Skeletal Radiol (2008) 37:575–596
DOI 10.1007/s00256-008-0500-1

ABSTRACTS

European Society of Musculoskeletal Radiology (ESSR) - 15th Annual ESSR/BSSR Meeting, 12–14 June 2008, Galway, Ireland

1

Hand Injuries: Diagnosis by Tissue Harmonic Ultra High-Resolution Ultrasound

M M S Hamed, Y Allam; *Saudi Arabia* (mshafik2003@yahoo.com)

Purpose/Introduction: we hypothesize that ultrasound can accurately diagnose bone fractures and ligament/tendon injuries of the dorsum of hand.
Materials and Methods: This was a prospective study of adult patients with hand injuries. After written consent, patients were scanned with linear ultra high resolution ultrasound with tissue harmonic by the radiologist; subsequently standard radiographs were performed and read. The findings were confirmed by MRI. On ultrasound, fractured bones had cortical interruptions and subperiosteal hematomas or displaced fragments. Injured ligament/tendon were thickened, hypo-echoic or interrupted. Linear and multiple regression analysis were performed, $p<0.05$ was considered significant.
Results: 103 patients enrolled in the study 71 of which had positive findings. 26 had fractures: 4 carpal, 5 metacarpal and 17 phalangeal. We had in all 73 ligaments/tendons injuries: 11 carpal interosseous ligaments, 6 thumb ulnar collateral ligaments, 10 extensor hood and 46 phalangeal collateral ligaments. Ultrasound missed 2 spiral shaft fractures and one terminal phalangeal fracture. Cortical interruption / subperiosteal hematoma and chip displacement were significantly diagnostic ultrasound signs of fractures ($p<0.005$, $R2=0.93$). Ultrasound correctly diagnosed all ligament injuries ($p<0.001$, $R2=0.97$). The sensitivity of ultrasound in detecting fractures was 88.5%, while it sensitivity in detecting ligament injuries was 100%. The overall sensitivity for detection and characterizing hand injuries was 95.7% and the specificity was 100% with no false positive results.
Discussion/Conclusion: ultrasound of the hand is an accurate procedure that showed excellent sensitivity and specificity in diagnosis of fractures, ligaments/tendons injuries in dorsal hand injury.

2

Physical Examination and In Vivo Kinematics in Two Posterior Cruciate Ligament Retaining Total Knee Arthroplasty Systems

M J M Ploegmakers; *Netherlands* (mjmploegmakers@hotmail.com)

Purpose/Introduction: Two PCL retaining TKA prostheses have been used in our clinic. During follow up in the outpatient clinic the suspicion arose that the CKS prosthesis had more anterior-posterior (AP) instability, compared with the PFC prosthesis. The aim of this study was to investigate AP instability in these two prostheses.
Materials and Methods: Physical examinations, including the VAS for pain and satisfaction, IKS rating and the WOMAC were performed. A detailed fluoroscopic measurement technique was used for three-dimensional kinematic assessment of knee arthroplasty function, during knee bend and deep knee bend activities.
Results: AP instability rated with the IKS was not significantly different ($p=0.34$), but patients with a CKS prosthesis showed more limitations according to the WOMAC joint stiffness total score, and for items regarding higher flexion activities in the WOMAC score for knee disability. Kinematic analysis showed the CKS prosthesis tended to have more anterior sliding of the femur on the tibia during mid-and deep flexion activities. The sliding distance was larger at the medial than at the lateral side. This phenomenon has also been described for PCL deficient knees. Furthermore, the CKS showed significantly lower range of tibial rotation ($p<0.05$) from maximum extension to maximum flexion during deep knee bend activities.
Discussion/Conclusion: We describe a knee arthroplasty device comparison where clinical performance is related directly to joint kinematics. Knees with the CKS prosthesis demonstrated greater anterior medial condylar translation and more physical limitations. Kinematic differences can be ascribed to PCL deficiency/laxity or differences in TKA design.

3

CT-guided Ganglion Impar blockade - A Radiological Approach to the Management of Coccydynia

A P Datir, D A Connell; *United Kingdom* (apdatir@gmail.com)

Purpose/Introduction: 1. To evaluate the role of CT in needle placement for ganglion Impar blocks. 2. To determine the efficacy of CT-guided ganglion Impar blocks in the management of coccydynia.
Materials and Methods: A case series reviewing the results from eight patients presenting with coccydynia secondary to trauma or unknow cause. The diagnosis of coccydynia was based on clinical history, location of pain and response to previous diagnostic and therapeutic procedures. These eight patients were treated with CT-guided ganglion Impar blocks to manage their coccyx pain after more conservative procedures including oral medication failed to provide relief. All patients were subjected to ganglion Impar blocks under thin-slice CT-guided technique for needle placement, using 0.5% Bupivacaine and were followed up for a period of six-month.
Results: A significant pain relief was seen in 6 out of 8 patients, lasting from at least few weeks to months. The ganglion Impar is a solitary retroperitoneal sympathetic ganglion that represents the termination of paired paravertebral sympathetic chain and provides innervation to the perineum. The use of ganglion Impar blocks is a well documented technique to relieve the coccyx or perineal pain. CT-guided technique does appear to provide an alternative imaging method for ganglion Impar injections, as opposed to commonly used fluoroscopic-guided method. This may be used to an advantage for accurate needle placement in the ganglion Impar, due to precise localization of the ganglion at the sacro-coccygeal junction on cross-sectional imaging.
Discussion/Conclusion: The use of ganglion Impar blocks is a well documented technique to relieve the coccyx or perineal pain. The

precise localization of ganglion Impar with CT imaging helps in accurate needle placement and may be considered as an alternative route to fluoroscopic method of injection.

4

High resolution whole-body MRI versus FDG-PET-CT for the detection of skeletal metastases

G P Schmidt, S O Schoenberg, R Schmid, R Stahl, R Tiling, C Becker, M F Reiser, A Baur-Melnyk; *Germany* (gerwin.schmidt@med.uni-muenchen.de)

Purpose/Introduction: To evaluate diagnostic accuracy of whole-body MRI (WB-MRI) compared to FDG-PET for screening of skeletal metastases.

Materials and Methods: In a prospective study 30 patients (18 female, 12 male; 24–76 years) with different oncologic diseases and suspected skeletal metastases underwent FDG-PET-CT as well as WB-MRI with the use of parallel imaging (PAT). Coronal imaging of the total body and sagittal imaging of the spine was performed using T1-weighted-TSE-and short tau inversion recovery (STIR)-sequences on a 32-channel scanner. PET-CT was conducted using a low-dose CT for attenuation correction, a PET-emission scan and diagnostic contrast-enhanced CT scan covering thorax, abdomen to the proximal femurs. Two radiologists read the MRI scans, another radiologist and a nuclear medicine physician read the PET-CT scans, each in consensus. Radiological follow-up within at least 6 months was used as standard of reference.

Results: 102 malignant and 25 benign bone lesions were confirmed in 29 patients. Findings were concordant for both modalities in 72% (91/127) of the detected lesions. WB-MRI showed a sensitivity of 94% (96/102) and specificity of 76% (19/25), PET-CT resulted in a sensitivity of 77% (78/102) and specificity of 80% (20/25). Diagnostic accuracy was 91% (115/127) for WB-MRI and 77% for PET-CT (98/127). Findings were concordant for both modalities in 72% of the detected lesions. Large lesions (>2 cm) were correctly diagnosed in 100% with WB-MRI and 93% with PET-CT, medium-sized lesions (1–2 cm) in 91% and 70%, small-sized lesions (<1 cm) in 88% and 56%, respectively. WB-MRI revealed 10 additional bone metastases in 5 patients outside of the anatomic coverage of PET-CT. Total imaging time for WB-MRI was 45 minutes and 43 minutes for PET-CT.

Discussion/Conclusion: WB-MRI and PET-CT are reliable imaging modalities for a systemic assessment of metastatic bone disease. Whole-body MRI with the use of PAT enables high resolution bone marrow screening within 45 minutes with a diagnostic accuracy superior to PET-CT.

5

De Quervain's Disease – Efficacy of Ultrasound Guided Injection

S Choudhary, K Jeyapalan; *United Kingdom* (surabhi_ravi@yahoo.com)

Purpose/Introduction: The aim of this study is to describe the technique and determine the efficacy of ultrasound guided intra-synovial injection of triamcinolone and bupivocaine in the treatment of De Quervain's disease

Materials and Methods: A total of 17 patients with symptomatic De Quervain's disease from January 2005 to October 2007 were included in this study. The procedure involved confirmation of diagnosis with ultrasound followed by injection of a mixture of 20 mg of triamcinolone (40 mg/ml) and 1 ml of 0.5% bupivocaine. Ultrasound guidance with a high resolution (7–15 Mhz) footprint probe was used for injection into the first dorsal extensor compartment tendon sheath (E1). Informed consent was obtained from all patients prior to the procedure. The patients were followed up after a minimum period of 3 weeks. The following parameters were analysed – demographic data, sonographic features of E1 compartment, duration of follow up, response rate and immediate and delayed complications.

Results: There were 14 female and 3 male patients from 29 to 74 years of age (mean – 50.24 years). Fourteen (82.4%) patients were referred by hand surgeons. The disease was equally distributed between the dominant and non dominant hand (right: 9, left: 8). The mean duration of symptoms was 8.9 months (range: 3–18 months). The predisposing factors include diabetes in one patient and injury in three patients. Five patients had one non-ultrasound guided injection in the past, varying from 2 to 5 months prior to the present injection therapy. One of 17 patients had an atypical septum in the first extensor compartment and the extensor pollicis brevis alone was involved. Vascularity of the abnormal tendon sheath was demonstrated on colour doppler in 10 (58.82%) patients. The mean post injection follow up for clinic review was 6.75 weeks (range: 3–12 weeks). One patient was lost to follow up. Fifteen out of 16 patients had significant symptomatic relief (93.75%). There were no immediate or delayed complications. None of our patients had focal fat atrophy at the injection site. Recurrence of symptoms was seen in 3 (20%) patients at 1, 3 and 4 months post injection. Of the three patients with recurrence, one was offered surgery and others were managed conservatively with physiotherapy.

Discussion/Conclusion: Ultrasound guided injection of triamcinolone and marcaine is safe and effective in controlling symptoms of De Quervain's disease. Ultrasound guidance ensures correct needle placement avoiding intratendinous injection as well as local complications like fat atrophy.

6

The intravertebral cleft in acute osteoporotic fractures: Fluid in MR – vacuum in CT?

A Baur-Melnyk, J Linn, C Birkenmaier, M Reiser; *Germany* (andrea.baur@med.uni-muenchen.de)

Purpose/Introduction: In acute osteoporotic fractures sometimes an intravertebral vacuum is present in CT. The aim of this study was to investigate the nature of the intravertebral cleft in acute osteoporotic vertebral fractures in CT in correlation to MRI.

Materials and Methods: 28 patients with 30 osteoporotic fractures with intravertebral vacuum in CT and the presence of MRI of the spine were included retrospectively. Furthermore, we prospectively examined 13 consecutive patients with 14 osteoporotic fractures with an intravertebral vacuum in CT with MRI. T1-w SE, STIR and 5 repetitive T2-w TSE images were performed (1.5 Tesla system, Siemens). Two experienced readers assessed the exams in consensus with regard to the occurrence and location of the intravertebral vacuum on CT and the corresponding signal in MRI.

Results: 27 (90%) of the retrospectively analysed fractures showed a fluid like signal in the area of the vacuum in MRI. In the prospective group a discrete fluid like signal was initially present on T2-weighted sequences in 12 of 14 fractures (85.7%). During the repeated T2-weighted measurements the fluid occurred or increased markedly in all cases.

Discussion/Conclusion: The occurrence of the fluid in MRI in intravertebral clefts is a dynamic process, which is dependent on the position of the patient, secondary to the extension momentum in the supine position. This may be due to the negative pressure in the horizontal position where the fracture is distracted.

7

An Audit of the Paediatric Soft Tissue Masses Referred to the London Bone and Soft Tissue Tumour Service over an 8 Year Period: Diagnoses and Imaging Appearances

M Khanna, A Saifuddin; *United Kingdom* (m_bhumbra@hotmail.com)

Purpose/Introduction: To audit the histological diagnosis and imaging appearance of paediatric soft tissue tumours referred to the London Bone and Soft Tissue Tumour Service (LBSTTS) over an 8 year period.

Paediatric soft tissue tumours are rare. We audited the histological types of tumours referred to the LBSTTS and correlated this with their imaging appearances so as to establish a suitably ordered differential diagnosis when faced with a paediatric soft tissue tumour.

In our practice MR is performed most commonly after initial radiography, this is sometimes supplemented with CT.

Materials and Methods: Paediatric Soft Tissue masses referred to the London Bone and Soft Tissue Tumour service (BSTTS) over the last 8 years were reviewed retrospectively from our database. The histological diagnoses were divided into Neoplastic lesions: Benign, Intermediate and Malignant according to the WHO classification of soft tissue tumours and Non-neoplastic lesions.

Results: 120 paediatric soft tissue masses were referred. Approximately 70% of the soft tissue masses referred were benign or non-neoplastic. A quarter were haemangiomas. 15% were malignant in nature; the most common malignant lesions were a synovial sarcoma (3%) and extraskeletal Ewing's tumour (3%). 10% of the neoplastic lesions were classified as intermediate in nature; by far the commonest of these was fibromatosis. It is classified as intermediate because of its locally aggressive behaviour and high incidence of recurrence despite resection. Characteristic radiological appearances are seen in myositis ossificans, fatty tumours, haemangiomas, peripheral nerve sheath tumours (PNST) and diffuse type giant cell tumour (DTGCT). These lesions made up 53% of all the neoplastic soft tissue lesions referred.

Discussion/Conclusion: Paediatric Soft Tissue tumours are rare. The majority of referred tumours were benign and have characteristic radiological appearances.

8

Hand Ganglions versus Synovial Cysts: Ultrasound Study

M Hamed, A Mostafa, Y Allam; *Saudi Arabia and Egypt* (mshafik 2003@yahoo.com)

Purpose/Introduction: to differentiate between synovial cysts and ganglions of the wrist according to their ultrasound features.

Materials and Methods: A prospective study of adult patients complaining of swellings and/or chronic wrist pain was undertaken. Patients were scanned with linear ultra high resolution ultrasound with tissue harmonic by the radiologist, and results were confirmed by surgery and histopathology. Ganglions were anechoic or hypoechoic cystic mass with or without lobulations. Synovial cysts were comprisable cysts with joint or tendon communications. Sensitivity and specificity of compressibility and tendon communication were calculated.

Results: 65 patients enrolled in the study, 15 had wrist/hand cystic masses. 9 of 15 were ganglions, 3 dorsal over joints, (2 related to scapholunate, one related to the distal interphalangeal of the thumb), 3 over extensor tendons, and 3 ventral related to flexor tendons. 6 of 15 were synovial cysts, 4 dorsal, (2 over the scapholunate joint and 2 related to extensor tendons) and 2 ventral related to flexor tendons. The sensitivity and specificity of compressibility were 93.3%, and 86.6% (with two false positive cases), while those of tendon communication were 100% in differentiation between ganglions and synovial cysts.

Discussion/Conclusion: wrist and hand cystic masses having joint or tendon communications are synovial cysts and not ganglions.

9

Incidence Of Spinal Surgery For Patients With Back Pain

A Zubovic, F Dowling, D McInerney; *United Kingdom and Ireland* (adizubovic@gmail.com)

Introduction: Purpose: Back pain is a significant problem in Europe with important socio-economic impact. The purpose of this study was to evaluate the incidence of spinal surgery for patients with back pain. Study design: This was a retrospective Level II type study. Patient sample included five thousand and forty five patients with a five year follow up.

