

the posterior labrum secondary to impingement. The kinematic sequences with the arm in abduction and extrarotation proved to be the best ones to define the pathophysiological phases of impingement. A comparison between MRI results and surgical findings demonstrated that MRI is the "gold standard" diagnostic technique in the evaluation of posterosuperior glenoid rim impingement syndrome of the shoulder.

PRIMARY MUSCLE LYMPHOMA: REVIEW OF CLINICAL AND RADIOLOGICAL FINDINGS

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Introduction: To present the clinical and radiological findings in primary muscle lymphoma.

Material and methods: Retrospective review of seven cases of biopsy proven primary muscle lymphoma. Disseminated disease excluded by marrow aspirate and CT of thorax and abdomen.

Results: Clinical presentation either indolent (four) or rapidly progressive (three). Masses appeared hypoechoic on ultrasound, iso/hypodense on CT, iso/minimally hyperintense on T1W, hyperintense on T2W, PD and STIR sequences and enhanced. Three patients had multifocal disease. Infiltration of subcutaneous fat was a prominent feature in four patients.

Discussion: Primary muscle lymphoma should be considered in a differential diagnosis of multiple masses. Multiple muscle masses combined with infiltration of subcutaneous fat suggest lymphoma, polymyositis or pyomyositis. Biopsy is required to establish the diagnosis and should be performed urgently to exclude pyomyositis.

SONOGRAPHIC EVALUATION OF ELASTOFIBROMA DORSI

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Introduction: The purpose of this presentation was to describe the sonographic appearance of elastofibroma dorsi (ED) with CT, MRI and pathologic correlation.

Material and methods: Three patients (one man and two women, aged 69, 42 and 49 years respectively) with a unilateral palpable mass on the parascapular area were evaluated with 7.5-13 MHz sonography. Color Doppler sonography was obtained in two cases. All patients had a CT examination. T1-, T2-weighted fat suppressed and gadolinium 1.5 T. images were obtained in two patients. Diagnosis was confirmed by open surgery.

Results: At sonography ED appears as a crescent mass located in the subscapular region, between chest wall and serratus anterior muscle. Although there was good cleavage from serratus anterior muscle the mass was not well separated from chest wall. ED had unsharp margins and an irregular internal texture made of alternating hyper- and hypoechoic linear areas. Color Doppler sonography disclosed nearly absent intralesional flow.

Discussion: ED is a rare pseudotumor located in the parascapular region. Gross pathology hallmark of the entity is the presence of alternating fibrous and fat areas. The sonographic appearance of ED correlate well with pathologic specimen, CT and MRI findings. In the proper clinical setting, the sonographic appearance of ED is highly suggestive of the diagnosis.

THE EFFICACY OF A LOW FIELD SYSTEM IN THE DETECTION OF BONE BRUISE

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Introduction: To evaluate the efficacy of a low field system for the detection of bone bruise, we compared four optimised sequences.

Material and methods: 134 patients with recent joint trauma were imaged on a 0.2 Tesla dedicated system (Esaote ArtoScan). The diagnosis of bone bruise was established in 17/134 patients on the basis of decreased signal intensity in SE T1w (TR 500/TE 18) and increased signal intensity in TSE T2w (TR 3500/TE 80), GRE (TR 600/TE 22/FA 60), and STIR imaging (TR 800-1200/TE 16/TI 75). Signal changes within the bone marrow were statistically evaluated and correlated to normal bone.

Results: The GREw and the T1w sequences demonstrated intense signal (S)

alterations ($[S_{\text{normal-SBB}}/N=23.47\pm 5.35$ and 20.90 ± 6.68), followed by STIR, that detected lower differences in signal intensity (15.48 ± 7.19). TSE T2w1 showed the least difference (9.21 ± 5.07). The areas (A) with bone marrow changes were approximately equal in size in SE T1w and TSE T2w1 ($A_{T1}/A_{T2}=1.04\pm 0.17$). STIR and GREw depicted areas involved to be significantly larger ($p < 0.01$).

Discussion: Using a 0.2 Tesla dedicated system, according to signal intensity, SE T1w, GREw and STIR sequences were most sensitive to detect bone marrow edema, while TSE T2 was inferior. GREw and STIR imaging showed areas about four times larger depicting bone marrow changes. For clinical diagnosis we recommend a protocol with GREw and STIR pulse sequences.

THE EFFICACY OF A LOW FIELD SYSTEM IN THE DETECTION OF OSTEOMYELITIS

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Introduction: To evaluate the efficacy of a low field system for the detection of osteomyelitis, we tested T1w pre and post i.v. contrast and T2w pulse sequences on a 0.2 Tesla dedicated system.

