and the other had well-differentiated adenocarcinoma. The authors of the current study have found tumor seeding in only 2 of 1,024 lung tumors treated in their institution (incidence, 0.2%). Although tract ablation has not been reported to decrease the incidence of tumor seeding, it is thought to be a good practice to prevent tumor seeding. Seeding of tumors after tract ablation has been reported, however. After these cases of needle-tract seeding, these authors now routinely ablate the tract. If tract seeding does occur, prompt treatment with RFA seems to be an effective treatment.

**Additional Keywords:** RF Ablation

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UAE Decreases Deep Vein Compression Caused by Fibroids

Katsumori T, Kasahara T, et al:
Cardiovasc Intervent Radiol; 32 (March): 284-288

Uterine artery embolization decreases compression of the deep veins caused by uterine fibroids.

Background: Uterine fibroids are a common benign neoplasm in women of reproductive age. They can cause a multitude of complications by exerting mass effect on the other organs in the pelvis. One of the complications that can occur is compression of the deep veins in the pelvis, which can cause venous stasis and long-term problems.

Objective: To assess the deep venous narrowing caused by the uterine fibroids seen in a series of patients and to measure the changes seen in the size of the veins after treatment with uterine artery embolization (UAE) with time-of-flight (TOF) MR venography (MRV).

Design: Retrospective study.

Participants: 36 women undergoing treatment of symptomatic uterine fibroids during a 12-month study interval.

Methods: 29 patients had unenhanced and enhanced MRI and TOF-MRV both before and at 4 months after UAE. On the TOF-MRV, 2 blinded radiologists measured 3 deep veins, including the inferior vena cava (IVC) and bilateral common and external iliac veins. The measurements were graded as 0 (venous diameter of most severe narrowing was 50% of normal vein), 1 (venous diameter at most severe narrowing was <50% of normal vein), and 2 (at least 1 part of vein was collapsed). The baseline and the 4-month scores were compared. Symptom severity scores were also compared.

Results: The deep venous scores decreased significantly between baseline MRI (mean score, 1.52) and the 4-month MRI (mean score, 0.93). The uterine volume decreased significantly between the baseline MRI (948 mL) and the 4-month MRI (617 mL). The deep venous score and symptom severity score correlated with uterine volume. The symptom severity scores decreased significantly as well.

Reviewer's Comments: This study showed that, based on TOF-MRV, the deep venous scores were improved by UAE and correlated with the uterine volume. Therefore, the presence of deep venous stasis was lowered by UAE, as seen in this study. In some patients, hysterectomy has been performed to relieve venous stasis in patients who developed DVT secondary to the fibroids. In this study, venous compression was improved. These authors suggest that the shrinkage of the fibroid uterus caused relief of some deep venous compressions, therefore leading to less venous stasis. The authors suggest that UAE may be a non-invasive way to treat venous stasis causing deep venous thrombosis in patients. The amount of improvement seen in the venous compression can be monitored via MRV, which has the advantage of having no radiation.

Additional Keywords: Deep Venous Compression

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3-T MRI More Sensitive for Breast Cancer Detection

Increasing Accuracy of Detection of Breast Cancer With 3-T MRI.
Elsamaloty H, Elzawawi MS, et al:
AJR Am J Roentgenol; 192 (April): 1142-1148

Similar to lower-magnet-strength machines, 3-T MRI is much more sensitive than mammography or sonography for the detection of breast cancer, although it is not as specific as the other 2 modalities.

Objective: To determine the sensitivity and specificity of 3-T MRI of the breasts compared with mammography and sonography and to correlate these results with established data for 1.5-T MRI.

Design: Retrospective study.

Methods: During an 18-month study interval, patients who underwent mammography, breast ultrasound, and breast MRI were identified. Only patients who underwent breast MRI with 3-T magnets were included. Only high-risk patients were included, with high risk defined as BRCA positivity or a personal or family history of breast cancer. All patients underwent MRI on the same machine utilizing the same protocol, and images were interpreted by an experienced radiologist who was not blinded to each patient's imaging and clinical history. Lesions on MRI were categorized via BI-RADS criteria utilizing morphology and enhancement kinetics. Whether a biopsy was performed was recorded, and resultant pathology results noted.