Discussion: Methods and results: During past five years 5145 patients were seen in the back pain screening clinic. 823 patients (16%) were referred to the spine clinic ($p<0.001$). 127 patients (2.47%) were operated on ($p<0.001$). 106 patients (2.1%) had lumbar discectomy/decompression, 9 (0.59%) cervical discectomy, 3 (0.06%) pars reconstruction, 9 (0.17%) fusion and PLIF for spondylolisthesis, 5 (0.1%) decompression for spinal stenosis and 1 (0.01%) subtraction osteotomy for kyphosis. 5 patients (0.1%) were referred with "red flag" symptoms: 4 with spinal stenosis and 1 with tumour. 17 patients (0.3%) had discogram. 4 of them went for surgery: 1 had L4/5 PLIF, 2 L5/S1PLIF and 1 L5/S1 discectomy. 289 patients (5.6%) had nerve root blockade. Following NRB 47 patients (0.9%) had discectomy/decompression ($p<0.001$). 62 patients had discectomy/decompression without previous NRB. L5/S1 discectomy was the most common (48 pts; 0.9%). 86 patients (1.7%) had facet joint injections. 8 patients (0.15%) had surgery following FJI ($p<0.001$). 1 patient had L4 nerve root decompression, 3 L4/5 discectomy, 1 L5/S1 nerve rot decompression, 1 alartransverse fusion and 1 L5/S1 PLIF. 465 patients (9%) did not have nerve root blocks or facet joint injections. 3 patients (0.06%) had epidural injections of local anaesthetic and steroid.

Conclusion: Spinal surgery is not commonly performed in patients with back pain. Majority of patients can be treated conservatively. Prior to surgery nerve root blocks and facet joint injections are useful in selected patients.

10

Radiology aspects of injuries in avalanche victims

M C Wick, R J Weiss, W Jaschke, M Rieger; *Austria and Sweden* (marius.wick@i-med.ac.at)

Purpose/Introduction: Avalanches are a major threat in the Alps and the increasing tourist population outside the controlled boundaries of skiing slopes has given rise to an increasing frequency of avalanche victims. Injuries in such victims are multifaceted, and the utilization of different radiological modalities in emergency patient management highlights the need for radiology injury characterisation.

Materials and Methods: Patients who were carried by an avalanche or partially/completely buried by snow in Tirol in the time period 1994–2005 and admitted to the Innsbruck Medical University Hospital were included. Data were obtained from the Austrian avalanche register and local electronic patient files archive, which uses the codes of the International Classification of Diseases (ICD).

Results: During the observation period, 94 avalanche victims in Tirol were admitted to our hospital, and a mean (SD) number of 1.5 (0.6) Radiology modalities were performed at first clinical presentation. They presented with a mean (SD) of 3.0 (2.0) diagnoses per victim, of which a mean (SD) of 1.1 (2.1) were eligible for Radiology examinations only. Most victims (56%) were diagnosed with hypothermia, followed by unspecific contusion/s (54%), injuries of ligaments, tendons or muscles (26%), and fracture/s (23%). Twenty-one victims died during their hospital stay.
Discussion/Conclusion: The dynamic action of avalanches over mountainous terrain exposes victims to multiple trauma and/or death. Radiology examinations avoid overlooking injuries not immediately apparent. However, initial use of radiological assessments such as computertomography in victims admitted under cardio-pulmonary resuscitation does not always ensure an optimal outcome.

11

Osteoporosis a disease of bone marrow-correlation between marrow

J O'Brien, M Shelly, P MacMahon, P Doran, S Eustace; *Ireland* (juliemarobrien@yahoo.com)

Purpose/Introduction: To evaluate the relationship between bone density and red marrow volume determined by Whole-Body MRI (WBMRI);and subsequently compare these results with each of the cytokine levels.

In addition, we aim to evaluate the clinical significance of these results with discussion of the role of serum bone turnover markers.
Materials and Methods: 124 participants were included. In each, bone density was recorded by conventional DEXA. WBMRI to determine red marrow volume was performed on a Philips Intera 1.5T scanner with a moving table-top. In addition, serum was yielded to determine cytokine levels using conventional ELIZA techniques. These included: Bone Morphogenic Protein(BMP)2 and 7, Leptin, and Transforming Growth factor(TGF) beta. Correlation between these results was performed.
Results: Total body red marrow volume, as determined by WBMRI appears to correlate with DEXA recorded levels of bone density. Similarly there was a correlation between this relationship and serum cytokine levels.
Discussion/Conclusion: The results of our study suggest that red marrow provides a milieu for healthy bone osteoblasts, and therefore contributes to the maintenance of bone health. The results suggest a direct relationship between total red marrow volume and bone density. The measurement of several serum markers have been widely investigated as a complement to Bone Mineral Density (BMD) measurements. In this study, we measured a number of cytokines associated with the osteoblast/osteoclast cycle, which have shown a correlation with bone density and marrow volumes. They cannot however be used alone for screening or diagnosis but may be useful as an adjunct to BMD measurement, for prediction of higher risk patients.

12

A Randomized Trial of Balloon Kyphoplasty and Nonsurgical Care for Patients with Acute Vertebral Compression Fractures: One year results

F W Smith, J Van Meirhaeghe, D Wardlaw, L Bastian, S Boonen; *United Kingdom, Belgium and Germany* (fwsmith@doctors.org.uk)

Purpose/Introduction: Balloon kyphoplasty is a minimally invasive treatment for acute vertebral fractures that aims to reduce and correct vertebral deformity by inserting expandable balloon tamps and then stabilize the body by filling it with bone cement. The effect of balloon kyphoplasty on quality of life has until now, not been tested in a randomized trial.
Materials and Methods: In this international, multicentre trial, 300 Patients with non-traumatic acute vertebral compression fractures were enrolled within 3 months of diagnosis and randomly assigned to receive either balloon kyphoplasty (N=149) or conservative care (N=151). Measurements of quality of life, back pain and function, days of disability and spine radiographs were assessed through 12 months of follow-up.
Results: Compared with those assigned to nonsurgical care, participants assigned to balloon kyphoplasty had 5.2 points (95% CI, 2.9 to 7.4; $p<0.0001$) greater improvement in the physical component of the SF-36 quality of life questionnaire at one month and 1.5 points (95% CI,-0.8 to 3.8; $p=0.2$) at twelve months. Those in the balloon kyphoplasty group also had greater improvement in quality of life by the EuroQol questionnaire at one (0.18 points; 95% CI, 0.08 to 0.28; $p=0.0003$) and twelve months (0.12 points; 95% CI, 0.01 to 0.22; $p=0.025$) and improved disability by the Roland-Morris scale at one month (4.0 points; 95% CI, 2.6 to 5.5; $p<0.0001$) and twelve months (2.6 points; 95% CI, 1.0 to 4.1; $p=0.0012$). Balloon kyphoplasty patients had less back pain on a 0 to 10-point numeric rating scale at seven days (2.2 points; 95% CI, 1.6 to 2.8; $p<0.0001$) and twelve months (0.9 points; 95% CI, 0.3 to 1.5; $p=0.0034$) and reported fewer days of limited activity at one month (2.9 days per 2 weeks; 95% CI, 1.3 to 4.6; $p=0.0004$) and twelve months (1.6; 95% CI,-0.1 to 3.3; $p=0.068$). Fewer patients assigned to balloon kyphoplasty took pain medications or used walking aids during follow-up. New radiographically detected vertebral fractures occurred in 41.8% of subjects in the balloon kyphoplasty and 37.8% in the nonsurgical group (4% difference; 95% CI-7.5 to 15.6; $p=0.5$) and were not statistically different.
Discussion/Conclusion: Compared to nonsurgical treatment, balloon kyphoplasty safely improved quality of life and reduced back pain, disability and the use of analgesia and walking aids. Significant improvements in multiple measurements of quality of life, pain and disability continue for at least 1 year. Balloon kyphoplasty did not increase adverse events including the risk of vertebral fractures

13

Effectiveness of Hydrodilatation in Shoulder Pain due to Internal Impingement in Overhead Athletes

A P Datir, D A Connell; *United Kingdom* (apdatir@gmail.com)

Purpose/Introduction: The purpose of this study was to evaluate the usefulness of hydrodilatation in the management of internal impingement of shoulder in overhead athletes.
Materials and Methods: Twenty overhead athletes with internal impingement of shoulder were recruited in this study. All subjects were male and between the ages of 19–32 years with a mean of 24.4 years. Subjects included 9 tennis players, 5 cricket bowlers, 4 swimmers, 1 javelin thrower and 1 golf player. All were assessed at baseline (pre-hydrodilatation) and also after undergoing hydrodilatation at 2 weeks, 3 months and 6 months subsequently, with VAS pain scores and Oxford Shoulder Scoring method. The statistical analysis was done using paired-t test and significance level was set at $p<0.001$.
Results: The results indicated that there was a significant difference between the pre-treatment values and the values at each of the other subsequent times ($p<0.001$ for all). The baseline Mean Oxford Shoulder Score decreased from initial value of 29.4 to 16.6 at 2 weeks after hydrodilatation, whilst the VAS decreased from 7.6 to 2.3. This

score remained significantly low at 3 months (16.8 on Oxford Score and 2.4 on VAS) and at 6 months (21.5 on Oxford Score and 5.1 on VAS). The biggest difference was at 2 weeks, where the values were dramatically lower than they were pre-treatment (difference of 12.8 on Oxford Score and 5.3 on VAS). Although the values at 6 months are higher than they were at 2 weeks, they are still significantly lower than they were before treatment. In addition to this, 90% athletes were willing to have this procedure again whereas 85% opined that they would definitely recommend this procedure to a friend with similar problem.

Discussion/Conclusion: This limited study suggests that hydrodilatation can improve the pain scores and functional capacity in the overhead athletes with shoulder pain due to internal impingement. The most beneficial effect is gained from 2 weeks to 3 months.

14

Radiofrequency ablation of chondroblastoma: Early experience and follow up of 6 cases

M Christie-Large, S L J James, M Davies; *United Kingdom* (mcl@doctors.org.uk)

Purpose/Introduction: Percutaneous radiofrequency ablation is an established treatment for osteoid osteomas and is increasingly being used to treat other musculoskeletal tumours such as metastases. Chondroblastoma is a benign, cartilagenous bone tumour which presents with joint pain and swelling. The standard treatment is surgical curretage however the subarticular location of these tumours means that this can have significant associated morbidity. We present 4 cases of chondroblastoma which have been treated with CT guided radiofrequency ablation. The procedure, technique, clinical outcome and follow up imaging (1 year) is presented

Materials and Methods: 4 consecutive patients (F:M 3:1, mean age 13 yrs) underwent the procedure following discussion at our orthopaedic oncology MDT. All patients had symptomatic, biopsy proven, chondroblastomas (2 proximal femur, 2 proximal tibia. Mean size 1.7 cm). Bone access was gained with a Bonopty biopsy needle system (mean number of needle placements- 8, mean radiofrequency ablation time- 9 minutes).MRI scans were first performed 3 to 6 months after the procedure. Treatment was considered successful if the patient was symptom free and no peri-lesional oedema was evident on MRI.

Results: All patients reported improved symptoms between 2–6 weeks post ablation. 2 patients were completely asymptomatic at 7–9 months, with full return to normal function. MRI scans in these patients at 4 and 10 months demonstrated no residual oedema and fatty replacement in the lesion. 1 patient reported a return of pain 1 month after the initial improvement, however the pain pattern was different and thought to be unrelated. An MRI at 14 months demonstrated no residual oedema. The last patient reported dramatic improvement in symptoms 2 weeks after the procedure and is awaiting the first follow up MRI.

Discussion/Conclusion: The standard surgical treatment of chondroblastomas consists of curretage followed by packing of the lesion with bone graft or bone cement. As chondroblastomas are epiphyseal/ peri-epiphyseal there is risk of damage to the overlying articular cartilage and the growth plate. This can result in disability and potential growth disturbance.Surgical treatment also has up to a 20% recurrence rate. Radiofrequency ablation is not risk free as there remains potential risk of thermal damage to articular cartilage. It is minimally invasive and less likely to damage surrounding structures if electrodes are carefully placed. We believe that multiple electrode positions while technically more challenging may provide better control of the thermal ablation zone reducing the potential for articular cartilage injury.

15

Ultrasound-Guided Intra-articular Injections of Hyaluronic Acid (Viscosupplementation) in the Treatment of Symptomatic Hip Osteoarthritis: Clinical Results at 18 Months

F Brescia, E Pofi, S Zucchi; *Italy* (francobrescia@virgilio.it)

Purpose/Introduction: This study was aimed at investigating the safety and duration of benefit after the treatment of hip symptomatic osteoarthritis (OA) patients (pts) by US-guided intra-articular injections of hyaluronic acid (Jointex).

Materials and Methods: 133 pts whit OA (graded 2–3 according the Kellgren-Lawrence score) was treated with US-guided intra-articular injection (USIAi) of 4 ml of Jointex (sodic hyaluronan, molecular weight 800–1200 kDalton) repeatable after 3–6 month. Pts were esamined supine by anterior parasagittal approach, 3,5 MHz convex trasducer whith sterilized biopsy guide. Treatment efficacy was assessed by Lequesne index,monthly non-steroidal anti-infiammatory drug (NSAID) intake,visual analogue scale (VAS) pain measurement, global patient assessment and global physician assessment;all these scores were recorded at baseline and,then,at visit 3,6,9,12,18 months after enrolment. All adverse events were reported.

Results: 16 pts had bilateral hip OA. 45 pts received only 1 injection, 33 pts 2 injections, 41 pts received 3 injections and 14 pts 4 injections. A total of 290 injections are performed.The results show that there are significant changes at the VAS and Lequesne index at all timepoints compared to baseline;the decrease in pain VAS and Lequesne index at 18 months was 43% and 36% respectively. As for NSAIDs, without the drop-out,both tests proved significant at all timepoints (all P values$<$ 0.05).Global patient evaluation and global physician evaluation had decresed at 18 months by 38% and 41% respectively. No infectious or sistemic complications were reported.

Discussion/Conclusion: These data suggest that USIAi of hyaluronic acid in OA is able to reduce pain and to ameliorate joint function. Is well tolerated,economic and safe.

16

Plantar fascitis: Evaluation of Laser therapy – observations at Ultrasound imaging

O Kiritsi, K Tsitas, V Georgopoyloy; *Greece* (kirolga@hotmail.com)

Purpose/Introduction: Plantar fasciitis is a common cause of heel pain. Non surgical treatment of plantar fasciitis includes Laser therapy.

The purpose of this study is to prospectively evaluate changes in patients with plantar fasciitis, using US, after Laser Therapy.

Materials and Methods: Entry criteria included:heel pain, localized tenderness at the plantar fascia insertion site, US confirmed lesion and negative work up to rule out other causes of heel pain.

Patients were randomly assigned to receive Laser Therapy (nL=15), or identical placebo therapy (nP=10).

Ultrasound was performed twenty-four hours before treatment and immediately after completion of therapy.

Differences between groups were examined for statistical significance using Student's t-test and x2 criterion.

Results: 21/25 individuals (nL=12/15, nP=9/10) had thickened plantar fascia before treatment and 11/25 patients (nL=5/15, nP=6/10) after completion of treatment.

Twenty-four hours prior to treatment, the thickened plantar fascia was hypoechoic (nL=10/15, nP=8/10), had altered fibrillary pattern (nL=8/15, nP=6/10) and was accompanied by soft tissue edema (nL=10/15, nP=6/10). After treatment the fascia was isoechoic (nL=13/15, nP=6/10), had normal fibrillary pattern (nL=13/15, nP=8/10) and there was no surrounding edema (nL=13/15, nP=8/10).

Discussion/Conclusion: The most common US changes related to Laser Therapy are: gradual conversion of echogeneity and fibrillary pattern to normal, disappearance of surrounding edema and decrease of plantar fascia thickness.

Our US findings demonstrate that Laser Therapy is significantly ($0.05<p<0.001$) more effective in the treatment of plantar fasciitis compared to Placebo Therapy, when fascia thickness is considered.

In conclusion US imaging can depict the morphologic changes related to Laser Therapy in the treatment of plantar fasciitis.

