MSK POSTER PRESENTATIONS

P001 The gooey bits of MSK: Periarticular cystic lesions

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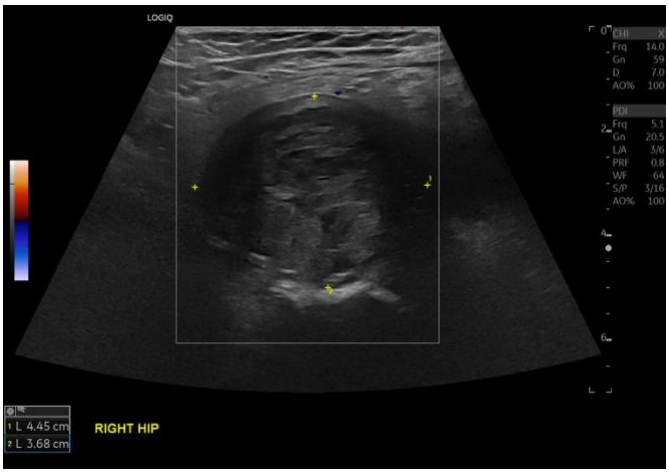
Aim: Both general radiologists and those with a special interest in musculoskeletal imaging may encounter cystic lesions around joints on a wide variety of imaging modalities. This educational presentation seeks to highlight some of the frequently encountered and more unusual pathologies in the differential for peri-articular fluid-containing lesions.

Cases: Common lesions such as ganglia and Baker's cysts are widely known of, but a host of other pathologies can cause periarticular cystic lesions. Some of these may be secondary to underlying disease within the joint and should prompt further evaluation for a causative arthropathy. A pictorial review will be presented showcasing classic examples of cases ranging from: paralabral cysts in a variety of joints, metal on metal pseudotumour, infective collections, arteriovenous malformations, an array of different bursae, post operative complications and more. Ways to differentiate these lesions and important aspects to describe in the radiology report will also be covered.

Conclusion: It is important for radiologists to appreciate the full scope of differentials when assessing the imaging characteristics of periarticular cystic lesions to enable accurate diagnoses and appropriate recommendations for further studies.



1. Guermazi, A et al (2010) Cyst-like lesions of the knee joint and their relation to incident knee pain and development of radiographic osteoarthritis: the MOST study. Osteoarthritis and Cartilage. 18(11), 1386-1392. 2. Kim IJ et al (2016) The prevalence of periarticular lesions detected on magnetic resonance imaging in middle aged and elderly persons: a cross-sectional study. BMC Musculocketal Disorders. 17(186), 1244

P002 The knee: An overview of anatomy and approach to knee MRI

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Background: MRI examinations of the knee are amongst the most commonly performed musculoskeletal MRI studies, probably second only to the spine. This means that of all MSK MRI this is one of the most commonly encountered - be it by the General Radiologist in a District General Hospital, by Radiology trainees, or increasingly, by reporting radiographers. It is therefore an important study for these reporters to feel comfortable with. The unfamiliarity with the modality and with the soft tissue structures well depicted by it, structures poorly outlined on other imaging, can make reporting a little daunting initially.

Purpose: This pictorial review aims to provide an overview of an approach to reviewing an MRI Knee and a guide to imaging signs of common soft tissue pathology. The aim is to provide a useful aid to those new to the study or act as a revision tool for those with prior experience.

Summary: A poster aiming to provide an overview of knee anatomy, common soft tissue pathology and an approach to reviewing an MRI of the knee.

P003 Best practice: Service evaluation of a one-stop lumbar spine pathway, from referral to nerve root block via MRI

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Background: Patients with radicular leg symptoms who have MRI showing neural compromise may be treated with a nerve root block (NRB) under CT guidance. The typical pathway for such patients involves multiple hospital visits with waits between appointments. This is inconvenient for the patient and adds delays in terms of their progress to treatment when indicated.

Purpose: The aim of this abstract is to describe the introduction of a one-stop clinic for these patients in terms of impact upon time from referral to treatment. The implementation of this clinic is intended to improve patient management by providing same day referral and rapid diagnosis for patients with acute spine problems. Same day scanning also enables further on-the-day discussion with the patient regarding available treatment options including conservative treatment.