Results: 434 women with a mean age of 53 years were included in the study. When correlated with pathology results, 7.6% of the 868 breasts imaged contained malignant tumors. MRI features suggesting malignancy included the following: (1) mass with spiculated margin or rim enhancement; (2) clumped linear, segmental, or regional enhancement; or (3) non-masslike enhancement with rapid washout. The sensitivities of MRI, mammography, and sonography were 100%, 81.8%, and 86.4%, respectively. The specificities were 93.9%, 99%, and 98.1%, respectively. Of the MRI-detected lesions that were true-positive for breast cancer, 13.6% were mammographically and sonographically occult. When compared with published performance numbers of 1.5-T MRI, the sensitivity of 3-T was higher, but these two modalities had similar specificities.

Reviewer's Comments: The study serves to demonstrate 3-T MRI as more sensitive than mammography and sonography, albeit less specific. Without the patients having undergone lower-magnet-strength MRI as well, a true direct comparison of 1-T and 1.5-T MRI with 3-T MRI cannot be assessed. Those who are using 3-T MRI for detection in high-risk populations can find comfort in this data that their sensitivities are high. The problem of poor specificity of breast MRI, regardless of magnet strength, has not been addressed.

Additional Keywords: 3-T MRI

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Cancer Rates Similar for Palpable, Nonpalpable BI-RADS 3

**Probably Benign Breast Masses Diagnosed by Sonography: Is There a Difference in the Cancer Rate According to Palpability?**

Shin JH, Han BK, et al:

*AJR Am J Roentgenol*; 192 (April): W187-191

There is no statistical difference in the malignant potential of palpable versus nonpalpable BI-RADS category 3 masses as assessed on sonography.

**Objective:** To assess whether palpability of a sonographically assessed mass affects its malignant potential.

**Design:** Retrospective study.

**Methods:** During a 1-year study interval, cases assessed on ultrasound and subsequently categorized as BI-RADS category 3 were identified. Those that eventually were biopsied were included in the study. Exclusion criteria included women younger than 25 years of age, male gender, and women with typical signs and symptoms of infection. Tissue sampling was performed when a patient or clinician wanted to confirm the breast lesion diagnosis. Masses were categorized as palpable or nonpalpable. Sonography was always performed by the same radiologist. Sonographic criteria used to categorize a probably benign mass were as follows: (1) round, oval, or gently lobulated shape; (2) circumscribed margins; (3) width greater than height; (4) isoechoic or hypoechoic; (5) no acoustic shadowing; and (6) presence of thin echogenic capsule. Histopathology was reviewed, and statistical analysis was performed.

**Results:** 374 masses were included in the study. Of these, 94 were surgically excised or biopsied under vacuum assistance, and the remaining masses were followed up for an average of 26 months. Eighty-six masses were lost to follow-up. Of the 288 masses with follow-up or tissue diagnosis, the cancer rate was 2.4%. The cancer rate was 3.2% in palpable masses and 2.1% in nonpalpable masses, although palpability was not statistically significant for increased malignant potential as assessed on ultrasound. The mean size of nonpalpable masses was 1.1 cm, and the mean size of palpable masses was 2.1 cm.

**Reviewer’s Comments:** Findings of this study are similar to those in recent articles by Graf et al in 2004 as well as Kim et al in 2008. If and when a new BI-RADS edition is created, it will be interesting to see if the American College of Radiology (ACR) removes its recommendation that all palpable probably benign masses undergo biopsy. For now, the ACR appropriateness criteria force the hand of the breast imager and surgeon by considering palpability a reason for biopsy regardless of ultrasound findings.

**Additional Keywords:** Palpability vs Malignancy

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Upgrade Rate of ADH to Malignancy Is Rather Unpredictable

Atypical Ductal Hyperplasia Diagnosed at Sonographically Guided 14-Gauge Core Needle Biopsy of Breast Mass.
Youk JH, Kim EK, Kim MJ:
AJR Am J Roentgenol; 192 (April): 1135-1141

There is no reliable factor to predict the surgical upgrade rate of ADH after ultrasound-guided 14-gauge core biopsy.

**Background:** The rate of upgrade to malignancy of atypical ductal hyperplasia (ADH) on 14-gauge core needle biopsy of breast masses has been reported to be up to 75%.

