

Clinical: Musculoskeletal**P-001 A pictorial review of spinal infection**

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Purpose: We will describe the anatomical and aetiological classification of spinal infections and review a number of cases presenting to our departments. Our aim is to illustrate the importance of MR imaging in the diagnosis of spinal infection and to depict the typical radiological features that may be seen.

Content:

Classifications

Anatomical:

Vertebral column - with or without intervertebral disc involvement

Facet joint

Spinal canal

Adjacent soft tissue

Causation:

Haematogenous spread

Post surgery

Direct spinal trauma

Invasion from a surrounding infection

Review of cases and images, including a review of MR features

Vertebral osteomyelitis

Discitis

Tuberculous disease of the spine

Facet joint septic arthritis

Cervical epidural abscess

Lumbar paravertebral abscess

Multilevel discitis, intradural abscess, paravertebral abscesses in an immunosuppressed patient

Conclusion:

Certain patterns of clinical features may lead to a suspicion of spinal infection, but MR has a crucial role in confirming the precise diagnosis. An understanding of MR appearances and review of interesting cases is of great importance in determining appropriate clinical management.

P-002 Identifying cervical spine fractures in trauma patients

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Cervical spine injury often has major implications for patients and has been reported in 2.4% of blunt trauma victims. Quickly and accurately assessing radiographs to identify any fractures or pathologies is vitally important in the acute trauma setting.

Cervical spine x-ray interpretation can seem a daunting task and key points may easily be forgotten. The poster aims to guide viewers through a step-by-step approach, covering the standard views performed and aiming to prevent missed fractures or pathologies.

This poster aims to act as concise visual resource on the interpretation of cervical spine pathology in trauma patients, utilising a relevant case report and current literature on the topic.

P-003 Neoplastic spinal lesions

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The general radiologist will frequently encounter vertebral lesions and must be able to identify aggressive lesions that require urgent biopsy and surgical management, while not over-investigating incidental and inconsequential benign lesions. Aggressive lesions are largely infective or malignant, and malignant lesions may be primary or secondary. The appearance of the lesion and its cortex and its evolution or progression is used to differentiate benign from aggressive.

Lesions are categorised according to their imaging characteristics on multiple modalities, and location within the spine.

Lesions can also be categorised according to cell of origin:

- osseous: osteoma, osteoid osteoma, osteoblastoma, osteosarcoma
- cartilaginous: osteochondroma, chondroblastoma, chondrosarcoma
- haematopoietic: plasmacytoma, multiple myeloma, lymphoma
- round cell: Ewing sarcoma
- vascular: haemangioma, Gorham's disease
- notochord: giant vertebral notochordal rest, vertebral chordoma
- miscellaneous: simple bone cyst, aneurysmal bone cyst, giant cell tumour, fibrous dysplasia, metastases

The diagnosis of vertebral lesions is dependent on both clinical and radiological findings. MRI is widely used to identify and diagnose vertebral lesions, and examples of MRI findings of common vertebral lesions are shown. Understanding the radiological findings will assist diagnosis of vertebral lesions and aid further management, including the need for biopsy.

P-004 Accuracy of shoulder ultrasound versus shoulder arthroscopy in the detection of rotator cuff tears

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Background - Shoulder ultrasound is a cost-effective and non-invasive tool for the investigation of rotator cuff pathologies. Shoulder arthroscopy enables direct visualisation of the cuff and is regarded as the gold standard. A pilot study conducted by the senior authors showed a 69% correlation between ultrasound findings and those found on shoulder arthroscopy in 42 cases. Reporting practices were changed as a result of the initial audit in an attempt to prevent overcalling of cuff tears and reduce false positive results.

Aims - To close the audit cycle and reexamine the accuracy of shoulder ultrasound against shoulder arthroscopy in the detection of rotator cuff tears.

Methods - Patients whom had a shoulder ultrasound confirming a tear in the rotator cuff and followed by arthroscopic repair between November 2010 and October 2012 were identified from a database. Patients with rotator cuff tears were only included. A single surgeon performed all operations. The findings on the ultrasound scan were compared to those as found on arthroscopy. Patient demographics, side of injury, mechanism of injury and ultrasound operator were recorded. The following data points were noted for every ultrasound and shoulder arthroscopy: position (mid-substance, free edge or foot print) and location of cuff tear (supraspinatus / infraspinatus or subscapularis), whether the transverse humeral ligament was intact, presence of long head of biceps tendonosis and whether the ACJ was degenerative. The results were statistically analysed and reviews against the literature.