Summary: The poster will provide timelines for the multi-stop (established) pathway i.e. specialist physiotherapist assessment, referral to MRI where indicated, discussion of results with neurosurgery, referral to radiology for CT-guided NRB. The one-stop pathway which utilises the skills and knowledge of an interprofessional team (specialist physiotherapist and reporting radiographer) to provide on-the-day results and onward referral to the relevant treatment pathway will be described. Challenges encountered will be identified. The key metric - timeline from referral to treatment - for this pathway will be compared with the multi-stop pathway. This is particularly important as the sooner a patient receives a NRB the more likely it is to be effective. Finally, consideration will be given to patient experience which is also key.

P004 Glucocorticoid-induced osteoporosis - a need for early intervention

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Society of Radiographers

Background: Glucocorticoid-induced Osteoporosis (GIOP), in Cushing syndrome (CS), remains the most common form of drug-induced osteoporosis.1 This health condition creates weaknesses in bones, causing fractures. In a 2020 Health-related Quality of Life (HRQoL) study of 86 CS patients, 38% of them were diagnosed with GIOP. Method As part of this HRQoL survey, patients were asked if they had been diagnosed with osteoporosis, the methods of diagnosing and treatments, and the impact it had on their HRQoL.

Results: Patient ages were between 35-68 years old. All patients recorded very poor QoL scores. 91% of the women reported mobility disabilities and regularly attend a fracture clinic. Identified within the thematic analysis was that their mobility disabilities had, reduced their ability to socialise and work and if osteoporosis had been diagnosed earlier, then this would have improved their HRQoL. Of the 38% diagnosed with osteoporosis, 26% had a DEXA scan, the rest were referred for other forms of imaging, including MRI, and skeletal imaging which confirmed their diagnosis. All patients were prescribed medical therapy (bisphosphonates), and 23.8% of them reported that this had improved their HRQoL Conclusion This study highlighted the prevalence of osteoporosis in CS patients. Health Professionals' awareness and early diagnosis would reduce the sustained burden of hypercortisolism, which is a major cause of GIOP. Referral for a DEXA scan following biochemical testing would help in risk stratifying to identify early signs of osteoporosis. New technology such as artificial intelligence to identify early changes in bone density and early intervention would also reduce the financial burden of healthcare.

1Saag K et al, (2021). Marcus and Feldman's Osteoporosis, Chapter 45, Ed. T. Glucocorticoid-induced osteoporosis in Cushing syndrome: Vol. 2, Pp. 1103-1138.

P005 Retrospective audit of acute inpatient whole spine MRI for MSCC

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Introduction: Up to 5% of cancer patients will be affected by metastatic cord compression (MSCC) , although the true incidence is unknown. NICE recommends imaging assessment in a timely fashion depending on the suspected clinical diagnosis. MRI within 1 week is recommended for symptoms suggestive of spinal metastases and more urgent MRI within 24 hours if symptoms suggest an oncological emergency of MSCC - the hallmark of which is positive neurology on examination.

Method: All inpatient MRI studies performed for suspected MSCC between January 2019 and December 2019 at our tertiary cancer center were reviewed with data collected regarding imaging findings, referring history and patient demographics including details on any known cancer. A positive study was taken as that demonstrating MSCC.

Results: There were a total of 311 scans performed over 12 months for suspected MSCC - 19% of which were positive for compression. 134(43%) of the MRI scans had clinical details fitting the NICE criteria for urgent MRI - that is known malignant disease with neurology. Of these, 46(34%) were positive. Interestingly of these 46 positive cases, 41 had known bony metastatic disease.

Conclusion: Despite the number of urgent MRI we perform for suspected MSCC, less than 20% of cases were positive. Our audit demonstrated that known bony metastatic disease alongside neurology was the greatest indicator for a positive MSCC MRI. Pain alone was found to be a poor indication for scanning acutely accounting for only 10% of positive scans.