17

Imaging strategy for staging lung metastases at presentation in patients with soft tissue sarcomas

M Christie-Large, S L J James, M Davies, L Tiessen, R J Grimer; *United Kingdom* (mcl@doctors.org.uk)

Purpose/Introduction: To identify the risk of lung metastases at the time of diagnosis in patients with soft tissue sarcomas (STS) and to establish the optimum imaging strategy for the diagnosis of these metastases.

Materials and Methods: A retrospective review of an Orthopaedic Oncology database identified 1170 patients with newly diagnosed STS during a 7.5 year period (1996–2004). The patient demographics, tumour type, size, depth, histology grade, and presence of metastatic disease at presentation were studied. The chest radiograph (CXR) / computed tomography of the chest (CT chest) findings performed as part of the initial staging study, were available in all patients. We estimated the efficacy of CXR in identifying pulmonary metastatic disease compared with CT chest. We also analysed survival data to determine if diagnosis of lung metastases by CXR or CT chest had any impact.

Results: The incidence of metastases at diagnosis was 10% (116 patients), 8.3% (96 patients) had lung metastases on chest CT and 1.7% (20 patients) had metastases elsewhere. The risk of having lung metastases at diagnosis was 11.8% in high grade tumours, 6.95% in intermediate grade and 1.2% in low grade tumours. CXR alone detected 2/3 of all lung metastases. The positive predictive value of the CXR was 93.3%, the negative predictive value was 96.7%, the sensitivity 60.8% and the specificity 99.6%.The accuracy was 96.9%. CT overestimated metastases in 4% with a sensitivity of 100%, specificity of 99.6% and accuracy of 99.6%.Average survival after diagnosis of lung metastases by CXR was 10.6 months and after diagnosis by CT was 12.9 months (p value 0.462, not significant). 90% of patients were dead 2 years after diagnosis of lung metastases.

Discussion/Conclusion: We recommend that all patients with a suspected STS should have a CXR at presentation, prior to histological diagnosis. CT of the chest should then be performed in those patients with an abnormality on the presentation CXR and routinely in those patients who have large, deep seated or high/intermediate grade tumours. In our experience this strategy will detect 93% of all chest metastases.

18

Cervical muscle area measurements in acute Whiplash patients and controls

E J Ulbrich, S E Anderson, A Busato, S Abderhalden, C Boesch, H Zimmermann, P Heini, J Hodler, M Sturzenegger; *Switzerland and Australia* (erika.u@gmx.de)

Purpose/Introduction: Our hypothesis was that females more frequently are symptomatic after whiplash injury than men due to smaller cervical muscle volumes and that symptomatic patients have smaller cervical muscle volumes than matched controls. There are only sparse in vivo data of cervical muscle volumes in acute whiplash patients and compared to asymptomatic control subjects. The objective of this study was therefore to quantitatively compare the cross-sectional areas as surrogate markers for muscle volumes of the extensor cervical and sternocleidomastoid muscles in symptomatic acute whiplash patients and controls and to compare females with males and patients with controls.

There is evidence that suggest an important role of cervical muscles in whiplash injury.

a) Patients aware of the impending impact and/or with precontracted neck muscles seem to have less acute and chronic symptoms.
b) Women more frequently are symptomatic than men.
c) Chronic whiplash patients may show cervical spine muscle atrophy/fatty infiltration compared to controls.

Materials and Methods: A prospective case-control study investigating cross-sectional muscle area measurements in acute whiplash patients and controls.

We examined 38 patients suffering acute whiplash injury within 48 hours and 38 healthy age-and sex-matched asymptomatic controls. MRI cross-sectional muscle area measurements (CSA) were performed of the cervical extensor muscles bilaterally using axial STIR (Short Tau inversion Recovery) sequences on level C2 (deep and total dorsal cervical extensor muscles), C4 (sternocleidomastoid muscles) and C5 (deep and total dorsal cervical muscles).

Results: There were no significant differences between patients and controls for all CSAs. Females had consistently smaller CSAs than males, but group effects were not consistent across genders.

Discussion/Conclusion: The study provides mixed and only weak evidence that subjects with smaller CSA of cervical extensor muscles are at higher risks to develop symptoms after a whiplash injury and confirms smaller CSA in women. Isolated cervical muscles might have a special role.

19

Separating different structural elements of osteoporotic trabecular bone: an approach for better predicting bone strength

J S Bauer, R A Monetti, D Mueller, M Matsuura, T M Link, F Eckstein, C W Raeth, E J Rummeny; *Germany, United States of America and Austria* (jansbauer@gmail.com)

Purpose/Introduction: The Scaling Index Method (SIM) has been successfully applied for the characterization of bone trabecular structure in osteoporosis. In this study, the SIM was used to distinguish between different structural elements of the trabecular network and to predict biomechanical strength of the bone.

Materials and Methods: Cylindrical trabecular bone specimens (diameter 8 mm, length 10 mm) were harvested from formalin-fixed femora of 95 elderly human donors. 65 specimens were harvested at the neck (n) and 70 specimens were harvested at the greater trochanter (t). μCT images with isotropic spatial resolution ($26\times26\times26$ μm) were acquired. Standard morphometric parameters were determined and scaling properties (mP(a)) calculated using the SIM. Maximum compressive strength (MCS) of the specimen was measured in a biomechanical test.

Results: Using the SIM, the dimensionality of every voxel is determined, thus rod-like structures can be separated from plate-like structures. The correlation coefficient for MCS versus mP(a) is highest when considering all structural elements ($r=0.80$). It decreases when

considering only rod-like elements (r=0.67) or only plate-like elements (r=0.73). Correlation coefficients for the morphometric parameters are substantially poorer, e.g. Tb.N and Tb.Sp versus MCS correlate with r=0.59 and r=0.51, respectively.

Discussion/Conclusion: Using the SIM it is possible to characterize the different structural elements of trabecular bone. With this approach, the contribution of each structural element to the MCS can be considered and weighted differently. Thus, a higher correlation with MCS was found for the non-linear texture measure mp(a) than for conventional morphometric structure parameters.

20

MR Findings of Prepatellar Morel-Lavallee Effusions

E C Kavanagh, N J Maxwell, C G Borrero; *Ireland and United States of America* (eoin.kavanagh@ucd.ie)

Introduction: Closed degloving injuries of the soft tissues overlying the hip and pelvis were first described by the French physician Maurice Morel-Lavallee in 1853. These injuries have been reported to involve the soft tissues adjacent to the greater trochanter, lower back, and buttock regions. Typically these injuries manifest as fluid collections at the interface between the subcutaneous fat and underlying fascia, with variable appearances on MRI. Although Morel-Lavallee lesions (MLLs) have been described in the knee in the orthopedic literature, to our knowledge, a case series describing the imaging findings of MLLs of the knee has never been reported in the radiology literature.

Report/Discussion: We describe the MR imaging features of prepatellar collections in four young wrestlers, with two cases proven with surgical inspection and pathological analysis and two cases suggested by imaging alone. Imaging features that might aid in distinguishing between prepatellar bursitis and MLL are suggested.

21

Audit of Primary Care Open Access MRI Spine Examination

A Acharya, S Hegde, R Bhatt, K Jeyapalan; *United Kingdom* (drhegdeshilpa@yahoo.com)

Introduction: MRI of the Spine is requested for a number of reasons including degenerative spine disease, infection, malignancy etc.

This audit was done to evaluate 1.the referral pattern for MRI spine from the primary care, 2.compliance with RCR enabled access guidelines3.correlation of clinical history and MRI findings and 4. justification of the continued provision of service.

Materials and Methods: Retrospective analysis of all MR spine examination performed over 24 month period(Jan '04 to Dec'05) across UHL. Patient list, clinical details and MR report obtained from radiology information system- CRIS. Correlation of clinical information and MRI findings from the MRI report

Results: Total 315 examinations (144 males).Age range 17 years to 87 years (mean of 52 years).52% were between 41–60 years.The MRI scans performed were Lumbar72%,thoracic4%,cervical18%whole spine 2%.

Clinical indications included degeneration (76%), metastasis/primary malignancy(12%),infection(2%),trauma(1.5%), osteoporotic collapse (3%) and in 4% no clinical details were documented.

Only 34 (11%) had plain Xray prior to MRI.

MRI findings were degenerative spine disease-94%,malignancy/metastasis-2%,infection-1% and osteoporotic collapse-3%. 8% had normal findings. 2% were cancelled.

Incidental findings included spondylolisthesis, ankylosing spondylitis, chronic sacroilitis, arachnoid cyst, haemangiomas, etc.

38% (115) of the referrals were compliant with the enabled access guidelines.MRI findings correlated with clinical impression in 31%(93).

Conclusion: Majority of the referral is for degenerative spine disease. This study indicates the need for more awareness of the guidelines amongst the referrer and provision of more clinical information to the radiologist. There is also a need for continued provision of service with more robust vetting service and further education of the referrer. Future reaudit is recommended.

22

Adamantinoma, Osteofibrous Dysplasia and Osteofibrous Dysplasia like Adamantinoma: Correlation of radiological imaging features with surgical histology and assessment of the use of radiology in contributing to the needle biopsy diagnosis

M Khanna, D Delaney, A Saifuddin; *United Kingdom* (m_bhumbra@hotmail.com)

Purpose/Introduction: To correlate the imaging features with surgical histology for Adamantinoma, Osteofibrous Dysplasia (OFD) and Osteofibrous Dysplasia like Adamantinoma (OFD/LA). To compare surgical histology with the original needle biopsy result. To assess the use of imaging, in contributing to the initial needle biopsy diagnosis to aid management.

Materials and Methods: 24 patients had complete imaging records for analysis. The following radiological features were recorded: Dimensions of the lesion, longitudinal length ratio to length of bone, presence of satellite lesions within the tibia and fibula, lesion margin, periosteal reaction and matrix ossification on plain film. Cross sectional characteristics analysed included, whether the lesion was confined to the cortex, the degree of bulging into the medullary cavity and the T2W signal characteristics. Soft tissue extension and the presence of a pathological fracture was also evaluated.

The needle biopsy diagnosis and resection specimen histological diagnoses were retrospectively reviewed and compared. Cases where the needle biopsy diagnosis did not correlate with the final histological diagnosis, were reviewed with radiology to assess whether established radiological signs may have aided in the diagnosis.

Results: Out of 24 patients, 8 had adamantinoma, 11 OFD/LA and 5 OFD. The average length of an adamantinoma lesion was 13.2 cm, longer than in OFD/LA (6.5 cm) and in OFD (6.1 cm). 7/8 adamantinoma lesions had moth eaten margins, compared to 5/11 in OFDLA and 2/5 in OFD. 3/8 adamantinoma lesions demonstrated cortical destruction with 7/8 cases completely involving the marrow cavity. In comparison only 1/11 of the OFD/LA cases and 1/5 OFD cases demonstrated cortical destruction. 1/11 OFD/LA and 2/5 OFD cases demonstrated complete marrow involvement.

4 of the 24 patients, (16.7%), had a different needle biopsy result compared to the final histology, 3 cases were upgraded from OFDLA or OFD to adamantinoma. The radiology of these cases, were in keeping with the features more commonly found in a more aggressive lesion.

Discussion/Conclusion: Adamantinoma; OFD and OFD/LA are histogenetically similar lesions and are thought to represent a spectrum of the same disease. Adamantinoma, however, has a worse prognosis; it is therefore essential to distinguish this in order to select the appropriate management, which ranges from conservative treatment to extensive reconstructive surgery. The following radiological criteria are useful in suggesting a more aggressive lesion: large longitudinal length, moth eaten margin, cortical destruction and complete marrow involvement. This is particularly useful with a needle biopsy diagnosis of OFD, where an unrepresentative sample may be obtained.

23

Analysis of bone mineral density, structure and strength in patients with â-thalassemia major: a pQCT study

A Balanika, O Papakonstantinou, S Kostaridou, C Baltas, K Georgiadis, A Gouliamos; *Greece* (mpaltas@hotmail.com)

Purpose/Introduction: We aimed to examine the volumetric trabecular and cortical bone mineral density, bone strength and geometry at the tibia in patients with â-thalassemia major by peripheral quantitative computed tomography (pQCT).

Materials and Methods: Thirty six patients with â-thalassemia major (10 male and 26 female, age 24–47) and history of fragility fracture were investigated. pQCT at the non dominant tibia was used to measure trabecular (TBD) and cortical bone mineral density (CBD), strength strain index (SSI) and marrow cavity area (MC). Obtained data were compared with data of 36 healthy subject (11 male and 25 female) matched for age and body mass index (BMI).

Results: Men with â-thalassemia major presented significantly reduced TBD, CBD, SSI compared with healthy males. Thalassemic female patients had significantly reduced TBD, SSI compared to healthy females although CBD was significantly higher in female thalassemic. There is no significant difference of MC between male patients and male subjects. On the contrary MC of female patients was significantly higher compared with healthy female controls.

Discussion/Conclusion: These data showed trabecular osteopenia and bone fragility in both men and women with â-thalassemia major. The increased size of marrow cavity and cortical density in female and the cortical osteopenia in male indicate a possible interfering pathogen effect of sex hormones on bones of these patients.

24

Noncontrast MRI of the Rotator Cuff Interval: Visualization of its structures and its appearance in association with abnormalities of the Rotator Cuff and Biceps Tendon

D Bergin, N Rao, W Morrison; *Ireland and United States of America* (dianebergin@yahoo.com)

Purpose/Introduction: 1.To evaluate the rotator cuff interval (RCI) and its contents including RCI fat, medial and lateral coracohumeral ligament (MCHL and LCHL) on standard noncontrast MRI.

2.To observe what changes occur in the RCI and its structures in association with rotator cuff (RC) and biceps tendon abnormalities.

Materials and Methods: A database search was performed to identify patients who had noncontrast 1.5 T MRI of the shoulder at our institution over a 2 year period. MRI exams selected included a full range of RC and biceps tendon abnormalities as well as normal exams based on reports. Exams were reviewed in consensus by two musculoskeletal radiologists at two different settings to assess the RCI and its contents. Presence of fat, fluid, edema and/or fibrosis was noted in the RCI. Visualization of the MCHL and LCHL was rated: as1=not seen, 5=excellent) in all planes. Abnormalities of the MCHL and LCHL were recorded. On second MR review the RC tendon cuff and biceps tendon were evaluated. The mean scores for visualization of LCHL and MCHL on axial, sagittal and coronal planes were calculated. Relationship between status of RCI structures and of the rotator cuff and biceps tendon was analyzed using ANOVA and Student-Newman-Keuls test.

Results: MR exams of 100 symptomatic patients were reviewed. Homogenous normal fat was seen in 9% of exams, edema and/or fluid was seen in 89% and fibrosis replacing part or all of RCI fat was seen in 81%.The MCHL/LCHL was seen (good or excellent) in one or more MR planes in 81%/83% patients respectively.Both the MCHL and LCHL were best visualized in the sagittal plane, mean score (5 highest score) for MCHL was 3.4 and LCHL was 3.8 respectively. There was a significant relationship between abnormality of the CHL ($p<0.0001$) and abnormality of the subscapularis, supraspinatus and long head of the biceps tendons.There was a significant relationship ($p=0.005$) between subluxation/dislocation of the long head of biceps tendon with abnormalities of the CHL.

Discussion/Conclusion: The RCI plays an important role in glenohumeral stability, particularly superoinferior stabilization. The rotator cuff interval and its structures can be assessed on noncontrast 1.5 MRI.Abnormalities of the RCI and its contents can be appreciated on noncontrast MRI in association with rotator cuff tendon and long head of biceps tendon abnormalities. This may allow appreciation of early and impending RC tendon or long head of the biceps tendon abnormalities and influence subsequent clinical management.

25

The role of multidetector CT (MDCT) arthrography in investigating hip pain

M Christie-Large, M J F Tapp, K Theivendran, S L J James; *United Kingdom* (mcl@doctors.org.uk)

Purpose/Introduction: Investigation of hip labral and cartilage pathology has mostly concentrated on the use of arthographic and non-arthrographic MRI. The inherent limited spatial resolution of MRI can prevent identification of subtle hip pathology. Diagnostic hip arthroscopy is an invasive procedure and is best reserved for therapeutic intervention. The purpose of this study was to assess the diagnostic ability of multidetector CT (MDCT) arthrography in the detection of cartilage and labral disorders in patients with hip pain and the clinical suspicion of a labral tear.