**Objective:** To examine the surgical outcome of ADH diagnosed on 14-gauge core needle biopsy of breast masses and to determine if there are corresponding clinical, procedural, or radiologic features of ADH.

**Design:** Retrospective study.

**Methods:** During a retrospective 7-year study interval, patients who underwent ultrasound-guided 14-gauge core needle biopsies were identified. Pathology was reviewed, and those that yielded ADH were included in the study. ADH associated with other lesions was not included. Subsequent pathology after surgical excision was also recorded, and final diagnosis was categorized as malignant or benign. Medical records, sonograms, and mammograms were reviewed, and clinical, procedural, and radiologic characteristics were recorded. For the radiologic characteristics, images were reviewed retrospectively by a radiologist who was blinded to the final surgical pathology.

**Results:** 21 lesions were included in the study. At surgical excision, 62% of lesions were upgraded to malignancy. The mean patient age was 46.9 years, and no patients had a family history of breast cancer, although 9.5% had a personal history of breast cancer. Symptoms consisted of palpability or nipple discharge in 57% of lesions. There was no statistical significance for malignant potential based on clinical or procedural variables. Furthermore, there was no statistical difference in underestimation based on sonographic or mammographic findings.

**Reviewer's Comments:** The authors imply in the objective of the article that, if there was to be a statistical clinical, sonographic, procedural, or mammographic variable which predicted the surgical upgrade rate, then perhaps those lesions may require more sampling. The results hold that, regardless of these variables, the upgrade rate of ADH is rather variable and unpredictable.

**Additional Keywords:** Biopsy

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**Malignancy Potential High for US-Occult MRI-Evident Breast Lesions**

*Utility of Targeted Sonography for Breast Lesions That Were Suspicious on MRI.*


MRI-evident yet sonographically occult breast lesions carry a sufficiently high probability of malignancy that does not eliminate the need for biopsy.

**Objective:** To evaluate the usefulness of second-look ultrasound (US) when evaluating suspicious MRI-evident breast lesions.

**Design:** Retrospective study.

**Methods:** During a 1.5-year study interval, all patients who underwent targeted sonography for lesions initially detected on breast MRI were identified. MRI-detected lesions were clinically and mammographically occult. MR exams were interpreted by 1 of 4 fellowship-trained breast imagers utilizing the BI-RADS lexicon for MRI. Only those lesions categorized as BI-RADS 4 and 5 on MRI were included in the study. When targeted sonography was recommended, 1 of 4 fellowship-trained breast imagers performed the exam. Lesions visible on sonography were biopsied via US guidance, and those not visualized on sonography were biopsied under MRI guidance. Variables recorded for all MRI-detected lesions included type of focus, mass or non-masslike enhancement, lesion size, and histopathology outcome. For US-evaluated lesions, patient age, clinical indication for breast MRI, and presence or absence of sonographic correlate were recorded. Frequency of overall sonographic detection was determined.

**Results:** 201 suspicious breast lesions in 155 women were included in the study. Of these, 17% went directly to MRI-guided biopsy without a subsequent second-look US. These lesions tended to be characterized as non-masslike enhancement, whereas those detected with US were more frequently characterized as masses on MRI. Of 167 lesions evaluated sonographically, 50% were described as masslike enhancement on MRI, and 32% were characterized as non-masslike enhancement. In addition, 18% were described as foci of enhancement. Mean lesion size was 16 mm. On final pathology, 28% were malignant. Overall, 54% of all the lesions were sonographically occult. Those described as masses on MRI were most readily demonstrated on sonography. Only 37% of foci and 30% of non-masslike enhancements were seen on US. A sonographic correlate was more likely for malignant lesions, although 43% of sonographically occult lesions were malignant.

**Reviewer's Comments:** The results of this remarkable study have revealed the limitations of US in detecting MRI-evident lesions. The results have real clinical implications as the authors have demonstrated that only 57% of malignancies are being detected on second-look US. The lack of an US finding does not preclude the need for biopsy, and these data create a greater importance on establishing MRI-guided biopsy capability in a busy practice.