1. Cancer Research UK. 2021. Spinal cord compression. [ONLINE] Available at: https://www.cancerresearchuk.org/about-cancer/coping/physically/spinal-cord-compression/about. [Accessed 29 November 2021].

P006 Bone infection: From infectious osteitis to osteomyelitis- the many faces of serious osseous involvement

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Background: Differentiating among diagnosis of bone and soft tissue infection is crucial to clinicians in selecting certain treatment options, such as operative intervention, percutaneous drainage, or noninvasive medical treatment. Furthermore, the early diagnosis of infection is important in prompting treatment that will prevent serious complications.

Purpose: We focus on diagnosis of osseous infection according to the osseous compartment involved- that is, infection either limited to cortical bone (infectious osteitis) or affecting bone marrow (osteomyelitis). Regardless of the mechanism of contamination, we consider specific situations including recurrent multifocal osteomyelitis, pedal infections in diabetic patients, and bone infections in immunocompromised patients. Although radiography remains the initial imaging examination of choice for suspected skeletal infection, CT provides exceptional detail of cortical bone in a cross-sectional display. With CT, abnormalities in cortical bone including erosions, subtle osteolysis, foci of gas, and intracortical bone abscesses can be optimally detected. Changes in medullary bone including increased intraosseous density, sequestra, involucra, and cloacae also can be delineated by CT. With MRI, diagnosis can be achieved before destructive changes are identified by radiography/CT, owing to the contrast MRI typically provides between abnormal and normal bone marrow. Furthermore, MRI is the most appropriate method to detect involvement of the cartilaginous epiphyses in children that is impossible with other methods.

Summary: CT can be useful to detect early spread of infection to periosteum or cortex (osteitis), whereas MRI is superior in delineating the presence of abscesses and sequestra in medullary bone (osteomyelitis), and regional extent of infection.

1. Mandell JC, Khurana B, Smith JT, et al (2018). Osteomyelitis of the lower extremity: pathophysiology, imaging, and classification, with an emphasis on diabetic foot infection. Emerg Radiol 25(2):175-188 2. Anwer U, Yablon CM (2017). Imaging of osteomyelitis of the extremities. Semin Roentgenol 2017; 52(1):49-54 3. Schmitt SK (2017). Osteomyelitis. Infect Dis Clin North Am 31(2):325-338

P007 Audit of the use of collimation during orthopaedic theatre fluoroscopy

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Background: Fluoroscopy provides intra-operative imaging to guide surgical equipment. Fluoroscopy improves the surgeons' proficiency and reduces morbidity (Ojodu et al., 2018). It has the potential to be high dose and pose a radiation risk (Narain et al., 2017), therefore parameters known to reduce dose such as collimation to help keep the dose as low as reasonably achievable (ALARA) should be utilised.

Purpose: This audit aimed to determine to what extent collimation is being used during orthopaedic theatre cases using fluoroscopy in a Major Trauma Centre and to consider the effectiveness of quality improvement tool Optimal Orthopaedics (Silverton and Forbes, 2019). Between data collections the number of images with evidence of and adequate collimation improved by 20.43% and 19.45% respectively, demonstrating the effectiveness of Optimal Orthopaedics (Silverton and Forbes, 2019). Identification of theatre training champions may have contributed as this is an effective way to facilitate change (Gesme and Wiseman, 2010). Discussions between modality leads and theatre staff about shared expectations strengthened working relationships. Effective leadership ensured ways of working aligned with what was discussed. Barriers to implementation such as workload, lack of time, staff working across multiple areas (Geerligs et al., 2018) may be why, despite an improvement, the second data collection did not meet the standard. The interrelationship between the four pillars of advanced practice is demonstrated: modality lead -- leadership, theatre champions -- education, collimation as an indicator of clinical practice and audit as research.