Materials and Methods: Retrospective analysis of 96 consecutive patients (37 male, 59 female; age range 10–65 years, mean age 38 y) who had undergone arthrography for hip pain and suspected labral pathology over an 18 month period was performed. Hip arthrography was performed under fluoroscopic guidance, via an anterolateral approach. The hip joint was distended with approximately 10–12 ml of dilute iodinated contrast (50:50 mix of 240 strength iodinated contrast and normal saline). The saline was substituted with local anaesthetic (0.5% Bupivicaine) if a diagnostic injection was required. Block axial acquisition through the hip was performed using a 4 slice MDCT at 0.6 mm intervals. Following this a small block acquisition was performed through the femoral condyle to calculate femoral anteversion measurements. The study was then reported from a workstation using axial oblique, coronal and sagittal reconstructions. Data regarding the presence of labral tear, chondral loss, acetabular version, femoral head and neck morphology and presence the of fibrocystic change was collected.

Results: There were 37 labral tears (32 anterior, 4 lateral, 6 anterolateral and 0 posterior); acetabular cartilage loss in 47 patients; femoral cartilage loss in 10 patients; abnormal femoral morphology (osseous bump) in 18 patients; coxa vara in 1 patient; fibrocystic change of the femoral head and neck junction in 8 patients, acetabular retroversion in 10 patients and paralabral cysts in 3 patients. In addition 4 patients had had previous Perthes disease, 2 previous trauma and 3 previous triple pelvic osteotomies. Hip dysplasia was diagnosed in 15 patients.

Discussion/Conclusion: MDCT arthrography is quick and easy to perform with no movement artefact. It provides excellent spatial resolution and enables 3D reconstructions for surgical planning. It allows detection of labral tears, cartilage loss and femoral and acetabular morphology. If combined with injection of local anaesthetic, it

provides diagnostic information regarding the source of the pain. MDCT arthrography is a useful adjunct to MR and MR arthrography in the investigation of hip pathology.

26

Early Postoperative Management after Rotator Cuff Repair under Ultrasonographic Control

B Renaud, B Johannes; *France* (renaud.barthelemy@groupe-du-mail.com)

Purpose: The purpose of this study was to assess early anatomic results after arthroscopic rotator cuff repair using ultrasounds in order to better control early motion recovery with maximum safety for tendon healing

Materials and Methods: A total of 66 patients were prospectively included between January 2007 and February 2008. An ultrasonographic evaluation was performed at 3 weeks and 3 months. Cuff integrity and inflammatory phenomenon were evaluated and correlated to clinical findings to optimize the postoperative rehabilitation protocol and daily activities without jeopardizing the tendon-healing process. Distance of the footprint, tendon thickness, and mobility of the cuff with its tuberosity were evaluated as well as subacromial bursitis.

Results: 36 male and 30 female patients (mean age 60 years) underwent an arthroscopic cuff repair. None had a stiff shoulder preoperatively. The study is ongoing and final results are not available yet. Preliminary results showed 8% of retorn tendons. At 3 months, ultrasound scan is easier to perform since mobility is fully recovered; it revealed 10% of subacromial bursitis correlated with intensive rehabilitation or daily activities

Discussion/Conclusion: Ultrasounds are the inner eye that allow for a linear anatomic evaluation of the shoulder without any morbidity. This technique is a modern way to check the good healing process of the tendon to the bone as well as to assess bursitis linked to extensive activity or rehabilitation.

27

MDCT arthrography of wrist: a pictorial review of anatomy and common pathology

K Jeyapalan, S Choudhary, B Bhowal, A Ullah, C J Wildin, J Dias; *United Kingdom* (jeyapalan@ntlworld.com)

Introduction: The ligaments of the proximal row of carpal bones and the triangular fibrocartilage (TFC) strongly influence the function and stability of the wrist. Injury to the ligaments may result in chronic wrist pain or instability. MDCT arthrography has emerged as a relatively new technique which combines detailed delineation of bone as well as ligament anatomy.

Material and Methods: Retrospective review of MDCT arthrograms from August 2006 to December 2007.Patients were identified from the radiology information system (CRIS). All patients had dorsal radio carpal injection of dilute Niopam/Iopamidol.Combined DRUJ injection was performed in 5. MDCT of carpus and wrist (Siemens Somatom16) was performed with multiplanar reconstruction (1–2 mm) to demonstrate TFCC and intrinsic ligaments. The CT findings were correlated with clinical information.

Results: Thirty two examinations were analyzed. Mean age 40.2 years (range 17 to 77). 80% of the patients were within the age group of 20–60 years. The clinical indications included radial wrist pain (10), carpal instability (5), ulnar wrist pain (13) and others (1). Four patients had metallic implants (4 corner fusion, ulna head implant, ulnar osteotomy and titanium radial plate).

MDCT arthrography demonstrated TFC tears (9) partial scapholunate ligament tears (6), complete scapholunate ligament tears(3), partial lunotriquetral ligament tears (2), ulna impaction (2), chondral lesions (4),carpal coalition(1),extra capsular loose body(1) and normal study(6).

Conclusion: MDCT arthrography is a valuable imaging modality to diagnose occult TFC and intrinsic ligament abnormality. Occult chondral lesions, evidence of ulna impaction and extra capsular loose bodies can also be demonstrated.

28

The Use Of Sonography In Assessing Nail Related Disorders

K Jeyapalan, J Dias, R Singh; *United Kingdom* (jeyapalan@ ntlworld.com)

Purpose: We report on 36 consecutive sonographic assessments of nail disorders presenting to hand clinics over 45 months.

Materials and Methods: Retrospective review of 36 patients performed between April 2003 and Jan 2007. Radiology information system was searched for total number, hand/wrist study and nail related disorders. Sonographic findings were correlated with clinical information.13 male and 23 female.Mean age 54.2 yrs (range 14–80).

Results: These patients presented with Lump(27)of which 13 were painful, post trauma (6) and infection(3). The sonographic diagnoses were Infection(4),Trauma(2),Cyst(7), Foreign body(5), ganglion(1), GCT (4), miscellaneous (3), osteoarthrits related (3),neurogenic tumour (5), implantation dermoid(2)and normal (1)

Surgery was performed on 15(42%). The Procedures included 12 excisions of lumps, 2 explorations and debridements and 1 refashioning of the nail bed.

10 (67%) of the 15 had histological confirmation.Final histology confirmed Glomus tumour (2), GCT(4), Superficial acral fibromyxoma(1)Granuloma(2)and Ganglion (1).

All of the provisional diagnosis of trauma (2), ganglion (1) and GCT(4) were confirmed by USS. Discrepancy occurred in rest of the provisional diagnoses. Sonographic diagnosis of OA (1), ganglion (1), implantation dermoid (1), foreign body (1), miscellaneous (1), neurogenic tumour (1) and No abnormality detected (1) were made in a group of 7 cases with the clinical diagnosis of cyst.US detected foreign bodies in 3 cases with a clinical diagnosis of indeterminate lumps (4).

Conclusion: Sonographic study was performed to assess atypical lesions, local staging and obtain further information regarding location, size and relationship to anatomical structures prior to surgery. Role of Sonogaraphy and typical findings will be illustrated.

29

Multidetector Computed Tomography Arthrography of the Shoulder: Diagnostic Accuracy and Indications

M De Filippo, F Pogliacomi, A Bertellini, R Averna, M Onniboni, M Zompatori; *Italy* (massimo.defilippo@unipr.it)

Purpose: To evaluate the diagnostic accuracy and indications of arthro-MDCT of the shoulder in patients with absolute or relative contraindications to MRI and in patients with periarticular metal implants.

Materials and Methods: After intra-articular injection of iodixanol, 70 shoulders in 70 patients (30 females, 40 males, age-range 32–60 years) were examined with a 16-detector-row CT scanner. The patients had arthralgia but no radiologically detected fractures. They could not be studied by MRI either because of subcutaneous electronic implants, surgical metal implants or claustrophobia. In 28 of the 70 patients who had had previous shoulder surgery, the arthro-CT

examination was preceded by an MRI on the same day. All examinations were interterpreted by two experienced musculoskeletal radiologists.

The findings were compared with arthroscopic findings carried out within 28 days of the CT study.

Results: In the 42 non-operated patients, the comparison between arthro-MDCT and arthroscopy showed sensitivity and specificity ranging between 87% and 100%. In the 28 operated shoulders, arthro-MDCT had an accuracy of 94% compared with 25% with MRI.

Inter-observer agreement was almost perfect (k=0.95) in the evaluation of all types lesions, both on MDCT and MRI.

When arthro-MDCT was compared with MRI in the post-operative patients by a McNemar test, a significant difference ($p<0.05$) was found between these two techniques.

Conclusion: Arthro-MDCT of the shoulder is a safe technique that provides accurate diagnosis in identifying chondral, fibrocartilaginous and intra-articular ligamentous lesions in patients who cannot be evaluated by MRI, and in patients after surgery.

30

Multidetector Computed Tomography Arthrography of the Knee: Diagnostic Accuracy and Indications

M De Filippo, F Pogliacomi, A Bertellini, R Averna, M Onniboni, M Zompatori; *Italy* (massimo.defilippo@unipr.it)

Purpose: To evaluate the diagnostic accuracy and indications of arthro-MDCT of the knee, in patients with absolute or relative contraindications to MRI and in patients with periarticular metal implants using diagnostic arthroscopy as the gold standard.

Materials and Methods: After intra-articular injection of iodixanol, 68 knees in patients of both sexes (30 females, 38 males, age range 32–60 years) were examined with a 16-detector-row CT scanner. The patients had arthralgia but no radiologically detected fractures. They could not be studied by MRI either because of subcutaneous electronic implants, surgical metal implants or claustrophobia. In 37 of 68 patients who had had previous knee surgery, the arthro-CT examination was preceded by an MRI on the same day. All examinations were interterpreted by two experienced musculoskeletal radiologists.

The findings were compared with arthroscopic findings carried out within 28 days of the CT study.

Results: In non-operated patients the comparison between arthro-MDCT and arthroscopy showed sensitivity and specificity ranging between 86% and 100%. In the 37 operated knees, arthro-MDCT had an accuracy of 95% compared with 53% of the MRI.

Inter-observer agreement was almost perfect (k=0.97) in the evaluation of all types lesions, both on MDCT and MRI.

When arthro-MDCT was compared with MRI in post-operative patients by a McNemar test, a significant difference ($p<0.05$) was found between these two techniques.

Conclusions: Arthro-MDCT of the knee is a safe technique that provides accurate diagnosis in identifying chondral, fibrocartilaginous and intra-articular ligamentous lesions, in patients that cannot be evaluated by MRI, and in patients after surgical.

31

Assessment of rotator cuff psoriatic enthesopathy in young patients with arthropathic psoriasis of lower limbs by ultrasonography

P Cardello, A Ricci, V Scalzi, C Meschini, E Pofi; *Italy* (p.cardello@virgilio.it)

Purpose/Introduction: To assess the prevalence and severity of rotator cuff psoriatic enthesopathy in young patients with arthropathic psoriasis involving the lower limbs by using ultrasonography in B mode combined with power Doppler

Materials and Methods: We considered 42 patients, mean age 22 years (range 18–39), 22 female and 20 male, with diagnosis of cutaneous psoriasis and lower limb enthesopathy, clinically asymptomatic at the level of shoulders. US examination was performed with a 12,5 MHz linear array transducer (iU22 Philips, The Netherlands). We examined in B-mode bilaterally the enthesal insertion sites of the greater and lesser tuberosity to detect: thickening or intratendinous focal alteration, calcific deposits, bone erosion and surrounding bursitis. The detection of vascularization, examined at the insertion of enthesis, was considered pathological. We classified five combinations of abnormal gray scale and /or power Doppler features

Results: US identified enthesal involvement of the rotator cuff in 32 asymptomatic patients (76%). The vascularization at the cortical junction was detected in nine shoulders (14%)-stage 1-, associated to thickening and/or focal decreased echogenicity at greater and lesser tuberosity in five cases (7,9%)-stage 2-and also associated to cortical bone erosion, enthesis calcifications and bursitis in two cases (3,1%)-stage 3-. US defined in 33 shoulders (51,6%) only thickening and/or focal hypoechogenicity of enthesal insertion-stage 4-and showed in 15 cases (23,4%) enthesal calcification and cortical erosion-stage 5-; both these stages without vascularization

Discussion/Conclusion: US techniques are useful in detection of rotator cuff psoriatic enthesopathy in asymptomatic young patients with arthopathic psoriasis involving lower limbs

32

Unilateral spondylolysis and the presence of facet joint tropism

J J Rankine, R A Dickson; *United Kingdom* (james.rankine@leedsth.nhs.uk)

Purpose/Introduction: Spondylolysis is a fatigue fracture of the pars interarticularis which occurs most commonly at L5 and can be unilateral or bilateral. The demonstration of a unilateral spondylolysis is important as there is the potential for full healing if the athletic activity is modified, whereas bilateral spondylolysis frequently lead to established non union. Coronally orientated facet joints are known to predispose to spondylolysis by increasing the point loading of the pars interarticularis. To date there has been no investigation into the facet joint anatomy in unilateral spondylolysis.

Materials and Methods: A review of patients with low back pain and a possible diagnosis of spondylolysis who were investigated with multi-slice CT was performed. The coronal orientation of the facet joints at L4/5 and L5/S1 was recorded. The mean angle of coronal orientation was compared between those with and without a spondylolysis

Results: The coronal angle of 140 facet joints in 35 patients was recorded. 23/35 patients had a spondylolysis which was unilateral in 12 patients. The facet joint angle was significantly more coronally orientated in the presence of a lysis when compared with an intact pars (means 53 degrees and 43 degrees respectively). In the presence of a unilateral spondylolysis, the facet joint was more coronally orientated on the side of the spondylolysis (means 52 degrees and 45 degrees respectively).

Discussion/Conclusion: Asymmetric facet joints are likely to increase forces through one side of the spine, with a unilateral spondylolysis occurring on the side of the more coronally orientated facet joint.

33

Nerve Ultrasound in Acromegaly: one year follow up

A Tagliafico, E Resmini, F Bianchi, P Ameri, R Alberto, N Raffaella, D Ferone, C Martinoli; *Italy* (Alberto.Tagliafico@unige.it)

Purpose/Introduction: Context: We have previously demonstrated a peripheral nerve enlargement in acromegaly

Objective: The aim of this study was to examine nerves of acromegalic patients with ultrasound (US) after one year from the first evaluation.

Materials and Methods: Patients: We prospectively examined the median and ulnar nerves in 34 acromegalic patients and 34 age-, sex- and BMI matched controls with 17–5 MHz US.

Intervention: The median nerve was examined at the carpal tunnel (MN-Ct) and at the mid-forearm (MN-f) level; the ulnar nerve at the mid-forearm (UN-f) and at distal arm (UN-a). A total of n=272 nerve cross-sectional areas (CSA) were recorded.

Results: Within acromegalic patients "always controlled" and within patients "always uncontrolled" there are no differences in all radiological parameters.

Within patients with an improvement in the clinical control at the follow up, there is a significant reduction in GH120' ($p=0.01$), IGF-I SDS ($p<0.001$), MN-f ($p=0.01$), UN-a ($p<0.001$) and the sum of UN-a, UN-f, MN-f, MN-ct ($p=0.02$). The sum of UN-a and UN-f at follow up was significantly lower than the basal one ($p=0.02$). The sum of UN-a and MN-ct at follow up was significantly lower than the basal one ($p=0.01$).

In patients with a worsening of the clinical control at the follow up there are no statistically significant differences in the nerves' ultrasound parameters.