Materials and methods: 12 diabetic patients with Charcot's joints were studied on a 0.2 Tesla dedicated system (Esaote ArtoScan) using SE T1w (TR 500/TE 18: axial and coronal) before and after i.v. application of 0.2 ml Gd-DPTA/kg BW and TSE T2w imaging (TR 3500/TE 80: axial). The results were compared to a 1.0 Tesla whole body system using a surface coil (Siemens Magnetom Impact) and correlated to granulocyte scintigraphy.

Results: 10 of 12 patients had osteomyelitis. Sensitivity for detection of osteomyelitis was 100% in comparison to high-field system. In inflammatory regions according to granulocyte scintigraphy, the SE T1w sequence showed highest signal differences before ($[S_{\text{normal-S Osteomyelitis}}/N=24.22\pm 4.06$) and after contrast (10.21 ± 3.82 ; $p < 0.01$). The TSE T2w pulse sequence demonstrated bone marrow changes very well (9.85 ± 7.02).

Discussion: Despite its lower spatial resolution, the low field system showed to be a valuable tool to establish a diagnosis of osteomyelitis in Charcot's joints. Its major limitation is the small field of view of 12 cm, which requires two sessions for the complete scan of the foot and ankle.

THE USABILITY OF MONITOR PRESENTATION FOR REPORTING OF DIGITAL RADIOGRAPHS IN COMPARISON TO LASER FILM PRINTS

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Introduction: Digital radiography provides the opportunity to use different film formats and viewing monitors for the presentation of the same radiograph. The purpose of this study was to determine the usability of monitor presentation for reporting of digital radiographs of skeletal structures in comparison to different film formats.

Material and methods: We used the Agfa Diagnostic Center (ADC 70, a storage-phosphor computed radiography system) to depict pelvis, skull and long bones. On the basis of critical structures typical for the specific anatomic area, radiographs of 50 different patients were evaluated by four observers. The same radiographs were presented on 8"x10", 11"x14" films and a viewing console (1280x1024 matrix), respectively. Each reader had to decide whether critical structures were presented worse, equal or better in comparison.

Results: Comparing the two different film formats, there was no significant difference in the presentation of critical structures. The evaluation of monitor presentation is still in progress.

NEW APPROACHES TO COMPUTER-ASSISTED DIAGNOSIS OF RHEUMATOLOGIC DISEASES

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Introduction: The great majority of knowledge-based systems for computer-assisted diagnosis in radiology has been implemented as off-line systems. This and inadequate man-machine interfaces may have inhibited the routine clinical use of such systems. The goal of this paper is to describe the current research toward the development of the on-line expert system Cadiag-4/

Rheuma-Radio. The underlying fundamentals of the system design, including client/server architecture, communication interfaces, and fuzzy set theory and fuzzy logic as methods for knowledge representation and inference, are presented.

Material and methods: In our approach, we use pre-existent sources of information to build an expert system that minimizes the interaction between radiologists and the computer. To handle uncertainty and vagueness of medical knowledge, fuzzy set theory and fuzzy logic are used. Given data of a specific case, a deductive inference procedure combines the observed radiological signs, establishes confirmed and excluded diagnoses as well as diagnostic hypotheses, and provides explanations for these conclusions. Furthermore, proposals for confirmation or exclusion of diagnostic hypotheses are offered.

Results: An early prototype of Cadiag-4/Rheuma-Radio was tested on radiological disorders of the hip joint related to rheumatological diseases. Twenty radiological cases were used as test cases, reaching a diagnostic accuracy of about 80%.

Discussion: The first results are acceptable and encourage further work to cover the whole area of rheumatologically relevant radiological signs and diagnoses. Furthermore, research into the development of user-oriented data acquisition tools will be carried out.

DIAGNOSTIC ACCURACY OF DIGITIZED VS CONVENTIONAL FILM IN THE EVALUATION OF RHEUMATOID ARTHRITIS OF THE HAND AND WRIST

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Introduction: We present the results of a prospective study to evaluate the diagnostic accuracy of digitized versus conventional film in the evaluation of bone lesions in rheumatoid arthritis.

Material and methods: Two musculoskeletal radiologists evaluated the small joints of the hand and wrist in 50 patients with rheumatoid arthritis. Digitized images were printed by laser camera in a 1536 x 2048 pixel matrix (ADC) with a 4,5 mm pixel size. The scoring system of Sharp was applied, which included 17 areas read for erosions and 18 areas read for joint space narrowing. In addition focal osteoporosis, joint capsule distension and soft tissue abnormalities were compared. Results were analysed by means of method comparison statistics according to Bland and Altman.

Results: The intra-observer differences in comparing thousand eight hundred areas by two different film methods were not statistically significant. Small differences in interpretation were noted, comparing lesions of the scaphoid and trapezoid bone. Although soft tissue abnormalities were more easily shown on digitized film, it did not lead to a higher diagnostic accuracy in comparison to conventional film.

Discussion: There is no statistically significant difference in diagnostic accuracy between digitized and conventional film in the detection of erosions and joint-space narrowing.