Results - 34 patients (35 shoulders) were identified. The results are currently being analysed.

P-005 Improving the lateral elbow technique

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Mid Yorkshire Trust

Purpose: To review the techniques for positioning lateral elbows in a single NHS trust

Method: An audit was carried out to compare the repetition rate of lateral elbow projections to other lateral projections in order to assess if it was one of the more commonly repeated projections in the Emergency Department. The current practices and problems with diagnostic quality were explored by interviewing

radiographers and reporting radiographers. The PA projection was analysed to evaluate its usefulness when imaging the elbow.

Results: The findings suggest that radiographers sometimes struggle to encourage patients to adopt the correct position and that the true centring point for a lateral elbow is not always used. It was found that the PA lateral elbow is believed easier to obtain for radiographers however reporting radiographers expressed that suboptimal PA projections can obscure the visualisation of fat pads, a reliable indicator of an occult fracture. The poster will present some case study examples of the effect of positioning on anatomy.

Conclusion: The lateral elbow projection has a high repetition rate and the alternative PA projection has the potential to obscure pathology if not positioned correctly. Visualisation of anatomy can be improved with the use of the correct centring point.

Discussion: Radiography is an integral aspect in the trauma setting and due to the elbow anatomy, fat pad visualisation is essential to ensuring correct diagnosis and patient management. Consequently high standards of image quality in the lateral elbow projection must be maintained.

P-006 An anatomical illustration of chronic wrist pain using magnetic resonance (MR) images

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Aims/objective: Chronic wrist pain is a complex subject. A pictorial review of the complex ligamentous anatomy of the wrist and its interdependent relationship with the carpal bones, distal radius and ulnar would aid understanding.

Content: We aim to demonstrate the MR appearances of pathologies such as scapholunate ligament tears, lunotriquetral ligament and early avascular necrosis with normal corresponding plain films. These subtle pathologies may be missed if MR is not utilised. A further discussion would be held regarding how MR images can be used as a tool for pre-operative planning.

Relevance/Impact: Chronic wrist pain reduces productivity in the Western societies, especially when it occurs in the dominant hand or when it occurs bilaterally. Plain radiographs are traditionally used to assess the presence of positive ulnar variance and irregularity in the proximal lunate surface whereas fluoroscopy may be utilised to assess the dynamic wrist function. Exquisite bony and soft tissue images obtained via MR images and MR arthrography are increasingly advocated as the second-line investigation.

Discussion: A comprehensive knowledge of ligamentous wrist anatomy and its correlated pathologies would allow readers to appreciate the different causes of chronic wrist pain such as occult bony injury, triangular fibrocartilage tear, ligamentous injury, tendon pathologies, ganglion cysts and nerve entrapments.

P-007 A magnetic resonance (MR) pictorial review of meniscal tears: Thirteen common pitfalls

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Aims/Objective: Specific magnetic resonance (MR) signs alert radiologists to the possibility of a meniscal tear. Misinterpretation of anatomical structures or artefacts can lead to an unreliable diagnosis of meniscal injury. We aim to highlight the awareness of common mimics and pitfalls in MR knee images.

Content: A comprehensive review of MR imaging of the meniscus provides the basis. A focused selection of cases and relevant MR slices would illustrate the easily avoidable errors during meniscal tear evaluation.

Relevance/Impact: Recognising the mimics and pitfalls related to meniscal tear diagnosis will improve the accuracy of MR image interpretation. This reduction in false positive diagnoses can reduce the number of patients undergoing avoidable diagnostic/therapeutic arthroscopic procedures.

Discussion: MR imaging is now an indispensable tool to guide orthopaedic surgeons in the treatment of meniscal injuries because it characterises both menisci and neighbouring structures and alerts the surgeons to areas of

abnormality not easily seen at arthroscopy. Some mimics can be easily differentiated from tears, including the meniscomfemoral ligament, the popliteus tendon sheath, the lax meniscal sign (buckled meniscus), diffuse meniscal oedema, Pseudo bucket-handle tear and magic angle effect. A thorough understanding of the relevant MR anatomy would improve the diagnostic accuracy of meniscal tears.