Conclusion: acromegalic neuropathy seems reversible only if the improvement of the disease is achieved. To obtain the best chance of sparing the disturbaces of acromegalic neuropathy, the disease should be diagnosed as early as possible and treated aggressively

34

The pathology of ulnar nerve in acromegaly

A Tagliafico, E Resmini, E Capaccio, F Bianchi, R Nizzo, D Ferone, C Martinoli; *Italy* (Alberto.Tagliafico@unige.it)

Purpose/Introduction: Background: median neuropathy is commonly associated with acromegaly, however the ulnar nerve neuropathy at the cubital tunnel (UCT) in acromegalic patients has never been reported.

Objective: to describe and asses UCT in acromegalic patients by ultrasound (US) and nerve conduction studies (NCS). Ulnar nerve size and appearance were evaluated.

Materials and Methods: Patients: 37 acromegalic patients were enrolled in the study.

Setting: outpatient clinic and US unit.

Measurements: physical examination, NCS and US were used to diagnose UCT at the beginning of the study and after one year.

Results: in 8/37 patients mild UCT was present at the beginning of the study. After one year 62% (5 of 8) of patients reported clinical and electrophysiological improvements and an evident US reduction of nerve size ($p<0.05$).

Conclusion: ulnar neuropathy could be associated with acromegaly and can improve in 62% of cases with disease control. Due to the different management, differential diagnosis with median neuropathy is warranted. The use of US is mandatory to diagnose UCT in this group of patients since mild UCT has frequently a negative NCS.

35

Injection of the subacromial-subdeltoud bursa: blind or ultrasound-guided?

B S J Maresch, M J C Rutten, G Jager, M C De Waal Malefijt; *Netherlands* (maresch@concepts.nl)

Purpose/Introduction: Blind injection of the subacromial-subdeltoid bursa (SSB) for diagnostic purposes (Neer test) or therapeutic purposes (corticosteroid therapy) is frequently used. Poor response to previous blind injection or side effects may be due to a misplaced injection. It is assumed that ultrasound (US)-guided injections are more accurate than blind injections. In a randomized study we compared the accuracy of blind injection to that of US-guided injection into the SSB.

Materials and Methods: 20 consecutive patients with impingement syndrome were randomized for blind or US-guided injection into the SSB.

Injection was performed either by an experienced orthopedic surgeon or by an experienced musculoskeletal radiologist.

A mixture of 1 ml methylprednisolone acetate, 4 ml prilocaine hydrochloride and 0.02 ml (0.01 mmol) Gadolinium DTPA was injected. Immediately after injection, a 3D-gradient T1 weighted magnetic resonance scan of the shoulder was performed. MRI was used because in provides an objective 3-dimensional view of the bursa and shoulder, and enables differentiation between pre-existing fluid and injecting fluid, by using contrast material (gadolineum). The location of the injected fluid was independently assessed by 2 radiologist who were blinded as to the injection technique used.

Results: The accuracy of blind and US-guided injection was the same. The fluid was injected into the bursa in all cases.

Discussion/Conclusion: Allthough this is a small group of patients, we conclude that blind injection into the SSB is as reliable as US-guided injection and could therefore be used in a daily routine. US-guided injections may offer a useful alternative in difficult cases, such as with changed anatomy postoperatively or when there is no effective clinical outcome.

36

Bone biopsies in those with a primary carcinoma: are we performing too many bone biopsies?

C G Cronin, T Cashell, J NiMhuircheartaigh, E DeLappe, G J O'Sullivan, D O'Keeffe; *Ireland* (carmelcronin2000@hotmail.com)

Purpose/Introduction: We sought to evaluate the prevalence of an alternative diagnosis in patients with a known primary cancer who present with a new suspicious bone lesion for biopsy. To establish the probability of a new suspicious bone lesion being a benign lesion or second cancer in a person with a known primary carcinoma.

Materials and Methods: All biopsies were performed in a single institution between 2002 and 2005.We reviewed the radiology and pathology of scheduled bone biopsies performed on 45 patients (M=17, F=28, mean age 67 years) with a known primary cancer.

Results: The primary cancers were diagnosed between 1 and 10 years prior to the new suspicious bone lesion and bone biopsy. Cancer types included GU, breast, thyroid, GI, lung, lymphoma and myeloma.1 biopsy (2%- 1/45) was not performed as a sacral insufficiency fracture was confidently diagnosed on CT. In 93.3% of biopsies the lesions were metastasis consistent with the primary diagnosis. 2% (1/45) of biopsies were due to a new malignancy and 2% (1/45) was a bone infarct. No adverse complications were encountered.

Discussion/Conclusion: Undoubtedly tissue diagnosis is important in patient treatment. Also bone biopsy carries relatively few risks. However in a patient with a prior diagnosis, biopsy of a new bone lesion carries a low probability to be anything other than a metastatic lesion from the primary tumor. They is an important consideration in optimizing patient management.

37

Ultrasound-Guided Cervical Transforaminal Epidural Nerve Root Injection – A Novel Technique for the Management of Cervical Radiculopathy

W A Bashir; *United Kingdom* (wabashir@doctors.net.uk)

Purpose/Introduction: Cervical radiculopathy is a common problem leading to neck and upper limb pain. Treatment is mainly conservative with analgesia and physical therapy.

Cervical transforaminal epidural injections (TF-ESIs) and cervical selective nerve root blocks (SNRBs) are currently performed under fluoroscopic or CT guidance. Unfortunately, there is increasing literature illustrating the potential for brain and spinal cord infarction following cervical TF-ESIs. The exact mechanism is unknown for the aetiology of these infarctions but variable anastamoses exist between vertebral and cervical arteries and with fluoroscopy and non-contrast CT, one cannot see vascular structures with total confidence. This pilot study looks at ultrasound in guiding transforaminal injections of cervical nerve roots.

Materials and Methods: 15 patients were referred to the radiology department after appropriate anaesthetic and surgical assessment as to the requirement of cervical TF-ESIs. Normally the patients would have undergone CT guided injection.

A 25G spinal needle was sonographically guided to a transforaminal position – nerve root levels were mapped by identifying the C7 transverse processes and then counting transverse processes and nerve roots cranially. Non-particulate corticosteroid and Bupivacaine in standard dosage was delivered.

Results: Patients had a significant reduction in pain scores at 4 weeks as assessed by Visual Analogue Scales.

Discussion/Conclusion: Sonographic guidance allows accurate real-time visualisation with high resolution of local anatomy and needle trajectory. Most importantly needle tip position is seen clearly. Colour Doppler allows scrutiny of vascular flow and therefore the investigator can have greater confidence in avoiding intravascular injection. Utilizing ultrasound also avoids the use of ionising radiation.

38

Positive association between increased popliteal artery vessel wall thickness and generalized osteoarthritis; is OA also part of the Metabolic Syndrome?

P Kornaat, R Sharma, R Geest, van der, H Lamb, J Bloem, M Kloppenburg, I Watt; *Netherlands* (P.R.Kornaat@lumc.nl)

Purpose/Introduction: To determine if a positive association exists between arterial vessel wall thickness and generalized osteoarthritis (OA). Our hypothesis is that generalized OA is another facet of the Metabolic Syndrome.

Materials and Methods: The medical ethical review board of our institution approved the study. Written informed consent was obtained from each patient prior to the study. Magnetic resonance (MR) images of the knee were obtained in 42 patients who had been diagnosed with generalized osteoarthritis (OA) at multiple joint sites. Another 27 MR images of the knee were obtained from a matched normal (non OA) reference population. Vessel wall thickness of the popliteal artery was quantitatively measured by dedicated software. Linear mixed models were used to investigate the association between vessel wall thickness and generalized OA. Adjustments were made for age, sex and body mass index (BMI).

Results: Patients in the generalized OA population had a significant higher average vessel wall thickness than persons from the normal reference population ($p<0.01$), even when correction was made for sex, age and BMI. The average vessel wall thickness of the popliteal artery was 1.09 mm in patients with generalized OA, and 0.96 mm in the matched normal reference population.

Discussion/Conclusion: The association found between increased popliteal artery vessel wall thickness and generalized osteoarthritis suggests that generalized OA may be another facet of the Metabolic Syndrome.

39

Prevalence of Lumbar Degenerative Disk Disease in Late Onset Idiopathic Scoliosis – A Study using MRI

W A Bashir, P O'Donnell, R Green, S Butt, T Muthukumar, A Saifuddin; *United Kingdom* (wabashir@doctors.net.uk)

Purpose/Introduction: The true prevalence of back pain and degenerative change in idiopathic scoliosis is essentially unknown. Disorders of the shape and function of the locomotor system are believed to encourage disk degeneration ("diskosis") in one or more motion segments. In the presence of spinal deformity, continuous asymmetrical loading leads to biomechanical stresses on the intervertebral disk.

No modern imaging studies currently provide accurate data as regards prevalence and distribution of disk degeneration in late onset idiopathic scoliosis.

Materials and Methods: T2-weighted whole spine MRI scans were retrospectively reviewed for 48 consecutive patients with late onset idiopathic scoliosis as part of their initial clinical assessment (age range 20 to 67). The presence of disk degeneration in the lumbar spine was documented by use of standard diskal intensity measurements. Furthermore, each disk level affected by degenerative change was identified.

Results: 50% of patients showed degenerative changes. The age of onset or the amount of lateral curvature did not significantly influence the amount of spinal degenerative change. A greater than expected number of degenerative disks were evident at the upper and mid lumbar levels (L1/2: 12.3%, L2/3: 16.9%, L3/4: 20%) with a more usual number present at the lower lumbar levels (L4/5: 24.6%, L5/S1: 26.2%).

Discussion/Conclusion: This retrospective radiological analysis of disk degeneration in late onset idiopathic scoliosis shows an increased frequency of upper lumbar degenerative disk disease. Surgical planning and determination of fusion and instrumentation sites are often controversial depending on the type of scoliotic curve. This data will influence the surgeon's decision regarding distal scoliosis fusion levels.

40

Open Magnet MRI of Knee Pathologies: Soft Copy and Hard Copy Evaluation

G K Atac, T Sanal, K Keklikci, I Guvenc, Y Ozdemiroglu, S Turkkan; *Turkey* (gokcekaan_atac@yahoo.com)

Purpose/Introduction: The purpose of this study is to compare the diagnostic performances of soft and hard copy interpretation of three radiologist on open magnet MRI imaging of knee pathologies.

Materials and Methods: Three experienced radiologist on musculoskeletal imaging interpreted the printed films and images of the same patients on work station with dual monitor of 5 megapixel resolution. Physicians blinded to the results of diagnostic and therapeutic arthroscopies performed by three orthopedic surgeons. Fourty five consecutive patiens included if they had both MRI exams and arthroscopy. Arthroscopy was the standard of reference. Knee pathologies which can be evaluated with arthroscopy like meniscal, ligamentous, synovial structures and cartilaginous surfaces were included.
Results: Specifities and sensitivities for meniscal tears were %85–89, %97–86 and %87–75 for soft copies, %87–75, %83–65 and % 85–67 for hard copies. Specifities and sensitivities for anterior cruciate ligament injuries were %86–79, %83–77 and %80–69 for soft copies, %83–77, %71–67 and % 75–62 for hard copies. Synovial pathologies including plicae and hypertrophies and injuries of cartilaginous surfaces were also evaluated.
Discussion/Conclusion: Hard and soft copy interpretation of knee pathologies examined with open magnet MRI equipment is effective and show similar diagnostic performances compareing to higher magnetic field power MRI devices.

41

Assessment of the Relationship Between Spinal Cord Abnormalities on MRI and Coronal Plane Imbalance in Idiopathic Scoliosis Patients

W A Bashir, P O'Donnell, S Butt, T Muthukumar, R Green, A Saifuddin; *United Kingdom* (wabashir@doctors.net.uk)

Purpose/Introduction: Scoliosis can be a presenting sign of an asymptomatic neural axis abnormality. There is a wide range of reported incidence of spinal cord or brainstem anomalies in the patient with "idiopathic" scoliosis. Coronal imbalance has potential to place sustained undue strain on the ligaments, muscles and joints as well as lead to sacroiliac dysfunction.

No one has looked at impaired truncal balance and its implicated relationship with spinal cord and brainstem abnormalities.
Materials and Methods: 359 patients with idiopathic scoliosis were investigated for the relationship of loss of coronal (frontal) plane balance and the presence of spinal cord abnormalities using MRI. Mean age 18 years. Initial balance analysis performed clinically and radiologically using plain radiography; coronal balance based on standard C7 plumb line intersection with centre of superior S1 endplate, with measurements more than 2 cm from this point in either direction representing radiographic coronal imbalance. Cobb angles of major and secondary curves and lateral shift were measured.
Results: 161 patients (44.8%) were found to be in coronal balance; 26.1% of these individuals had an abnormal MRI scan. 179 patients with coronal imbalance had a normal MRI scan. Only 19 patients with coronal imbalance (9%) showed an abnormal scan. Of the abnormalities detected, 46% were Chiari I malformations, 46% had a syrinx, and 2.5% had a primary cord tumour.
Discussion/Conclusion: In conclusion, and contrary to popular belief, we have shown for the first time with the use of modern imaging, that there is no significant association between a neural axis abnormality on MRI and coronal imbalance.

42

To define the optimal sitting posture whilst investigating variable seated positions of normal individuals using whole-body upright positional MRI

W A Bashir, T Torio, F W Smith, M H Pope; *United Kingdom* (wabashir@doctors.net.uk)

Purpose/Introduction: Normal morphology of the lumbar spine in a sitting posture is disputed. It has been more than 50 years since a single study of 4 individuals examined analysis of the optimal sitting posture for spinal and muscular relaxation. This study used plain radiography and a relationship between lordosis and thigh-trunk angulation was hypothesised. However, no one has proven or refuted this theory with modern imaging.
Materials and Methods: Lumbar lordosis angles, intervertebral disc (IVD) heights and nucleus pulposus translation were measured in 22 individuals who had no history of back pain or surgery. Mean age 32 years.

A 0.6 Tesla positional/upright MRI scanner was used to obtain T2-weighted images of the lumbar spine with subjects sitting in a 90 degree straight back, forward flexed and slightly reclined posture. It was subsequently determined which sitting posture showed least biomechanical 'stress' on the lumbar spine.

This study would not have been possible on a routine supine MRI scanner.
Results: IVD height tended to reduce as lumbar lordosis decreased in variable seated positions from reclining to forward flexion respectively. The nucleus pulposus showed movement within a limited range and showed no change in total area. An open "trunk-thigh" angle (slightly reclined posture) was shown to cause least 'strain' on the lumbar spine.
Discussion/Conclusion: Positional MRI can examine individuals in variable sitting positions in a natural weight-bearing manner.

This study allows for a better understanding of the incidence of chronic back problems from poor sitting postures.

43

Metal artifact reduction: A comparison of imaging at 3T and 1.5T MRI

C Farrelly, M Sampson, M Hayes, A White, S Eustace; *Ireland* (farrellycormac@gmail.com)

Purpose/Introduction: To compare metal artifact reduction techniques at 3 and 1.5 Tesla MRI.
Materials and Methods: Steel and then titanium plates were placed into the leg of a freshly harvested pig. Both types of plates were imaged at 1.5T and at 3T using a range of pulse sequences with varying voxel size, echo train lengths and readout bandwidths. The acquired images were then compared, using qualitative and quantitative parameters.
Results: At 1.5T and at 3T marked artifact reduction was obtained by using fast spin echo (FSE) with elongated echo train lengths and reduced echo spacing. The titanium plate produced less artifact than the steel plate with all imaging sequences and at both imaging strengths. Parallel imaging techniques and variation of voxel size yielded no artefact reduction. Using identical gradient echo pulse sequences at both magnetic field strengths resulted in increased blooming artifact at 3T compared to 1.5T. However higher signal to noise ratio (SNR) allowed imaging of diagnostic quality at 3T with a readout bandwidth of up to 125 kHz compared to 1.5T where this was obtainable at no higher than 32 kHz. The higher bandwidth possible at 3T resulted in superior artifact reduction than imaging at 1.5T.
Discussion/Conclusion: Successful artifact reduction can be achieved at both 1.5T and 3T using FSE with elongated echo train lengths. Despite potential increased blooming artifact at higher imaging field strengths, the ability to dramatically increase readout bandwidth at 3T leads to superior artifact reduction compared to 1.5T.