**Additional Keywords:** Second-Look US

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Modic Endplate Changes Really Matter

Modic Changes on MR Images as Studied With Provocative Diskography: Clinical Relevance — A Retrospective Study of 2457 Disks.
Thompson KJ, Dagher AP, et al:
Radiology; 250 (March): 849-855

Modic type I changes and, to a lesser extent, type II changes are predictive of a typical pain response in diskography (81% and 64%, respectively).

**Background:** Provocative diskography is used to determine which levels are responsible for a patient's back pain. Modic degenerative endplate changes are categorized into three types. Type I has high T2 and low T1 signal change and is considered to be due to neovascularization of the endplates. Type II corresponds to fatty change with high T1 signal change. Type III has low signal change on all sequences, consistent with sclerosis. There is evidence that type I change is most commonly associated with pain.

**Objective:** To determine whether Modic changes are predictive of a painful disk, as determined by provocative diskography.

**Design:** Retrospective study.

**Participants:** 736 patients who had undergone diskography.

**Methods:** All patients had undergone MRI within 1 year of the procedure. Every provoked disc was graded according to the Modic classification (including type 0 for no changes). During diskography, pain response was rated as P0 (no pain), P1 (mild or atypical pain), and P2 (substantial and typical pain).

**Results:** 2457 disks were evaluated. A P2 response was more likely from type I change (81% positive predictive value [PPV]) than a type II change (64% PPV), a type 3 change (57% PPV), or a type 0 change (30% PPV). The negative predictive values (NPV) of Modic classes were 68% for type I, 67% for type II, 65% for type III, and 30% for type 0. Inverting these numbers, this means that 70% of patients with no changes (type 0) did not have a P2 response. If they had any type of endplate change, they were 70% likely to have a P2 response. In terms of NPV, if a patient had anything but type 1 changes, they were 68% likely not to have a P2 response and 53% likely to have no pain at all (P0). The NPV of type 2 changes was 67%, but this means that a "negative test" includes all patients with type 0, I, and III. Type I changes were not at all positively correlated with annular tears (high intensity zones), spondylolisthesis, or herniations.

**Conclusions:** Modic type I endplate changes are strongly predictive of provocation of typical pain with a diskogram.

**Reviewer's Comments:** This was a strong paper as there were many patients, the statistics were straightforward and understandable, and the conclusions were clinically relevant. I have seen many MRI reports in which the authors mention the presence of degenerative endplate changes without categorizing them. This paper strongly supports other papers which have shown the clinical relevance of the various types of changes and whether changes are present at all. The findings suggest that radiologists should document specifically which degenerative endplate changes are present at various disk levels.

**Additional Keywords:** MRI Diskography

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Diffusion-weighted imaging with apparent diffusion coefficient maps could distinguish pleomorphic adenomas from most other primary neoplasms but could not distinguish Warthin tumors from malignant lesions.

**Background:** Many recent studies have investigated the use of diffusion-weighted imaging (DWI) and apparent diffusion coefficient (ADC) maps in distinguishing various disease states in the head and neck.

**Objective:** To determine the ability of echo-planar DWI in differentiating types of primary parotid gland tumors.

**Design:** Prospective study.

**Participants:** 136 consecutive patients with suspected primary parotid neoplasm who underwent surgery or biopsy during a 5-year study interval.

**Methods:** MRI was performed before surgery or biopsy. MR 1.5-T imaging was performed with axial T1, T2-weighted 3D fast imaging with steady state precession (FISP), and an echo planar fat-suppressed DWI with b factors of 0 s/mm2, 500 s/mm2, and 1000 s/mm2. ADC maps were generated, and an irregular region of interest was placed on these maps over the entire tumor. A mean of each ROI was determined, and a mean of all the ROIs in a patient was computed.

**Results:** There were 43 pleomorphic adenomas with a mean ADC value (in 10-3 mm2/s) of 2.09 SD of 0.16. This was statistically different from all other types except for myoepithelial adenoma, with a mean ADC of 1.86 0.18 (P =0.054). Mean values for Warthin tumors (n=32) were 0.89 0.16. Warthin tumors were not significantly different from mucoepidermoid carcinomas (n=16), acinic cell carcinomas (n=10), or basal cell adenocarcinomas (n=9) but were different from myoepithelial adenomas (n=6), lipomas (n=3), and salivary duct carcinomas (n=11).