P-008 A pictorial review of SLAP tears using MRI with surgical correlation

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Aims/Objectives: We aim to illustrate the relevant imaging findings that contribute towards a radiological diagnosis of a superior labral anterior to posterior (SLAP) tear. The gold standard for diagnosis remains surgical; we aim to illustrate the correlation between intra-operative and radiological findings.

Contents: This poster will review the common mechanisms of injury that lead to SLAP tears, the presenting features and the relevant radiological findings of a SLAP tear. Normal variants and other conditions that may mimic or need to be considered will also be reviewed.

Relevance/Impact: Superior labral anterior to posterior tears affects the superior glenoid labrum and is associated with non-specific shoulder pain. SLAP tears are not routinely detected by ultrasound or standard MR and can therefore lead to a delay in diagnosis.

Discussion: The role of the radiologist is to provide the referring clinician with an appropriate investigation pathway to both arrive at the diagnosis as well as to provide pre-operative planning. A detailed understanding of SLAP tears and their mimics would reduce diagnostic delay thereby streamlining the patient's clinical pathway to definitive treatment and recovery.

P-009 Femoro-acetabular Impingement: Radiological and arthroscopic correlation

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Background: Femoro-acetabular impingement (FAI) is a recognised cause of hip pain, particularly in the young athletic population. Arthroscopic intervention aims to restore normal anatomy and facilitates labral and chondral assessment and repair.

Objectives: To correlate the MRI and intraoperative arthroscopic findings.

Methods: A single surgeon series of 100 consecutive hip arthroscopies: 52 male and 48 female patients (mean 36 years) performed for symptomatic FAI were studied. All cases had undergone radiological investigations including Plain film and non-arthrographic MRI, the majority in the same hospital with identical scan protocols and single reporting Radiologist.

Results: Macroscopic findings from surgical records were correlated with reported radiological findings. All arthroscopies were abnormal, showing findings consistent with FAI, including chondrolabral separation, carpet delamination, synovitis, ligamentum teres tears and both pincer and cam type osseous anatomy. Radiological findings on MRI correlated well with arthroscopic findings in cases of large chondral defects and labral tears and the presence of joint fluid helped delineation of key structures.

Conclusions: MRI findings in patients with positive clinical signs of FAI correlated well with intraoperative findings. We demonstrate common radiological findings and correlate these with intra operative images and discuss the role of non-arthrographic MRI in this rapidly developing field in orthopaedics sports medicine practice.

P-010 Understanding the plain film in femoroacetabular impingement and a review of the current literature and practices

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Aims/Objectives: To increase the awareness and confidence of Radiologists and Radiology trainees in the interpretation of the plain film when considering a diagnosis of femoroacetabular impingement (FAI).

Content: The poster will illustrate different types of FAI and the key findings seen on plain films. It will cover acetabular and femoral head morphology, associated FAI signs and relevant measurements such as alpha angle and femoral head neck offset. A further discussion on the relevance of diagnosing FAI and current practices will be held.

Relevance: The diagnosis of FAI is often first suggested by plain films performed for either non-specific hip pain or suspected FAI. Confidence in the interpretation of these plain films can be improved by increasing awareness of the relevant diagnostic signs and measurements available from the humble plain film without necessitating a second opinion from a musculoskeletal Radiologist.

Discussion: FAI is a comparatively new entity particularly with regards to the evolving surgical techniques in its management and is a major cause of early osteoarthritis in young people. Limitations in awareness and confidence in diagnosing FAI can easily be rectified by understanding the relevant criteria on plain pelvic radiographs. This bares significant importance in the young patient with hip pain and/or reduced hip motion and provides the possibility of early surgical intervention prior to the development of degenerative change.

P-011 Law of the Rings -The invisible pelvic fractures revealed

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Aims/Objectives: We aim to highlight the importance and the known diagnostic difficulties synonymous with the diagnosis of subtle ligamentous pelvic injuries.

Content: Cases from a major trauma centre illustrating key findings in unstable pelvic fractures and common diagnostic pitfalls. Complications secondary to unstable pelvic fractures are addressed.