44

MRI Appearance of Native and Reconstructed Double Bundle and Selective Bundle Anterior Cruciate Ligament.

N J Maxwell, B Cassagranda, C G Borrero, E Kavanagh, J Towers, F Fu; *United States of America* (maxwellnj@upmc.edu)

Introduction: The goal of anterior cruciate ligament (ACL) reconstruction is the reestablishment of stability afforded by the native ACL, which anatomically consists of two separate bundles, the anteromedial (AM) and the posterolateral (PL). The bundles have some anatomic variability but distinct and complimentary roles in stabilization with the AM more responsible for prevention of anterior drawer and the PL stabilizing against rotational load. Double bundle and selective bundle ACL reconstructions have been recently developed in an attempt to better reproduce the specific bundle anatomy of the native ACL, thus restoring both rotational and anteroposterior knee stability. As the number of reconstructions using double bundle and selective bundle technique increases, it is important for radiologists to become familiar with the normal post operative appearance of these grafts to differentiate normal healing from common graft complications
Discussion: In this presentation we will show the normal MRI appearance of the native anteromedial (AM) and posterolateral (PL) bundles of the anterior cruciate ligament. We will discuss the optimum imaging planes to best evaluate the native and reconstructed double bundle anatomy. We will demonstrate the normal expected postoperative MRI appearance of double bundle and selective bundle ACL reconstructions. We will also show examples of abnormal MRI findings and postoperative complications in double bundle and selective bundle ACL reconstructions.

45

Ultrasound features of giant cell tumours of tendon sheath of the hand.

S Choudhary, K Jeyapalan; *United Kingdom* (surabhi_ravi@ yahoo.com)

Purpose/Introduction: Giant cell tumours of the tendon sheath (GCTTS) are the most common soft tissue tumours of the hand. The aim of this study is to elucidate the ultrasound features of these tumours.
Materials and Methods: From January 2005 to October 2007, 16 patients with histologically confirmed giant cell tumour of tendon sheath of the hand who underwent ultrasound were identified from the pathology and radiology database. The preoperative ultrasound findings were retrospectively analyzed. Each lump was assessed according to the following criteria: size (maximum diameter), site, number, relation to tendon and pulleys, echogenicity, compressibility, presence of calcification, through transmission, vascularity, neurovascular invasion and involvement of adjacent bone.
Results: Sixteen GCTTS in 10 females and 6 males with a mean age of 47.75 years (range: 28–73 years) were examined. Twelve patients presented clinically with a slowly growing lump in the finger, two were associated with pain. One patient presented with triggering in the carpal tunnel and two were thought to have osteoarthritis with a lump at the DIP joint. All patients had a single lump, with a mean largest diameter of 12.12 mm (range: 10–18 mm). The commonest site was at the level of middle phalanx of middle finger (50%). Fourteen (87.5%) lumps were closely related to the flexor tendon but not attached to it. Six involved the pulleys (A4, A5) and two involved the flexor tendon. None of the lumps extended into the adjacent joint. Majority (62.5%) were homogenous hypoechoic, with none showing through transmission or compressibility. A speck of calcification was seen in one lump. Minimal peripheral vascularity and bone involvement was demonstrated in 6 (37.5%) lumps.
Discussion/Conclusion: The diagnosis of GCTTS should be considered on ultrasound, in the presence of a homogenous hypoechoic lump located close to the flexor tendons of the fingers with lack of compressibility or through transmission.

46

Improving technique for fluoroscopically guided nerve root blocks

P G White; *United Kingdom* (philip.white3@nhs.net)

Purpose/Introduction: We perform fluoroscopically guided nerve root blocks for treatment of sciatica for about 150 patients per year. Most can be performed with fluoroscopic guidance without difficulty. In a small group of patients (about 3%) this may be unsuccessful, usually at the S1 level. When this happens the procedure is done under CT guidance. We have reviewed the CT findings to identify why fluoroscopic root block may have been unsuccessful.
Materials and Methods: retrospective review of patients having CT guided nerve root blocks for the above reason, over the last 18 months. Size and angulation of the posterior S1 neural foramen has been analysed and compared with a control group.
Results: Results and conclusions: in most cases difficulty was found to be due to lateral to medial angulation of the neural foramen. Hypoplasia of the posterior foramen can also occur. Illustrative cases are presented.
Discussion/Conclusion: When difficulty is encountered in obtaining an adequate needle position under fluoroscopy, lateral to medial angulation of the needle is likely to be successful. Our fluorscopic technique has been modified accordingly.

47

Guided Injection therapy in elite athletes: a winning combination

L E Gartner, M Loosemore, D Remedios; *United Kingdom* (louise gartner@hotmail.com)

Purpose/Introduction: Elite athletes seen in our institution are highly motivated individuals, with a limited time frame for training, competing and succeeding at international level. Pain thresholds are high but injuries may limit potential or prematurely end careers.

Dedicated sports medicine physicians accurately identify soft tissue and joint injuries in athletes enabling appropriate ultrasound-guided injections of corticosteroids, local anaesthetic, prolotherapeutic or sclerosing agents etc, at the advice of the sports physician.

This study assesses the success rate of appropriately selected ultrasound-guided injections in elite athletes.
Materials and Methods: 17 consecutive elite athletes, referred by the Olympic Medical Institute (OMI), who underwent ultrasound guided injection over a 1 year period, were followed up clinically. Outcome was graded:

> Complete Response: Good symptomatic improvement and no additional treatment required;
>
> Partial Response: Incomplete improvement. May require repeat injection but not surgery;
>
> No response: No improvement. May need escalation of treatment e.g. surgery.

Results: 17 injections in 14 athletes were assessed. Records for 3 athletes were unavailable. 11/17 (65%) had a complete response, 5/17 (29%) athletes had a partial response and 1/17 (6%) athletes had no response to treatment.
Overall 17/18 (94%) athletes had a complete or partial response.

Discussion/Conclusion: The 94% response rate from ultrasound guided injection of elite athletes may be attributed to the combination of precise identification of the symptomatic injury by experienced sports physicians and accurate injection of the appropriate agent by the radiologist. Three athletes have since won international medals.

48

Imaging of hypersensitivity reaction to metal on metal resurfacing arthroplasty

S Ostlere, C Fang, P Harvie, D Whitwell, M Gibbons, N Athanasou; *United Kingdom* (simon.ostlere@noc.anglox.nhs.uk)

Purpose/Introduction: To describe the radiological features of hypersensitivity reaction to metal-on-metal resurfacing arthroplasty of the hip.
Materials and Methods: The radiological features of 20 joints (17 cases) with mass-like lesions around metal-on-metal resurfacing arthroplasty were reviewed. The position and morphology of the lesions were documented. The patients had one or more of the following investigations: MRI, CT, ultrasound, arthrography. The histology was reviewed in 13 patients.
Results: All patients were female. 5 joints, in 4 patients, presented with an anterior, mainly solid mass, with one case being mainly cystic. 9 joints in 7 patients, presented with lesions in a posterior or lateral position, all but one being predominately cystic. Perilesional oedema was seen in two cases. All three cases with bilateral arthroplasties had bilateral abnormalities on imaging. The histology was compatible with a hypersensitivity reaction in all 13 cases with histology.
Discussion/Conclusion: Periarticular symptomatic masses may occur following metal-on-metal resurfacing arthroplasty. In the general population nickel allergy is known to be more prevalent in females. The female predominance, the bilateral abnormalities and histology would suggest that hypersensitivity to metal is the underlying cause of these masses.

49

Retrospective Review of Patient Experience with Cervical Nerve Root Injection in a Musculoskeletal Radiology Department

J A Soye, R McConville, M Crone, M Elliott; *United Kingdom* (jonathansoye@sky.com)

Purpose/Introduction: Cervical nerve root steroid injection can give symptomatic improvement to patients with cervical radiculopathy. However, a number of rare but potentially serious complications have been reported. To assess patients' experience with this procedure, a survey was conducted of those patients who had undergone cervical nerve root injection at the radiology department of Musgrave Park Hospital.
Materials and Methods: Thirty patients were identified as having had cervical nerve root injection. A questionnaire was distributed, allowing each to state their reasons for having the procedure, whether they obtained any benefit, and whether they experienced any complications following the procedure.
Results: Information was received from 27 of the 30 patients identified. Eighteen patients (60%) found the procedure beneficial. Four patients described complications. Of these, two had an increase in pain, one described a short-lived unilateral facial paralysis, and one described a reaction to a drug used during the procedure. More than half of patients (59.3%) said they would undergo the procedure again if offered.
Discussion/Conclusion: Cervical nerve root injection has a higher potential risk for severe complications than for lumbar nerve root injection. It is likely that the risk of complications is small, but under-reported. No cases of spinal cord infarction occurred in the patients surveyed. The majority of patients who responded found the procedure of some benefit. This procedure is therefore beneficial, in the authors' experience, in the majority of patients, in the appropriate clinical circumstances. However, the consent process should include discussion about any potentially serious side effects.

50

Small displaced meniscal fragments: common patterns on MRI

A McKnight, J Southgate, A Price, S Ostlere; *United Kingdom* (simon.ostlere@noc.anglox.nhs.uk)

Purpose/Introduction: To identify the pattern of non-bucket-handle displaced tears of the menisci of the knee on MRI.
Materials and Methods: This is a retrospective review of small displaced meniscal fragments reported on MRI over a sixteen month period. 73 meniscal fragments in 70 studies were analysed. Fragment position was recorded on a 'clock face' relative to the centre of the compartment. A reverse clock face was used for the left knee so that in all cases 12 o'clock represents an anterior position and 3 o'clock a medial position. The vertical direction of displacement in the recesses was also recorded.
Results: 82% of fragments originated from the medial meniscus. For the medial meniscus, 93% of fragments were positioned either medially at 2–4 o'clock (35%) or posterolaterally at 7–9 o'clock (58%). Of the medially positioned fragments 61% were located in the superior recess and 38% in the inferior recess. Lateral meniscal fragments were more evenly dispersed but 84% lay posteriorly.
Discussion/Conclusion: Small displaced meniscal fragments are often symptomatic and require excision. As they may be invisible or difficult to see at arthroscopy, diagnosing a displaced fragment on MRI is important. Awareness of the typical locations of these fragments will help the radiologists to identify these lesions.

51

High Resolution Ultrasound (HR-US) anatomy of the Hunter canal

F Paparo, L M Sconfienza, G Grillo, F Lacelli, G Garlaschi, E Silvestri; *Italy* (io@lucasconfienza.it)

Purpose/Introduction: Recent improvements in HR-US software and hardware have markedly increased the role of this imaging modality in the evaluation of musculoskeletal system. The aim of our paper is to assess with HR-US the anatomical structures contained in the Hunter canal, paying particular attention to peripheral nerves.
Materials and Methods: We assessed 20 canals (10 volunteers) with an ultrasound scanner equipped with a high resolution linear broadband array (5–12 Mhz), provided with compound and image optimization software. We performed axial, axial oblique and longitudinal scans, having the vessels as a reference. The assessment of the canal has be completed with color-Doppler and, then, dynamic evaluation.
Results: HR-US allowed to depict precisely the anatomy of Hunter canal, being able to differentiate all structures, in particular ligaments, vessels and peripheral nerves. The dynamic analysis increased the detection of cleavage plans among the muscles and allowed a perfect study of the course of the saphenous nerve. We have never been able to detect perforating vessels nor nervous branches through the vasto-adductor membrane.

Discussion/Conclusion: HR-US is the optimal technique for the assessment of the Hunter canal, being able to depict muscular, ligamentous and nervous structures with high anatomic detail.

52

High resolution Ultrasound (HR-US) dynamic evaluation of the coraco-humeral ligament (CHL) in young and elderly people

L M Sconfienza, F Lacelli, S Pucci, G Serafini, G Garlaschi, E Silvestri; *Italy* (io@lucasconfienza.it)

Purpose/Introduction: The aim of our paper is to describe the ultrasonographic appearance of such ligament along its whole course and not just at the reflection pulley.
Materials and Methods: We performed a HR-US scan of 45 shoulders in patients that reported no previous injuries. We divided the patients into group A (15 patients, 19 to 35 years), group B (15 patients, 36 to 55 years) and group C (15 patients, 56 to 81 years). We performed longitudinal scans to depict the short axis of the CHL, starting from its arising on the coracoid. We then performed axial scans to clearly depict the long axis of the CHL with intra-and extra-rotation dynamic manoeuvres of the arm.
Results: The CHL is depicted as a thin laminar structure in short-axis scans. It is characterized by a variable echotexture according to the angle of incidence of the ultrasound beam. In these scans, CHL was detected in all patients of group A, 15% of group B and no one of group C. In long-axis scans, the CHL appears as a thin band, highly echogenic if compared to surrounding tissues. The CHL can be detected in all patients of group A and B and in 53% of group C. The dynamic manoeuvres has allowed to depict the subscapularis region with high anatomic adherence.
Discussion/Conclusion: HR-US allows to detect the CHL till the free interval of rotator cuff just in group A and B. The optimal trophism of muscles and fat pads allows the CHL to be distinguished from the surrounding structures.

53

High-resolution Ultrasound (HR-US) evaluation of extrinsic carpal ligaments: comparison with Magnetic Resonance (MR) artrography

F Lacelli, L M Sconfienza, A Muda, F Paparo, G Garlaschi, E Silvestri; *Italy* (io@lucasconfienza.it)

Purpose/Introduction: Carpal ligaments can be divided into intrinsic and extrinsic ligaments. Extrinsic ligaments are often involved in carpal instability. The aim of this study is to describe the normal ultrasound appearance of extrinsic carpal ligaments with HR-US. We compared our results to MR arthrography.
Materials and Methods: We have studied both wrist in 21 patients (12 males, 9 females, range 18–62 years, mean age 34 years) with a ultrasound scanner equipped with a high resolution linear broadband array (5–17 Mhz). We have scanned along the major axis of extrinsic palmar, dorsal and collateral ligaments to assess the inner structure and to measure their normal thickness. In 11 cases, we have performed a MR arthrography of the wrist.
Results: In all patients we were able to appreciate the ligaments as fine fibrillar hyperechoic structures. We have been able to assess the course of 7/9 ligaments and the connections they take with the surrounding joint structures. Radioscapholunate and ulnar collateral ligament were not assessable at HR-US. MR arthrography demonstrated all ligaments except the ulnar collateral.
Discussion/Conclusion: The results obtained are coherent with literature. HR-US allows to assess the extrinsic carpal ligaments with a good anatomic detail but the role of ultrasound in the therapeutic path of carpal instability is yet to be demonstrated

54

Short-and long-time follow-up of calcific relapses and tendon tears in the ultrasound-guided percutaneous treatment of calcific tendinitis of the shoulder

F Lacelli, L M Sconfienza, N Perrone, G Garlaschi, E Silvestri, G Serafini; *Italy* (io@lucasconfienza.it)

Purpose/Introduction: In literature, there is no scientific studies that evaluate a long-term follow-up of any therapies for calcific tendinitis of the shoulder. The aim of our paper is to assess short-and long-time outcome of the ultrasound-guided percutaneous treatment of calcific tendinitis of the shoulder.
Materials and Methods: In 12 years, we treated 2812 shoulder with calcific tendinitis of rotator cuff. Patients presented with hyperalgic pain crisis or painful shoulder not responsive to medical therapy. They were treated with a double needle washing/aspiration technique. Among these, 724 patients were assessed after 5 years of more.
Results: The outcomes of the treatment were assessed according Visual Analog Scale (that gained 7.2 points) and Constant score (that gained 34.3 points). Pain relapse occurred in 24% of patients, typically 2 to 3 months after the treatment. We observed just one infective complication and 7 acute non-essudative bursitis. At 5 years follow-up, we observed no calcific relapse nor tendon tears in the site of previous treatment in all patients (100%).
Discussion/Conclusion: The ultrasound-guided percutaneous treatment of calcific tendinitis is an easy, quick, cheap and non-invasive procedure with a limited number of short-time complications and no long-time complications. This procedure is statistically effective in the treatment of such pathology

55

Ultrasonographic semeiotics of calcific tendonitis of the shoulder: where does the calcium go in the resorptive phase?