**Conclusions:** Echo-planar DWI can differentiate pleomorphic adenoma and myoepithelial adenomas from all other primary parotid neoplasms, but significant overlap between other benign and malignant lesions remains. Further studies combining DWI, morphologic criteria, and other MRI techniques are warranted.

**Reviewer's Comments:** This study included a relatively large number of patients. As the authors point out, it is most important to distinguish Warthin tumors, which are benign and have a low rate of recurrence, from malignant tumors and pleomorphic adenomas, which have a high rate of recurrence and significant potential for malignant transformation. As such, the inability to distinguish Warthin tumors from malignant tumors is unfortunate. However, combining morphologic features with ADC maps may prove valuable. I would have preferred the authors to have included 13 patients with lymphoma and inflammatory pseudolesions, since one does not know in advance if one is dealing with a primary parotid neoplasm.

**Additional Keywords:** DWI MRI

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Attenuated Vein Sign Sensitive for Cerebral DVT Diagnosis

Noncontrast CT in Deep Cerebral Venous Thrombosis and Sinus Thrombosis: Comparison of Its Diagnostic Value for Both Entities.

Linn J, Pfefferkorn T, et al:

Non-contrast CT is more sensitive and specific in assessing for cerebral deep vein thrombosis than for cerebral venous sinus thrombosis. Sensitivity for venous sinus thrombosis is particularly low.

**Objective:** To determine the sensitivity and specificity of non-contrast-enhanced CT (NCCT) in the evaluation of cerebral deep venous thrombosis (DVT) and venous sinus thrombosis (SVT).

**Design:** Retrospective study.

**Participants:** The study included 8 patients with cerebral DVT and 25 patients with cerebral SVT. In addition, 36 consecutive patients with clinical symptoms compatible with DVT or SVT but who did not have thrombosis were evaluated as controls.

**Methods:** All patients had undergone NCCT and either multidetector CT venogram or venous MRA combined with gradient echo T2. NCCT images were evaluated for hyperattenuated sinuses ("cord sign"), including superior sagittal sinus, inferior sagittal sinus, right and left transverse sinus, and right and left sigmoid sinus. Hyperattenuated deep cerebral veins ("attenuated vein sign") included straight sinus, right and left internal cerebral veins, vein of Galen, right and left basal veins of Rosenthal, and thalamostriate veins. Confidence in diagnosis of thrombosis was recorded on a scale of 1 to 5, with 1 being absolutely certain and 5 being uncertain.

**Results:** 3 neuroradiologists read studies on 69 subjects for a total of 207 readings. There were 28 false-negative and 5 false-positive diagnoses of patients with SVT. There was only one patient with a false-positive diagnosis of DVT (in a patient who had SVT) and no false-negatives. The cord sign (for SVT) was 64.6% sensitive and 97.2% specific, whereas the attenuated vein sign (for DVT) was 100% sensitive and 99.4% specific. If one looks at individual structures, sensitivity drops to 33.9% and 93.5% respectively, and specificity was 99.4% and 95%, respectively. In general, mean diagnostic confidence of the observers was near absolutely certain (1.1) assessing for DVT on NCCT, but was more equivocal for SVT (3.7 to not very certain). Interobserver agreement for attenuated vein sign was 0.958, whereas it was 0.80 for the cord sign.

**Conclusions:** There is a high sensitivity and specificity of the attenuated vein sign for diagnosis of DVT but not for SVT. Therefore, if one of these signs is present, further evaluation with venous CTA is necessary. The absence of attenuated vein sign makes DVT unlikely, but the absence of a cord sign does not exclude SVT.

**Reviewer's Comments:** This was a well performed and clinically relevant study. Despite the low false-positive rate of DVT, the low prevalence of this diagnosis will still result in a relatively low positive predictive value. The study highlights the fact that NCCT is rather insensitive for SVT, and clinical suspicion should always be high in patients with risk factors.

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Many Incidental Findings Seen on C-Spine CT in Trauma Patients

Incidental Findings in the Cervical Spine at CT for Trauma Evaluation.
Barboza R, Fox JH, et al:
AJR Am J Roentgenol; 192 (March): 725-729

In trauma patients evaluated with cervical spine CT, the incidence of traumatic and nontraumatic incidental findings is significantly higher for severely injured and older patients, respectively.