1. Geerligs, L., Rankin, N.M., Shepherd, H.L. and Butow, P. (2018) 'Hospital-based interventions: a systematic review of staff-reported barriers and facilitators to implementation processes', Implementation science, 13(1), pp. 36. doi: 10.1186/s13012-018-0726-9. (Accessed June 2021). 2. Gesme, D. and Wiseman, M. (2010) 'How to Implement Change in Practice', Journal of oncology practice, 6(5), pp. 257-259. doi: 10.1200/JOP.000089. (Accessed June 2021). 3. Narain, A.S., Hijji, F.Y., Yom, K.H., Kudaravalli, K.T., Haws, B.E. and Singh, K. (2017) 'Radiation exposure and reduction in the operating room: Perspectives and future directions in spine surgery', World journal of orthopedics, 8(7), pp. 524-530. doi: 10.5312/wjo.v8.i7.524. (Accessed July 2021). 4. Ojodu, I., Ogunsemoyin, A., Hopp, S., Pohlemann, T., Ige, O. and Akinola, O. (2018) 'C-arm fluoroscopy in orthopaedic surgical practice', European journal of orthopaedic surgery & traumatology, 28(8), pp. 1563-1568. doi: 10.1007/s00590-018-2234-7. (Accessed July 2021). 5. Silverton, J. and Forbes, R. (2019) 'Optimal Orthopaedics: an evaluation and improvement strategy for adults intraoperative radiographic imaging service'. NHS GGC.

P008 Correlation of the quantitative methods for the measurement of bone uptake and plasma clearance of 18F-NaF using positron emission tomography. Systematic review and meta-analysis

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Background: 18F-NaF PET is valuable for detecting bone metabolism through osteoblastic activity in the assessment of bone disease. Hawkins, Patlak, and standardised uptake value (SUV) are the most common quantitative measurements used to evaluate bone metabolism. This systematic review evaluates the correlation between quantitative positron emission tomography (PET) methods and to compare their precision.

Methods: A systematic search in Medline, PubMed, SCOPUS, and Web of Science was undertaken to find relevant papers published from 2000. All studies with human adults undergoing 18F-NaF PET, PET/CT, or PET/MRI were included except for subjects diagnosed with non-diffuse metabolic bone disease or malignancy. Quality Assessment Tool for Studies of Diverse Designs (QATSDD) was used to assess risk of bias. A qualitative review and meta-analysis using Hedges random-effect model was used producing summary size effects of the correlation between methods in healthy and unhealthy bone sites and assessing study heterogeneity.

Results: 228 healthy and unhealthy participants were included across 12 studies resulted from the systematic search. One-third of studies had a moderate quality percentage while the rest had relatively high quality. The pooled correlation coefficient in meta-analysis showed a high correlation of more than 0.88 (0.71--1.05. 95 %CI) between SUV and Hawkins and more than 0.96 (0.88--1.03. 95 %CI) between Patlak and Hawkins within all subgroups, suggesting all

methods yield similar results in healthy and unhealthy bone sites. SUV has the lowest precision error followed by Patlak while Hawkins method showed the highest precision error.

Conclusion: Patlak is the best within research and SUV is better within clinical practice.