L M Sconfienza, F Lacelli, S Sarzi, G Garlaschi, E Silvestri, G Serafini; *Italy* (io@lucasconfienza.it)

Purpose/Introduction: The destination of calcium after the spontaneous rupture of tendon calcifications is not exactly understood. The purpose of our work is to describe the appearance of calcifications during the resorptive phase, depicting the most common sites of migration of calcium.
Materials and Methods: In a period of 36 months, we treated 722 patients, affected by calcific tendinitis of the shoulder, that were experiencing a hyperalgic pain crisis. Among these, 178 had a broken calcification. We considered as broken those calcifications whose walls were not continuous after the injection of a small amount of saline solution. Then, ultrasound-bursography was performed in all patients to assess the involvement of subacromial-subdeltoid (SASD) bursa.
Results: The ultrasound assessment showed a fuzziness of the contour of calcification in 15% of intact calcifications and in 95% of broken calcifications ($p<0{,}001$), SASD bursitis (74% versus 81%), diffusion of calcium in the SASD bursa and in the sub-bursal space (3% versus 100%, $p<0{,}001$), inhomogeneous ultrasound appearance of calcification (35% versus 43%) and disappearance of fibrillar echotexture of

the tendon involved caused by a diffusion of calcium (28% versus 87%, p<0,001).
Discussion/Conclusion: The fuzziness of the contour of calcification, diffusion of calcium in the SASD bursa and in the sub-bursal space and disappearance of fibrillar echotexture of the tendon involved caused by a diffusion of calcium are specific signs of a broken calcification. SASD bursitis and inhomogeneous ultrasound appearance of calcification are non-specific signs.

56
Sonoelastography in the evaluation of Achilles tendon damage
L M Sconfienza, M A Cimmino, M D'Auria, G Minetti, G Garlaschi, E Silvestri; *Italy* (io@lucasconfienza.it)

Purpose/Introduction: Sonoelastography is a recently developed ultrasound (US) technique that allows in vivo assessment of tissue mechanical properties. Up to now, this technique has been mainly used to investigate prostatic tumours and breast masses. The aim of our paper is to evaluate if damaged Achilles tendons show abnormal mechanical properties by sonoelastography.
Materials and Methods: Twelve patients referred for unilateral Achilles tendon pain due to overuse associated with amateur sporting activities and 18 healthy controls were studied. US and sonoelastography were performed on 12 symptomatic tendons and 36 control tendons with a system equipped with a 10–6 MHz electronic broadband linear array. The array was positioned at the calcaneal enthesis, retrocalcaneal bursa and in 3 different areas of the tendon body. The elastogram colour range was translated in a numeric score. Results were compared by the Kruskall Wallis test.
Results: At grey scale US, symptomatic tendons showed a variety of basic changes in fibrillar pattern (2): increased tendon thickness (12), interruption (5), fragmentation (5), and disappearance of fibrillar echotexture (5). In the control group, we observed 1 case of increased tendon thickness and 5 cases of disappearance of fibrillar echotexture. By sonoelastography, no difference was observed between symptomatic and control tendons at the enthesis and bursa. However, symptomatic tendons bodies were significantly harder than control ones, showing a prevalence of blue to green colour (p<0.0001).
Discussion/Conclusion: Sonoelastography shows increased stiffness in symptomatic enlarged Achilles tendons in comparison to normal ones. Long-term studies are needed to evaluate if these findings have a prognostic value.

57
Radiologically guided peripheral intraarticular joint injection-our experience to date
G M Murphy, P A Hodnett, M M Maher, L D Spence; *Ireland* (grainnemurphy@lycosmax.co.uk)

Purpose/Introduction: To determine the value of injections of local anaesthetic and steroid intraarticularly in peripheral joints. We assessed patient satisfaction for pain relief following radiologically guided peripheral intraarticular injections.
Materials and Methods: A retrospective analysis of 55 radiologically guided intraarticular injections was performed. The study population consisted of patients referred to our tertiary referral centre with localised pain of varying severity and duration. Patients were contacted by phone and the Brief Pain Inventory (Short Form) was used to assess pain relief post procedure. The Brief Pain Inventory is a well validated pain scoring system employing a verbal analogue rating scale applied to levels of pain and interference with activities of daily living.
Results: We present statistical analysis of our results documenting symptomatic relief of varying degrees. Fluoroscopy with injection of contrast material confirms the accurate position of needle tip prior to injection of intraarticular steroid and local anaesthetic. Ultrasound guidance in certain instances provides better needle localisation over fluoroscopy.
Discussion/Conclusion: We present our findings over a 1 year interval and compare our experience with previous studies documenting safety and efficacy for intraarticular joint injections of different peripheral joints. We perform an evidence based review of the literature around a focused clinical question and clinically appraise retrieved literature. We present the varying levels of evidence supporting the use of radiologically guided peripheral joint injections

58
Sonographically guided dry needling to treat chronic tendinosis of the Achilles tendon: a retrospective study
R Dionello, B Sharp, S Ostlere; *United Kingdom* (rdionello@gmail.com)

Purpose/Introduction: To ascertain whether dry needling is an efficacious method for treating Achilles tendinopathy.
Materials and Methods: Retrospective study of all patients who underwent ultrasound-guided dry needling as a treatment for long-standing Achilles tendinopathy as confirmed by ultrasound. Average time to follow up was 12 weeks.
Results: 23 tendons were dry needled in 19 patients in the period September 2006 to January 2008. 52.2% of patients (n=12) stated a good response to dry needling, with 3 patients reporting complete cure and 9 reporting some improvement. 39.1% of patients (n=9) reported that dry needling did not relieve their symptoms. 8.7% of patients (n=2) reported that their symptoms were made worse. There was one reported complication of plantaris rupture.
Discussion/Conclusion: Numerous non-operative techniques have been described to manage chronic tendinopathy of the Achilles tendon. However, no single technique has been shown to be consistently efficacious. Management of chronic tendinopathy of the Achilles tendon therefore still remains unsatisfactory. This study shows that dry needling is potentially a useful technique in the management of Achilles tendinopathy.

59
Focal Full-Thickness Tears of Supraspinatus Tendon Measured with Conventional MRI, MRI Arthrography and Arhtroscopy
F De Bei, M Gallizioli, E Muraro, M Patacchini, T Meloni; *Italy* (muraro.emanuele@uslaosta.com)

Purpose/Introduction: To assess the diagnostic accuracy of conventional MRI and MRI arthrography in the diagnosis and characterisation of supraspinatus tendon full-thickness focal tears.
Materials and Methods: 34 patients with supraspinatus tendon full thickness focal tears were included in the study. The examinations were performed at low-field dedicated system (EscanXQ; Esaote): 19 patients underwent conventional MRI, 15 patients underwent MRI arthrography, performed after intra-articular injection of 20 cc of contrast media (Dotarem 0.0025; Guerbet). Lesions were measured on sagittal and coronal plane and were subdivided in 4 groups according to their size:<5 mm (G1), 5–10 mm (G2), 10–30 mm (G3)

and>30 mm (G4). Arthroscopies were performed by the same operator 7–48 days after MRI.

Results: The diagnosis of a tendon tear was confirmed at arthroscopy in 14/19 patients studied with conventional MRI and in 14/15 patients studied with MR arthrography. The 5 false positive at standard MRI belonged to G1 (3) and to G2 (2); the only false positive at MRI arthrography belonged to G1.

In 4 patients the conventional MRI underestimated the lesions: arthroscopy re-evaluated 3 patient of G2 and 1 of G3, classifying them in G4. No re-evaluation has been necessary for patients studied with MRI arthrography.

Discussion/Conclusion: Our study demonstrate that, in case of clinical suspect of a supraspinatus tendon focal full-thickness tear, patients should underwent MRI arthrography to allow an optimal arthtroscopical surgical planning.

60

Diagnostic Pitfalls of Knee MRI after Partial Meniscectomies: Comparison with CT Arthrography

M Gallizioli, F De Bei, E Muraro, T Meloni; *Italy* (muraro.emanuele@uslaosta.com)

Purpose/Introduction: The aim of our study is to identify, with MRI, cartilaginous or meniscus lesions after selec tive meniscectomies. We compare MR images with CT arthrography.

Materials and Methods: Since October 2006, 28 patients, operated of selective meniscectomies, suffering for pain or limited articularity, without direct trauma or sprain occurred after surgery, underwent conventional MRI.

CT arthrography (64 slice MDTC after intra articular injection of 40 cc of 6 g iodine diluted at 25% with saline solution) were performed 1–7 days after MRI.

Results: We identified 25 pathological findings.

In 16/25 patients MRI showed a chondral lesion on the operated side, with areas of subchondral bone edema. Chondromalacia had always been confirmed by arthro-TC.

In 6/25 patients MRI showed a significant meniscal degeneration; CT arthrography also identified a meniscal tear in 3/6 cases.

In 2/25 patients CT arthrography had confirmed the MRI diagnosis of meniscal remnant tear.

In 1/25 patients MRI showed degeneration of meniscal remnant and a tear in the controlateral meniscus; CT-artrography subverted the diagnosis showing a completely charged tear of the meniscal remnant and a normal controlateral meniscus.

Discussion/Conclusion: Our results demonstrate that, after partial meniscectomy, MRI is valid to detect chondromalacia associated to bone edema; CT artrography is necessary to study the meniscal remnants.

61

Ablation of osteoid osteomas

J Veryser, L Defreyne; *Belgium* (jan.veryser@skynet.be)

Purpose/Introduction: We present a series of 24 patients treated for osteoid osteoma in our department of interventional radiology since 1996.

20 patients were treated with laser ablation, 3 with thermocoagulation and 1 with alcoholisation.

We present images from different osteoid osteomas in different locations and images from the procedures.

Materials and Methods: We reviewed the age of the patients, the used interventional procedures, the side effects of these procedures, the complications, the duration of the hospitalisation and the final outcome.

Results: Several side effects caused by the procedure were noted: local hematoma, local radiation induced bandlike erythema, temporary loss of force (limb) and temporary neurological symptoms (spine).

As long term complication secondary pain was noted.

In general the outcome of the treatment was good.

Some cases without pain relief were seen: after normal ablation, after early interruption of the procedure and due to a concurrent second pathology.

In some cases the diagnosis had to be revised.

Discussion/Conclusion: In general the results of the treatment of an osteoid osteoma with an interventional procedure are satisfying.

Hospitalisation was short in all cases.

Side effects of the procedure depend especially on the location of the lesion.

The outcome seems to be related to the location of the lesion, the completeness of the procedure and the age of the patient.

62

MR imaging in the differential diagnosis of Diabetic Neuroarthropathy and Pedal Osteomyelitis

A N Fotiadou, S Hondromatidou, P Papapostolou, M Michailidis, I Tsitouridis; *Greece* (natfot@yahoo.gr)

Purpose/Introduction: Infection-related signal changes in diabetic patients may overlap with acute Charcot's neuropathic arthropathy (NA). The aim of this study was to present the MRI findings of osteomyelitis and NA and to discuss the MR signal characteristics of NA with superimposed osteomyelitis.

Materials and Methods: We evaluated the MR scans of 85 diabetic patients with clinically suspected osteomyelitis of the foot. Intravenous contrast material was administered in all patients. The MRI findings analyzed included location and distribution of bone signal alterations, secondary signs and pattern of enhancement. Technetium 99 m bone scintigraphy in three phases and clinical follow-up were used as the gold standard.

Results: Bone marrow signal was high on T2-w and STIR and low on T1-w sequences in all cases of osteomyelitis (n=54), whereas it was low on both T1-w and T2-w sequences in all cases of NA (n=31). There was focal bone involvement in 52 out of 54 cases of osteomyelitis, whereas several bones were involved in all ÍÁ cases. In 20 cases osteomyelitis was located in the metatatrsal heads, in 23 in the toes and in 11 cases in the calacaneus-maleoli. The MR diagnosis of osteomyelitis was confirmed by bone scintigraphy in 52 out of 54 cases. In 2 cases there was a false negative diagnosis of osteomyelitis. In these cases there was multiple bone involvement noted.

Discussion/Conclusion: MRI is the primary imaging modality for the assessment of diabetic foot where infection might coexist with acute NA.

63

Evaluation of volume and solitary bone cyst remodeling using conventional radiological examination

A Ignys-O'Byrne, M Glowacki, I Ignys, P Mankowski; *Poland* (aignys@eircom.net)

Purpose/Introduction: The aim of this paper is to evaluate cyst remodeling, including total healing or cyst recurrence, and the relationship to cyst volume.

Materials and Methods: 132 patients with solitary bone cyst were analyzed. 79 patients underwent curettage and bone grafting. 53

patients were administered methylprednisolone injection. Mean time to follow up after the procedure was 12 years. In 91 patients (69%) the solitary bone cyst was at the proximal end of either the humerus or femur. 50 cases (37.9%) constituted an active form of solitary bone cyst. In all cases the volume of the solitary bone cyst was evaluated using conventional radiological examination and the method originally reported by Gobel et al. (1987) to evaluate the volume of Ewing's sarcoma.The results of curettage with bone grafting were analyzed using Neer's criteria while the results of treatment with methylprednisolone injections were analysed using Cappane's criteria.

Results: The mean cyst volume was 36.8 cc (SD 35.3). Solitary bone cyst recurrence was noted in 20% of patients treated with curettage. In 17% of patients treated with methylprednisolone injections solitary bone cyst recurrence was reported. Total healing or recurrence of the solitary bone cyst in the latter group was neither age nor cyst activity or volume dependent.

Discussion/Conclusion: Based on the above evaluations the following conclusions were made:

1. The volume of the solitary bone cyst does not appear to affect solitary cyst remodeling in patients treated with methylprednisolone injection.
2. In patients treated with curettage and bone grafting, smaller volume of the cyst provided better results of total healing.

64

Imaging findings after meniscal repair with degradable polyurethane scaffold: preliminary results

W C J Huysse, R Verdonk, P Verdonk, K L Verstraete; *Belgium* (wouter.huysse@ugent.be)

Purpose/Introduction: To date, there are no satisfactory solutions to the meniscal originated knee pain post meniscal tear repair. In this study a newly developed polyurethane material that has the intended properties of reducing pain and inducing tissue growth in a damaged meniscus is tested.

Materials and Methods: All patients will be imaged using conventional and dynamic MR imaging techniques at 1 week and 3, 12 and 24 months after surgery.

The influx of gadolinium contrast in a tissue during the first three minutes after injection gives a measure of the vascularisation, capillary permeability, perfusion and composition of the interstitial fluid. It can be measured using dynamic MRI and is represented as a Time Intensity Curve (TIC). This curve permits an evaluation of the healing process after surgery.

Discussion/Conclusion: Thus far 11 patients have received meniscal implants. Eight medial and three lateral menisci were operated. All implants covered the posterior horn with 3 reaching halfway into the meniscal body and one extending into the anterior horn. The average length of the scaffold meniscus measured on MR imaging was 45 mm.

In the first week after surgery, the capsule and suture area display fast and intense enhancement typical for post-operative inflammation and the formation of early scar-tissue. There is no enhancement in the base or the tip of the scaffold meniscus. After three months the speed and intensity of enhancement in the capsule and suture area between the remnants of the native meniscus and the scaffold have decreased indicating maturation of scar-tissue. However, the base of the scaffold meniscus now shows enhancement. This can only be explained by proliferation of blood vessels from the capsule and the residual meniscus wall into the scaffold meniscus. The tip of the matrix shows limited enhancement in some patients after three months.