Objective: To demonstrate the incidence and significance of traumatic and nontraumatic incidental findings on CT evaluation of the cervical spine upon initial evaluation of trauma patients.

Design: Retrospective review.

Participants: 1256 patient charts were accessed from a trauma database. Age, gender, mechanism of injury, injury severity score, and diagnosis were reviewed. All findings other than C1-C7 fractures were classified as "incidental," which were then classified as traumatic or nontraumatic. Imaging of all patients was reinterpreted with correlation of initial diagnostic reports.

Results: 230 patients had a total of 264 incidental findings (traumatic, n=136; nontraumatic, n=106). Non-cervical spine fractures (thoracic spine, rib, etc) were the most prevalent traumatic incidental findings. Nontraumatic incidental findings included diagnoses such as spinal stenosis, osteoporosis, or bone lesions. Overall, the most common location for incidental findings was the lungs.

Conclusions: Statistical analysis demonstrated a higher probability of traumatic incidental findings with increasing degree of injury. Increasing patient age was determined to have the most substantial association with nontraumatic incidental findings. According to the authors, there was a 90.9% reporting rate of incidental findings of all types.

Reviewer's Comments: In my experience working at a Level I trauma center, management of trauma patients can occasionally be tricky. It is in the best interest of the trauma service to triage, diagnose, and treat patients efficiently. However, incidental findings (traumatic and nontraumatic) arise and need to be addressed by both the radiologist and clinician. Barboza and colleagues have demonstrated the importance of recognizing the increased incidence of incidental findings in both severely injured and older patients. A study such as this should bolster the radiologist's degree of suspicion when evaluating these particular patient subgroups, thus fostering an even higher rate of detection and reporting of incidental findings. Ultimately, it is attention to detail and diligence that constitutes an exceptional radiologist - one that will always be regarded as an important and necessary member of the trauma service.

Additional Keywords: Incidental Findings

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Intramuscular Cysts Potential Indicator of Rotator Cuff Tears

Clinical Significance of Intramuscular Cysts in the Rotator Cuff and Their Relationship to Full- and Partial-Thickness Rotator Cuff Tears.

Manvar AM, Kamireddi A, et al:
AJR Am J Roentgenol; 192 (March): 719-724

Intramuscular cysts of the rotator cuff are a reliable secondary sign of rotator cuff tears. Although they are not infrequently an isolated finding, their presence should prompt a more exhaustive search for a rotator cuff tear.

Objective: To evaluate the association between rotator cuff tears and intramuscular cysts and to determine the incidence of intramuscular cysts with full-thickness tears, partial-thickness tears, and as an isolated finding.

Design: Retrospective review.

Methods: 5,101 shoulder MRI examinations were assessed. The authors considered an intramuscular cyst to be any "rounded or fusiform fluid collection" within either the tendon sheath or muscle. Imaging was obtained by either multiplanar multisequence standard MRI or MR arthrography. Standard definitions were employed to determine presence or absence of full-thickness and partial-thickness rotator cuff tears on imaging interpretation.

Results: 134 shoulders in 132 patients had intramuscular cysts. Both intramuscular cysts and rotator cuff tears were found in 76.1% of patients. Of these patients, 46.1% had partial-thickness tears and 53.9% had full-thickness tears. Arthroscopy was performed in 48 patients, and 95.8% of these patients demonstrated identical findings appreciated on initial imaging. By standard MRI, 23.9% of patients had isolated intramuscular cysts. In 57.8% of patients, the intramuscular cysts were present in tendons apart from the rotator cuff muscle/tendon tear.

Conclusions: The presence of intramuscular cysts is a satisfactory secondary sign of rotator cuff tears of all types. Although no apparent predilection was demonstrated with respect to partial-thickness or full-thickness cuff tears, their presence should prompt a more meticulous approach in evaluating the rotator cuff. In addition, the authors have shown that isolated intramuscular cysts occur with a higher frequency than previously believed - the significance of which is speculative at this point.