STRESS FRACTURES OF THE PARS INTERARTICULARIS OF THE LUMBAR SPINE: HOW DO THEY HEAL?

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Introduction: A prospective study was performed to evaluate the healing capacity of fatigue fractures of the pars interarticularis in young, elite athletes.

Material and methods: Thirteen athletes with fatigue fractures of the lumbar spine were evaluated. The average age was 18,7. The fracture occurred at the L5 level in 10 patients. In the other 3 patients the level involved was L4. The lesion was unilateral in 8 patients and bilateral in 5. All of them were treated by bracing. Patients were reviewed after an average of 18,5 months using CT (GE/CT/T 9800). A CT examination was performed in two planes: parallel to the intervertebral disc space and parallel to the pars interarticularis.

Results: CT showed complete healing of the fracture in 9 patients and non-union in 4 patients. No difference was noted comparing the two planes of scanning. Complete healing was noticed in 7 out of 8 patients with unilateral pars fractures. From the 5 patients with bilateral lesions, 2 had bilateral recent fractures. In one of them non-union was diagnosed on both sides, while the other developed non-union on one side and union on the opposite site. Three patients had a recent unilateral fracture with an old lysis at the opposite side. In 2 of them non-union occurred on both sides, while in the other the most recent fracture healed.

Discussion: 1. This study shows that posttraumatic spondylolysis can lead to complete osseous fracture healing with nonoperative treatment. 2. CT seems to be useful to evaluate the completion of osseous union of the fracture and will thus be of significant prognostic importance. 3. The CT inclination plane is no significant factor in the evaluation of the presence and extent of osseous union.

RADIOLOGICALLY OCCULT SCAPHOID AND WRIST FRACTURES: VALUE OF MRI

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Introduction: To evaluate the diagnostic value of MRI in patients with clinically suspected scaphoid fractures but normal initial plain radiographs.

Material and methods: In 42 patients (23 m/19w) with four normal scaphoid view radiographs, MRI was performed within 7 days after trauma. T1-weighted spin-echo (SE), T2-weighted gradient-echo (GE), and short tau inversion recovery (STIR) sequences were performed. MR images were evaluated by two independent radiologists. Six week followup radiographs were used as gold standard.

Results: Occult fractures of the scaphoid were detected with MRI in 14 patients (33.3%), of the capitate in 4 (9.5%), of the trapezium in 1 (2.4%), and of the distal radius in 2 patients (4.8%). All wrist fractures were obtained with a combination of STIR and T1-weighted SE sequences. A total of 21 fractures in 20 patients could be compared to the six week followup radiographs. The sensitivity and specificity for detecting radiologically occult fractures of the wrist was 100% each for the first and 100%/95% for the second radiologist with a perfect interobserver agreement (Kappa 0.953).

Discussion: MRI has an extremely high sensitivity for detection of fractures of the scaphoid and wrist, not evident on plain radiographs, allowing early diagnosis and therefore early treatment. In addition, correct diagnosis prevents patients without a fracture from overtreatment by immobilization.

DETECTION OF INTRA-ARTICULAR BODIES OF THE KNEE WITH MR IMAGING AND MR ARTHROGRAPHY: EXPERIMENTAL OBSERVATIONS IN CADAVERS

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Introduction: To investigate the value of MR imaging and gadolinium (Gd) MR arthrography (MRa) in the detection of intra-articular bodies.

Material and methods: Cartilaginous, osteocartilaginous, and osseous bodies were created experimentally from cadaveric patellae. The bodies were cut into cuboid structures that varied in length from 3 to 9 mm. They then were implanted surgically in four locations in cadaveric knees and held in position by sutures. These locations were a) suprapatellar pouch, b) lateral and medial gatters, c) intercondylar area, and d) posterior joint. MR imaging (T1 w, T2 w, PD w, 3D SPGR) was performed with and without intraarticular injection of 2 mmol Gd in three standard planes. The images were evaluated by 2 investigators in a blinded fashion.

Results: Localization of intraarticular bodies of all sizes and types was more accurate with MRa. Detection of bodies smaller than 6 mm was difficult on non-enhanced MR studies and was significantly improved by administration of intraarticular Gd. Diagnostic difficulties usually were related to bodies in the intercondylar area, and 3D SPGR was the most valuable non-arthrographic imaging technique.

Conclusion: When compared to standard MR imaging, MRa significantly improves sensitivity to the detection of cartilaginous, osteocartilaginous, and osseous intraarticular bodies.

THE POSITION OF THE NORMAL CONUS MEDULLARIS ON MRI

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Introduction: The position of the normal conus medullaris on MRI.

Material and methods: The position of the conus medullaris on T1 weighted sagittal lumbar magnetic resonance (MR) scans was evaluated retrospectively in 504 patients (273 F, 231 M, age range 16-84). The position was described by reference to the adjacent vertebral body, divided into thirds, or the disc space.