On anatomical MR images, the signal intensity (SI) of the implanted scaffold is close to that of water on both T1-and T2-weighted spin echo and turbo spin echo sequences in the first week. After three months the SI decreases but is still clearly higher than that of the native meniscus. The implants in the posterior horn all had a normal position and no loosening of the sutures or tears of the scaffold were found. After three months, one of the patients had slight expulsion of body of the scaffold meniscus but this is a common finding in transplanted menisci.

65

Desmoid Tumors – Can MR Imaging achieve a confident diagnosis?

B J Gonçalves, M Armas, C Marinho, A Canelas, C B Marques, F Caseiro-Alves; *Portugal* (belarmino.goncalves@gmail.com)

Purpose/Introduction: This is a retrospective study to outcome MRI findings in patients with desmoid tumors and to determine some imaging features in order to make a differential diagnosis from other soft-tissue masses. Radiologic-pathologic correlation is also illustrated.

Materials and Methods: Desmoid tumors were found in 24 patients, 6 male and 18 female patients (age range, 15–71 years; mean age, 40 years), after a retrospective analysis carried at our institution. Examinations took place between 1998 and 2007. All images were reviewed by 2 musculoskeletal radiologists, considering tumor location, margins, involvement of adjacent organs, T1-weighted and T2-weighted signal intensity and enhancement pattern. Pathologic findings were also recorded.

Results: Desmoid tumors were found in the abdominal wall in 10 patients (42%), in the abdominal cavity in 8 patients and in soft-tissues (including muscles and subcutaneous fat) in 6 patients. 62% (n=15) showed irregular borders and 20% (n=5) invasion of adjacent muscle, bone or bowel. 62% (n=15) showed low signal intensity and 38% (n=9) moderate signal intensity relative to muscle tissue in T1-w SE images. In T2-w TurboSE images signal intensity was variable and heterogeneous. The majority also showed mild enhancement after contrast administration (75%, n=18). Recurrence rate was 10% (n=3) during the considered years.

Discussion/Conclusion: MRI of desmoids tumors showed no specific features to achieve a confident diagnosis with statistical significance. But some characteristics may resemble them. Desmoids should always be considered in patients with an abdominal mass, a history of abdominal surgery and in patients with a fibromatosis. MRI is useful to detect recurrence.

66

US-guided interventional joint procedures in patients with rheumatic diseases- When and how we do it?

B J Gonçalves, M J Saavedra, C Ambrosio, A Gil-Agostinho, F Alves, P Almeida, F Caseiro-Alves; *Portugal* (belarmino.goncalves@gmail.com)

Purpose/Introduction: To describe the main indications and the technical steps to perform ultrasound guided procedures in patients with rheumatic diseases. To access procedures accuracy, safety and effectiveness.

Materials and Methods: 27 patients with pain related to articular complications of rheumatic diseases and according to previous radiographic or US exam were submitted to several US-guided procedures. 42% of patients (n=11) had rheumatoid arthritis, 11% (n=3) spondyloarthropathies, 18% (n=5) psoriatic arthritis, 15% (n=4)

undifferentiated arthritis, 3% (n=1) Sjögren syndrome and 11% (n=3) had gout.

Described procedures are synovial biopsies, intra-articular injections of corticosteroids, radiation synovectomy and synovial cysts drainage procedures. When a therapeutical procedure was made patients were evaluated by 2 rheumatologists.

Corticosteroids used were Prednisolone and Triamcinolone. Yttrium-90 was used for synovectomy.

Results: In all cases success was achieved with correct needle placement inside the joint. After injection/aspiration symptoms successfully solved with all patients improving their health status. No complications were recorded during follow-up period.

Discussion/Conclusion: US-guidance is very reliable to afford a safety procedure always checking the injection, biopsy or aspiration. Guided-biopsy has high success rates obtaining several samples. Thus is also possible to use more powerful/long acting therapeutic drugs aggressive to extra-articular structures avoiding complications.

67

Collagenous fibre architecture of articular cartilage: comparison between high field DTI and scanning electron microscopy

C Glaser, L Filidoro, J Raya, O Dietrich, E Mützel, D Weber, R Putz, P Jakob, M Reiser; *Germany* (christian.glaser@med.uni-muenchen.de)

Purpose/Introduction: Disruption of the collagenous fibre architecture (CFA) is considered the hallmark of irreversible damage to cartilage with consecutive progression to open osteoarthritis (OA). Our purpose was to evaluate whether DTI is able to depict the CFA of cartilage and whether DTI-based zonal heights correlate to those measured by scanning electron microscopy (SEM).

Materials and Methods: DTI data (6 directions) were acquired from 20 human patellar cartilage on bone samples at 750 MHz (1500×62.5×250 μm^3, b: 0, 500 s/mm^2). ADC, fractional anisotropy (FA) and 1st eigenvector (EV) were plotted against cartilage depth from surface. SEM was performed on a Jeol35CF (critical point drying (CO2), freeze fracturing (N2), 400A gold sputtering). Heights of tangential (TGZ), transitional (TRZ) and radial (RZ) zones were compared between SEM and EV.

Results: All DTI parameters varied with increasing depth from surface consistent with different cartilage zones. FA was 0.1 for TGZ, 0.09 for TRZ and 0.18 for RZ. Heights of TGZ, TRZ and RZ measured with DTI and SEM showed a Pearson correlation coefficient of 0.11, 0.89 and 0.87 respectively. TRZ(in SEM) exceeded TRZ(in DTI) by 20% whereas the opposite was found for RZ.

Discussion/Conclusion: Zonal variation and zonal height of EV correlated well with SEM of the CFA. Shrinkage due to preparation for SEM and partial volume effects in DTI may explain the observed differences in zonal height. DTI parameters such as ADC, FA and EV are able to reflect the zonal CFA of cartilage suggesting high potential of DTI for the workup of cartilage in OA.

68

Review of GP-requested pelvic films in patients with hip pain, under 55 years of age

R Seymour, C Phillips, P P G White; *United Kingdom* (c.phillips4@nhs.net)

Purpose/Introduction: The aim of the study was to review pelvic films requested by GPs, specifically looking for 'cam' and 'pincer' deformity, both of which are recognised aetiologies in femoro-acetabular impingement (FAI) and early development of osteoarthritis.

Materials and Methods: Retrospective review of plain pelvic films requested over a 6 month period was performed. Six previously described radiographic parameters were measured on digital images for each patient: Acetabular Index, Lateral Centre Edge Angle, Femoral Head Extrusion Index, Profunda deformity, Sphericity and Neck-Shaft Angle. The results were divided into patients with</= 1 abnormal parameter and>/= 2 abnormal parameters. Comparison was made with the original report outcome in each case.

Results: Of the 27 patients (6 male; 21 female. Age range: 24–54 years; Mean 44 years), only one had completely normal parameters. Twenty patients had>/= 2 abnormal parameters (74%) including 13 of the 16 films reported as 'normal' (81%). Twelve patients had bilateral and 8 had unilateral abnormalities. Eleven patients had abnormal parameters corresponding to the side of pain (41%).

Discussion/Conclusion: Radiographic evidence of FAI is under-reported but should be interpreted with caution; the recognition of technical pitfalls, such as patient positioning and repeatability of measurements is essential. The radiographic abnormalities should be put into context with clinical signs and symptoms, therefore review of such patients should be considered. Those with both abnormal parameters and persisting hip pain may benefit from referral to a 'young adult' hip clinic. This suggestion has been supported by orthopaedic consultants, with a specialisation in hip surgery, in our centre.

69

Dynamic contrast-enhanced MRI in Paget's disease of bone: correlation of regional microcirculation and bone turnover

M Libicher, C Kasperk, W Hosch, H Kauczor, S Delorme; *Germany* (martin.libicher@uk-koeln.de)

Purpose/Introduction: The purpose of this study was to evaluate regional microcirculation in Paget's disease of bone (PD) with dynamic contrast-enhanced MR imaging (DCE-MRI). Additionally, we correlated regional bone perfusion with alkaline phosphatase as serum marker of bone turnover.

Materials and Methods: We examined 71 patients with PD (27 men, 44 women, 67±10 years) localized at the axial and appendicular skeleton. Contrast uptake was analyzed using a two-compartment model with the output variables amplitude A and exchange rate constant k. Color-coded parametric images were generated to visualize microcirculation. Serum levels of alkaline phosphatase (AP) were compared with DCE-MRI parameters.

Results: Amplitude A and exchange rate constant k were significantly increased in PD compared to unaffected bone (A-PD 0.81±0.24 vs A-control 0.34±0.1 and k-PD 4.0±2.86 vs k-control 1.73±0.88, $p< 0.001$). There was a significant correlation (r=0.5–0.7) of DCE-MRI parameters and AP at the axial (pelvis, spine) and appendicular skeleton (femur, tibia). The long bones showed increased circulation of the advancing peripheral zones and no vascularization of the central part, which had been replaced by fatty tissue.

Discussion/Conclusion: Regional microcirculation in PD is inhomogeneous with focal areas of excessive hypervascularity, especially in the advancing peripheral zone. There is a significant correlation of bone circulation and bone turnover in PD. DCE-MRI might therefore be a diagnostic tool for monitoring therapeutic effects of bisphoshonates in Paget's disease of bone.

70

Dynamic contrast-enhanced MRI for monitoring bone perfusion in Paget's disease during bisphosphonate therapy

M Libicher, S Delorme, W Hosch, H Kauczor, C Kasperk; *Germany* (martin.libicher@uk-koeln.de)

Purpose/Introduction: The purpose of this study was to evaluate changes of regional bone perfusion in Paget's disease (PD) during bisphosphonate therapy. We used dynamic contrast-enhanced MRI (DCE-MRI) for assessment of bone perfusion and correlated MRI findings with alkaline phosphatase (AP) as serum marker of bone turnover.
Materials and Methods: We examined 20 patients (8 women, 12 men, 66±11 years) who were selected for infusion therapy with bisphosphonates. The most affected bone was examined by DCE-MRI prior to therapy and on 6-month follow-up. The contrast uptake was semi-quantitatively evaluated by using a two-compartment model with the output variables amplitude A and exchange rate constant k. Color-coded parametric images were generated to visualize bone perfusion. Serum levels of alkaline phosphatase (AP) were compared with DCE-MRI parameters.
Results: After 6 months there was a significant decrease of alkaline phosphatase ($p<0.03$, matched pair analysis). There was also a significant decrease of bone perfusion parameters Amplitude A and exchange rate constant k ($p<0.0001$, matched pair analysis). Parametric MRI images showed initially a marked vascularization in Paget's disease that was significantly reduced after 6 months of bisphosphonate treatment.
Discussion/Conclusion: DCE-MRI shows a significant reduction of vascularization in PD after 6-month treatment with bisphosphonates. This offers the opportunity to investigate possible antiangiogenetic effects of bisphosphonates in PD.

71

Innovative assessment of the lesser metatarsophalangeal joints with ultrasound arthrography

J K Bell, S H Khan, J L Barrie, N Dodds, D S Enion; *United Kingdom* (jkbell@doctors.net.uk)

Purpose/Introduction: Plantar plate instability of the lesser metatarsophalangeal (MTP) joints is a common cause of forefoot symptoms. Historically, diagnosis has relied on fluroscopic and MR imaging with their inherent limitations. The aim of this study was to establish the reliability of ultrasound arthrography in the examination of the plantar plate by comparison with non-contrast ultrasound and MR.
Materials and Methods: A prospective study of patients with lesser MTP joint instability that had not responded to conservative treatment. Pre-contrast ultrasound was performed by a single radiologist to assess the MTP joints before ultrasound arthrography with dilute gadolinium. The patients then had an MR of their affected foot, which was reported by a second radiologist who was blinded to the ultrasound findings. Identification of pathology and, in particular, the presence of plantar plate tears was recorded. Tears were defined by thickness, appearance, location and size.
Results: Fifteen patients were included in the study and they were all found to have plantar plate tears. Three were defined as full thickness tears and 12 as partial thickness tears on both ultrasound arthrography and MR. Three tears were incorrectly reported as full thickness tears on pre-contrast ultrasound.
Discussion/Conclusion: Ultrasound arthrography has equal efficacy with MR and enables the accurate differentiation between full and partial thickness tears without radiation risk. Non-contrast ultrasound alone is associated with an increased number of false positive diagnoses of full thickness tears. Ultrasound arthrography is useful in ensuring appropriate patient selection for surgery, which is indicated in full thickness plantar plate tears only.

72

Efficacy of image-guided needle biopsy of pathological fractures. A study of 130 patients

P H M Péchon, T W R Briggs, S R Cannon, J A S Skinner, R Pollock, A Saifuddin; *United Kingdom* (pierrepechon@doctors.org.uk)

Purpose/Introduction: Pathological fractures are commonly biopsied prior to planning surgical management. This study examines the efficacy of image-guided needle biopsy in providing a tissue diagnosis.
Materials and Methods: Methods: 130 patients undergoing image-guided biopsy of pathological fractures between 1998 and 2007 were identified. Biopsy was by CT, ultrasound or fluoroscopy using a Jamshedi, Temno or Trucut needle. The outcome measure was the ability to make a tissue diagnosis by this method.
Results: The median age at diagnosis was 45 years, 59% male, 41% female. The commonest sites of fracture were the femur (34%), humerus (29%), tibia (12%) and pelvis (10%). Seventy-eight percent of biopsies yielded a tissue diagnosis. The remaining 22% underwent open biopsy, repeat image-guided needle biopsy or were not further investigated. Of those undergoing repeat image-guided biopsy the two most common subsequent diagnoses were: regenerative bone (42%) and fibrous dysplasia (15%) The commonest reason for uncertain diagnosis was an inadequate size of biopsy, usually of blood from the fracture haematoma and insufficient cells. Reasons for not investigating further were poor prognosis or radiological features strongly suggesting a benign condition. The commonest histopathological diagnoses were: metastatic carcinoma (15%), chondrosarcoma (9%), osteosarcoma (9%), soft-tissue sarcoma (6%), giant-cell tumour (5%), lymphoma (5%) Of the 20 cases of metastatic carcinoma, nine were renal carcinoma.
Discussion/Conclusion: Tissue diagnosis of pathological fractures can be obtained by primary image-guided needle biopsy in 78% of cases referred to a specialist bone tumour service. Of those undergoing repeat image-guided biopsy, over half proved to be regenerative bone or fibrous dysplasia, both benign conditions.

73

Accuracy of pre-operative tumour diagnosis by multidisciplinary team at a specialist musculoskeletal tumour service

P H M Péchon, T W R Briggs, S R Cannon, J A S Skinner, R Pollock, A Saifuddin; *United Kingdom* (pierrepechon@doctors.org.uk)

Purpose/Introduction: To assess the ability of an orthopaedic oncology service to diagnose soft-tissue and bone tumours based on clinical history and imaging alone.
Materials and Methods: All referrals made to the bone tumour unit at the Royal National Orthopaedic Hospital, London are presented to a multi-disciplinary team (MDT) consisting of an orthopaedic surgeon, radiologist and histopathologist who all specialise in musculoskeletal tumours. 220 patients underwent excision biopsy of lesions between January 2005 and September 2007, based on pre-operative assessment

of history and imaging at MDT meeting. The diagnosis recorded at MDT was compared with the histopathological diagnosis following analysis of the resection specimen.

Results: 54% were male and 46% female. 37% were fatty tumours, 37% were of bone or cartilage, 7% were neural, 5.5% were vascular, 1.4% were infective or inflammatory, 0.5% were metastases. These 220 cases, the diagnosis at MDT correlated with histopathological diagnosis in 98.6% (n=217) of cases. 1.4% (n=3) were incorrectly diagnosed at MDT; two were malignant tumours diagnosed as benign at MDT, but subsequent management was deemed to be correct i.e. complete excision of the lesion. The third was a benign lesion. All three cases were small superficial lesions for which needle biopsy carried the risk of spreading tissue beyond the original tumour margins and wide complete excision was easily possible.

Discussion/Conclusion: For a specific subset of musculoskeletal tumours accurate diagnosis can be made by an experienced MDT based on imaging and history alone. This practice did not lead to any inappropriate procedure being carried out.