Reviewer's Comments: Rotator cuff tears are common. Being able to identify a partial-thickness or full-thickness tear is a necessary skill for any radiologist, including the generalist. Since secondary signs can be helpful in diagnosing the occasionally elusive partial-thickness tear, knowing their incidence and significance is paramount. Although the authors have drawn on conclusions cited by previous studies, they illustrate the importance in recognizing intramuscular cysts as both an isolated finding and as a potential harbinger of both partial-thickness and full-thickness tears (with no particular predilection). As all radiologists are aware, sometimes necessary to connect seemingly ambiguous findings to confidently offer a diagnosis. Therefore, characterizing secondary signs, such as intramuscular cysts of the rotator cuff, is critical in bolstering our diagnostic potential.

Additional Keywords: Intramuscular Cysts
Bone Scintigraphy Useful for Detecting Jaw Osteonecrosis

Bone Scintigraphy and SPECT/CT of Bisphosphonate-Induced Osteonecrosis of the Jaw.

Dore F, Filippi L, et al:
J Nucl Med; 50 (January): 30-35

In patients with clinical findings of osteonecrosis of the jaw, bone scintigraphy and SPECT/CT can accurately define necrosis and reactive bone.

Background: The number of reported cases of osteonecrosis of the jaw following IV administration of bisphosphonates is increasing. Although the exact etiology is not clear, trauma appears to be involved.

Objective: To evaluate SPECT/CT and 3-phase bone scanning in patients with clinically suspected bisphosphonate-induced osteonecrosis of the jaw.

Design: Retrospective case review.

Participants: 15 patients with clinically suspected osteonecrosis of the jaw were studied. All patients had been previously treated with zoledronic acid for a mean of 2.2 years. Nine patients had predisposing surgery or trauma.

Methods: In all patients, other imaging included orthopantomography and CT, MRI, or both. Three-phase bone scintigraphy was performed in 12 of 15 patients, while only delayed imaging was performed in 3 patients. Delayed bone scan was imaged at 3 hours. As well, SPECT/CT was acquired on a hybrid system which allowed for attenuation correction and image registration and fusion. Planar and SPECT images were independently interpreted by 2 experienced readers. Other imaging was interpreted by 2 experienced radiologists.

Results: Final analysis was mandibular osteonecrosis in 9 patients, maxillary involvement in 4, and both mandible and maxilla were involved in 2 patients. In the 12 patients with 3-phase bone scintigraphy, flow and blood pool were increased in 9 patients, blood pool alone was increased in 1, and neither flow nor BP were increased in 2. On the delayed imaging, SPECT better demonstrated uptake and was abnormal in all patients, (maxillary area, n=2; mandibular area, n=9; both, n=4). In 2 patients with intense maxillary uptake, mild mandibular activity was also noted, which correlated with a second focus of early osteonecrosis. In another patient, SPECT highlighted involvement of the zygomatic and ethmoid bones, which had not been seen at the clinical assessment. SPECT-CT was also helpful in highlighting the metabolic difference between necrosis and areas of adjacent osteoblastic reaction. This was especially valuable in 8 patients by allowing more precise localization of the core of osteonecrosis.

Conclusions: Conventional orthopantomography provides an excellent assessment of the entire jaw but may not be able to demonstrate early disease or differentiate normal from necrotic bone or metastases from osteolytic lesions. Inflammatory changes were frequently seen on 3-phase bone scintigraphy in osteonecrosis, and delayed uptake was universally seen. SPECT-CT was helpful in defining necrotic and reactive bone. The rate of false-positive studies would be high if patients were not clinically selected, as in the present study.

Reviewer's Comments: In routine bone scanning on oncology patients, this disorder should be included in the differential diagnosis of perioral uptake in patients receiving bisphosphonates.

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Hiccups Effect FDG Uptake by Diaphragm in Cancer Cases

F-18 Fluorodeoxyglucose PET/CT Findings in Active Hiccups.
Yeatman CF II, Minoshima S.
Clin Nucl Med; 34 (March): 197-198

Diaphragmatic uptake of FDG may be a result of hiccups in patients with malignancy.

Background: Hiccups are commonly found in patients with malignancy. According to the authors of this case report, they are seen in up to 16% of patients with advanced cancer. Possible etiologies include tumor involvement of the mediastinum, hyponatremia, and irritation of the diaphragm. Because patients with malignancy are frequently imaged with PET/CT, it is not surprising that this disorder will be encountered in patients undergoing scans.