Relevance/Impact: Unstable pelvic fractures are frequently seen in high impact traumas. They can have serious complications including life threatening haemorrhage, nerve damage and genitourinary injury. Their prompt diagnosis will aid timely interventions Pelvic binders have a crucial role in temporary stabilisation of suspected pelvic fractures preventing exaggeration of injury and aiding haemostasis. However they are also very affective in masking pelvic ring fracture. High force pelvic fractures are commonly associated with other injuries that may also act as distracters. Radiologist should be aware of these common pitfalls.

Outcomes: To raise awareness regarding the importance and the diagnostic difficulties related radiological identification of ligamentous pelvic injury, which is further hindered by the now widespread practice of routine pelvic binder use. By sharing examples from our local experience we aim to emphasize the importance the “law of the rings” that usually necessitates active exclusion of further fracture/ligamentous injury when ever a single pelvic ring fracture is identified.

Discussion: Unstable ring fractures account for 20% of pelvic fractures. Haemorrhage is the leading cause of death in unstable pelvic fractures. With the increase use of acute trauma CT, it is paramount that radiologist can reliably diagnose these injuries so that appropriate treatment is instigated.

P-012 The effect of diagnostic ultrasound in patients referred with vague groin symptoms

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Background: Introduction of ultrasound into clinical practice acts as an important adjuvant in evaluating patients with occult groin pain. Prior to the advent of ultrasound, diagnosis of groin hernia was by patient history and clinical examination. In current clinical environment, clinicians rely on ultrasound as a primary imaging modality to confirm clinical findings and to eliminate unnecessary intervention and morbidity.

The aim of this study is to evaluate the effect of ultrasound in diagnosing groin hernia among these patients.

Methods: Retrospective data collection using electronic database over a period of four months with a mean follow-up of 18 months.

Results: Total ultrasound scans were 95. Median age: 51 years. Male to female ratio: 7:3. The referrals ratio for GPs to Hospital specialties was 5:4. Positive hernia finding on scan were 39, negative 50, inconclusive 6. Two patients with negative ultrasound underwent surgical exploration for possible hernia and established to have a hernia in one patient (1% false negative). 20 patients with positive scans had conservative treatment and 19 underwent surgical repair. All the operated femoral hernia and 95% of inguinal hernia were confirmed as per the ultrasound reports. 3 patients from the inconclusive group (50%) underwent hernia surgery.

Conclusion: The accuracy of ultrasound in diagnosing groin hernia is comparable to published standards with no false positive results. However, we recommend that ultrasound referral should be used judiciously to improve efficiency. Patients with inconclusive and negative ultrasound would benefit from clinical re-evaluation and should be treated accordingly.

P-013 The avoidance of radiation exposure by following RCR guidelines and Ottawa Rules in performing ankle radiographs

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Background: Ankle radiographs are commonly requested x-rays comprising 10% of all radiographs obtained on emergency patients. The Royal College of Radiologists (RCR) recommend traumatic ankle radiographs when clinical features fulfil the Ottawa rules. These are a set of criteria formulated to prevent inappropriate ankle x-ray requests and reduce preventable radiation exposure. They state that in the context of trauma, a bony ankle injury is likely if the patient has inability to weight-bear immediately and in the emergency room or if there is tenderness over the posterior edge or tip of either lateral or medial malleolus.

Aims and Methods: We aimed to audit the appropriateness of ankle x-ray request in light of recommendations by the RCR and the Ottawa Rules. We Reviewed 200 consecutive traumatic ankle radiograph requests with a view to achieving standards of 100%.

Results: 79% of requests emerged from the emergency department, 18% from the General Practice and 3% from other hospital clinicians. 43% of total ankle radiograph requests did not meet the criteria of the Ottawa rules with General Practitioners and Emergency department clinicians having 47% and 43% of inappropriate requests respectively.

Conclusion: A large proportion of ankle x-rays are inappropriately requested with respect to provided clinical information. We aim to improve clinical practice by emphasising RCR guidelines to respected clinicians through oral presentations, educative posters, algorithms and introduction of a proforma to aid request decisions. Implemented interventions will be reviewed through a re-audit with a view to improving clinical practice and reducing unjustified patient radiation exposure.