1. AL-BEYATTI, Y., SIDDIQUE, M., FROST, M. L., FOGELMAN, I. & BLAKE, G. M. 2012. Precision of 18F-fluoride PET skeletal kinetic studies in the assessment of bone metabolism. Osteoporosis International, 23, 2535-2541. 2. BRENNER, W., VERNON, C., CONRAD, E. U. & EARY, J. F. 2004. Assessment of the metabolic activity of bone grafts with (18)F-fluoride PET. European Journal of Nuclear Medicine & Molecular Imaging, 31, 1291-8. 3. BRENNER, W., VERNON, C., MUZI, M., MANKOFF, D. A., LINK, J. M., CONRAD, E. U. & EARY, J. F. 2004. Comparison of different quantitative approaches to 18F-fluoride PET scans. Journal of Nuclear Medicine, 45, 1493-1500. 4. DYKE, J. P., GARFINKEL, J. H., VOLPERT, L., SANDERS, A., NEWCOMER, M., DUTRUEL, S. P., SOFKA, C. M., ELLIS, S. J. & DEMETRACOPOULOS, C. A. 2019. Imaging of Bone Perfusion and Metabolism in Subjects Undergoing Total Ankle Arthroplasty Using 18F-Fluoride Positron Emission Tomography. Foot and Ankle International, 40, 1351-1357. 5. FROST, M., SIDDIQUE, M., BLAKE, G., MOORE, A., MARSDEN, P., SCHLEYER, P., EASTELL, R. & FOGELMAN, I. 2012. Regional bone metabolism at the lumbar spine and hip following discontinuation of alendronate and risedronate treatment in postmenopausal women. Osteoporosis International, 23, 2107-2116. 6. FROST, M. L., BLAKE, G. M., PARK-HOLOHAN, S. J., COOK, G. J., CURRAN, K. M., MARSDEN, P. K. & FOGELMAN, I. 2008. Long-term precision of 18F-fluoride PET skeletal kinetic studies in the assessment of bone metabolism. J Nucl Med, 49, 700-7. 7. FROST, M. L., SIDDIQUE, M., BLAKE, G. M., MOORE, A. E., SCHLEYER, P. J., DUNN, J. T., SOMER, E. J., MARSDEN, P. K., EASTELL, R. & FOGELMAN, I. 2011. Differential effects of teriparatide on regional bone formation using 18F-fluoride positron emission tomography. Journal of Bone and Mineral Research, 26, 1002-1011. 8. HADDOCK, B., FAN, A. P., JORGENSEN, N. R., SUETTA, C., GOLD, G. E. & KOGAN, F. 2019. Kinetic [18F]-Fluoride of the Knee in Normal Volunteers. Clinical Nuclear Medicine, 44, 377-385. 9. HADDOCK, B., FAN, A. P., UHLRICH, S. D., JØRGENSEN, N. R., SUETTA, C., GOLD, G. E. & KOGAN, F. 2019. Assessment of acute bone loading in humans using [18 F] NaF PET/MRI. European journal of nuclear medicine and molecular imaging, 46, 2452-2463. 10. PURI, T., BLAKE, G. M., FROST, M. L., SIDDIQUE, M., MOORE, A. E., MARSDEN, P. K., COOK, G. J., FOGELMAN, I. & CURRAN, K. M. 2012. Comparison of six quantitative methods for the measurement of bone turnover at the hip and lumbar spine using 18F-fluoride PET-CT. Nucl Med Commun, 33, 597-606. 11. RAIJMAKERS, P., TEMMERMAN, O. P., SARIDIN, C. P., HEYLIGERS, I. C., BECKING, A. G., VAN LINGEN, A. & LAMMERTSMA, A. A. 2014. Quantification of 18F-fluoride kinetics: evaluation of simplified methods. Journal of Nuclear Medicine, 55, 1122-1127. 12. SIDDIQUE, M., FROST, M. L., BLAKE, G. M., MOORE, A. E., AL-BEYATTI, Y., MARSDEN, P. K., SCHLEYER, P. J. & FOGELMAN, I. 2011. The precision and sensitivity of (18)F-fluoride PET for measuring regional bone metabolism: a comparison of quantification methods. J Nucl Med, 52, 1748-55.

P009 Short-term precision errors of radiofrequency echographic multi-spectrometry (REMS) bone density measurements at the lumbar spine and neck of the femur using an Echolight scanner

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Background and aim: Osteoporosis is a silent disease that keeps progressing without clear symptoms until a fracture suddenly happens. Globally, approximately 200 million cases are affected by osteoporosis with nearly 9 million fractures occur annually. Accessing dual X-ray absorptiometry (DXA) scanning can be limited and this encouraged searching for alternatives. REMS is a new diagnostic technology for osteoporosis that solves some limitations of DXA. As a new technology, this study aimed to assess the short-term precision errors for REMS using an (Echolight) scanner, to determine the potential for future clinical use compared to the currently adopted gold standard DXA.

Methods: Fifteen participants (10male, 5female), mean age 36.26 (sd ±12.8) years, underwent 3 scans of their lumbar spine and femoral neck, on the same day with repositioning between scans using the Echolight scanner. The root mean square (RMS) standard deviation (SD) and RMS coefficient of variation (CV%) were calculated.

Results: The RMSSD was 0.015g/cm², 0.010 g/cm², and 0.019 g/ cm² for the Lumbar spine, femoral neck, and proximal femur respectively. CV% was 1.24% for the lumbar spine, 1.14% for the femoral neck, and 1.88% for the proximal femur.