Objective: To present the PET findings in a patient with malignancy and hiccups.

Case Report: A 62-year-old man with non-small-cell cancer presented with a 2-week history of unmanageable hiccups that persisted throughout the examination from FDG injection through imaging. Findings of the FDG-PET scan were notable for uptake in a large mass in the left lung, which corresponded to the known tumor. The patient also had abnormal uptake in hilar and mediastinal lymph nodes. With respect to the hiccups, 2 findings were noted. First, the patient exhibited diffuse, somewhat heterogeneous increased FDG uptake by the diaphragms bilaterally. Secondly, there was intense symmetric uptake in the laryngeal musculature. A third finding detailed on a previous case report is uptake in the intercostal muscles, but this finding was not seen in the present case. The authors speculated that variation in this finding may be due to differences in the complexity and variety of this process and to the chronicity of the condition. The authors pointed out that the uptake by the diaphragm, in cases of hiccups, can obscure possible pleural-based metastases, necessitating careful correlation with CT images.

Conclusions: Diaphragmatic uptake of FDG during PET scans in patients with malignancy may be due to hiccups.

Reviewer's Comments: A take-home lesson that I learned from this case is the continuing necessity of obtaining adequate clinical history on FDG-PET patients.

Additional Keywords: FDG

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Prior Authorization, Appropriateness Criteria Proposed to Reduce Costs

Prior Authorization or Appropriateness Criteria: The Lady or the Tiger.
Stephen R. Baker, MD
-Special Presentation: ()-

Radiology will be subject to more surveillance and control in the upcoming national effort to reform healthcare because it has increased too much in volume, is now too expensive, and is too unregulated.

Healthcare reform is a hot political issue. The organizational problem inherent in the way we allocate payment for the ill and injured and how we seek to prevent disease in the United States will most likely not be ameliorated by any legislation because the philosophical polarities are too great and political infighting too intense to achieve anything more than piecemeal changes. Radiology will undoubtedly be subject to more surveillance and control in the upcoming national effort to reform healthcare. Radiology has increased too much in volume, is now too expensive and, in contrast to drug therapies, is too unregulated. Two means have been proposed to lower and/or rationalize costs.

Prior Authorization: First, policy wonks want to decrease imaging expenditures through the mechanism of prior authorization, allowing only certain tests in certain situations to be paid for by Medicare and Medicaid, with the expectation that private insurers would follow suit. At first, such an initiative for cost saving will work from an accounting perspective. Because many procedures are over-utilized and often, per case, lack medical justification, an across-the-board refusal to pay will stifle demand. However, prior authorization lacks sophistication as applied to medical management decision-making. A one-fits-all solution takes the referring physician and the radiologist out of the care-rendering scenario. It will undoubtedly lead to the harm of some individuals who may really need the "blackballed" test or procedure.

Appropriateness Criteria: The American College of Radiology offers an alternative approach. A panel of experts familiar with the capabilities, limitations, risks, and uncertainties of the various imaging examinations formulates "appropriateness criteria" for a wide range of clinical presentations - outlining a step-wise approach to diagnostic workups. The prospect is that this approach will save time and avoid unnecessary invasive tests and the ill effects they may engender. However, appropriateness criteria may not be useful because they are not patient-specific, rarely allow for the individualization of care, and are often out of date or rapidly become so. Any alternative system to rationing (prior authorization) must also save money. If it does not, it will be discredited on the basis of ineffectiveness alone.

Reviewer's Comments: The approach of "appropriateness criteria" brings with it as many problems and uncertainties as it seeks to resolve. The term itself is unnecessarily confrontational. The recommendation under its rubric represents consensus expert opinions, not scientifically confined pathways. It is overly broad in scope and non-temporal in that it is independent of historical information. Consequently, its widespread application will probably include unintended consequences which may dominate its implementation or ultimately lead to its abandonment. This review is an abstract of an audio presentation from Practical Reviews. If you do not have access to this presentation and would like to purchase a copy, please call 1-800-633-4743, email service@oakstonepub.com, or write Oakstone Medical Publishing, 100 Corporate Parkway, Suite 600, Birmingham, Alabama 35242.

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