P-014 Recognizing nail-patella syndrome- when genetic mutation meets the eye

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Objectives: This pictorial review illustrates the plain film imaging features of nail-patella syndrome (NPS) - also known as HOOD's disease. Even with its low incidence rate estimated at 1/50,000, plain film imaging plays a pivotal role in detection of the condition.

Content: Presenting with only an insidious onset of low back and knee pain with no definitive history of recent trauma or operation, this case review shines a light on a missed NPS diagnosis. In our series, the syndrome was overlooked during early childhood whilst in fact having been recessive in a whole family line.

Relevance: An outline of the typical appearance and X-ray imaging patterns enable the systematic and logical approach to differentiating the diagnoses. Reporting on the imaging features collectively enhances the understanding and knowledge on NPS. Advanced imaging techniques (e.g. MRI of the joints) and genetic typing was needed for confirmation as well as the genetic screening of the rest of the family.

Discussion: Although patient symptoms were quite subtle with clinical signs varying from the literature, Nail-Patella Syndrome diagnosis on radiological basis became quite conclusive when whole body joint plain film imaging was performed. This poster reviews the findings on the first line imaging modality for a case of NPS with recommendations on the line of management and differential diagnosis.

P-015 Utility of low field strength MRI in the evaluation of tuberculous spondylitis

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Background: Tuberculosis (TB) of the spine has a high prevalence in developing countries. About 90% of magnetic resonance imaging (MRI) scanners available in Nigeria are low field MRI scanners due to unreliable public power supply.

Materials and Methods: Thirteen patients with clinical and MRI features of tuberculous spondylitis were studied. Images were acquired with 0.2 Tesla Siemens Magnetom Concerto MRI scanner.

T1W and T2W spin echo sequences with T1W post-gadolinium sequence were routinely done. STIR sequences were sometimes included. Images were acquired with T1-weighted spin echo, 400 to 500/12 to 20 (TR/effective TE), matrix size 512x512, 300mm field of view, 11 slices of 4.5mm thickness and T2-weighted spin echo 2,900 to 3,450/100 to 141 (TR/effective TE), matrix 512x512, 270mm field of view, 11 slices of 4.5mm thickness.

Results: Ten patients (76.9%) were males while 3 patients (23.1%) were females. Mean age of patients was 44.8 ±16.8 years (range: 25- 75years). Eleven cases (84.6%) cases had wedge collapse of either one or two vertebrae. Vertebra plana was present in one case (7.7%). Spinal cord edema was present in 12 cases (92.3%). Pre or paravertebral abscess was seen in 11 cases (84.6%). Nine patients (69.2%) had spinal cord compression. Two cases (15.4%) had nerve root compression.

Conclusion: Low field strength MRI scanner is capable of producing images of diagnostic quality in the management of tuberculous spondylitis.

P-016 To evaluate the quality of request for musculoskeletal ultrasound from GPs

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Background: In recent decades Ultrasound has emerged as a useful imaging technique for evaluating soft tissue and joint related abnormalities. Introduction of open access service to GPs for requesting musculoskeletal ultrasound has resulted in increase waiting times for musculoskeletal ultrasound and also contributed to increase workload. There are limited guidelines for referral and making best use of clinical radiology services (MBUR) published by RCR is to ensure patients receive timely accurate diagnoses and also to ensure the efficient and even use of available diagnostic resources.

Aim: To assess whether GP referrals are compatible with RCR and locally agreed guidelines and to determine if the request was appropriate and sufficiently detailed. It is expected that request achieve 100% compliance.

Methods: Retrospective audit of 110 patient using Rad centre and IMPAX software.

Results: Ultrasound request examined 110, Male; female ratio 1;1.3, Median age: 52, time for scan (Median: 21 days). Request for ultrasound shoulder forms the bulk of imaging about 47% followed by foot 30%. Clinical history was adequate in 81% request form and 11% examination request did not mention clinical queries. Positive finding on scan was 70%. 33 % of patient had no X-ray prior to scan.

Conclusions: Details on request form for musculoskeletal ultrasound were not 100% compliant as laid by RCR. Adequacy of the referral forms helps in reducing workload and waiting time for musculoskeletal ultrasound. Its aids in decision making and in answer clinical queries accurately during scanning. It can be use for auditing, research and in medico legal issues.