Conclusion: The precision error rates in both targeted anatomical sites in this study are less than that of DXA. Further studies are required to investigate the medium and/or long-term precision errors of REMS to better understand the impact of time progression on REMS measurements as well as to assess operator dependency. Ethics committee approval University of Exeter - internal REC approval granted (19/11/233) Funding Sponsorship from the Royal Embassy of KSA.

P010 Exploring the agreement between the GE Lunar knee software and historical methods for the measurement of bone mineral density in the knee

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Background: Knee dual energy x-ray absorptiometry (DXA) is a relatively new measurement technique, but a potentially important one for research into peri-prosthetic changes. Historically, adjusted lumbar spine settings were used for knee scans; GE Lunar have now released knee software. The purpose of this study was to explore the agreement between historical methods and the knee software.

Method: 24 participants with prosthesis and 25 without (25 male to 24 female, mean age 70.9y ± 8.18, BMI 29.18kg/m2 ± 4.15) were scanned using the historical method, which utilises a long lumbar spine DXA setting with thin mode selected and rice bags to provide bolstering medially and laterally to the knee on a GE Lunar Prodigy (Bedford, UK). An eight region of interest template was used to analyse the scans and point typing used to ensure bone and soft tissue were correctly characterised. The scans were then converted and reanalysed using the knee software. Differences were tested using a Wilcoxon Signed Rank test and a p-value of <0.05 considered significant using SPSS V26 (IBM).

Results: Mean differences (SD) between the two techniques across the eight regions of interest ranged from -0.05 (±0.22) to 0.05 (±0.22) in knees with prostheses and -0.13 (±0.19) to -0.06 (±0.09) in knees without (p<0.05).

Conclusion: These results demonstrate significant, but small differences between the two techniques, which are close to the precision errors for Knee DXA [1,2]. The knee software required less post-processing, and thus was beneficial in terms of analysis time.

1. Soininvaara T, Kröger H, et al. Measurement of bone density around total knee arthroplasty using fan-beam dual energy X-ray absorptiometry. Calcified Tissue International. 2000;67(3):267-272 2. Jensen CL, Petersen MM, et al. Bone mineral density changes of the proximal tibia after revision total knee arthroplasty. A randomised study with the use of porous tantalum metaphyseal cones. International Orthopaedics. 2012;36(9):1857-1863

P011 Short-term intra- and inter-operator precision errors of radiofrequency echographic multispectrometry bone density measurements at the proximal femur using the Echolight scanner

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Background: The Echolight uses radiofrequency echographic multispectrometry (REMS) to perform measurements at the clinically important fragility fracture sites of the lumbar spine and femoral neck using a hand-held probe. The aim of this study was to explore the intra- and inter-operator precision errors associated with REMS measurements at the proximal femur with this new scanner.

Method: 29 participants were recruited and underwent REMS measurements at the proximal femur using the Echolight (Lecce, Italy). Three operators were trained and undertook practice sessions prior to conducting the study. Duplicate measurements were made by a minimum of two operators with repositioning between measurements. The root mean square standard deviation (RMDSD) and root mean square coefficient of variation (RMSCV%) were calculated for the intra- and inter-operator results.

Results: Participants' mean age was 24.4y (± 8.0) and their mean body mass index was 24.6kg/m2 (±4.2). Intra-operator and inter-operator precision errors ranged from RMSCV% (RMDSD) 1.24% (0.012) to 2.13% (0.021) for the total hip and 0.71 (0.005) to 1.18% (0.009) for the femoral neck. Degrees of freedom ranged from 9 to 13 for the intra-operator precision and was 12 for inter-operator precision because measurements were not achieved on 7 of the 29 participants, while only one operator achieved measurements in some of the participants.

Conclusion: These results demonstrate good precision errors, which are comparable to those reported for dual energy x-ray absorptiometry. However, further work is required to reduce the number of participants where measurements could not be successfully achieved. Greater experience on the scanner may reduce this number.

P012 Short-term precision errors of density index measurements at the distal radius and proximal plus distal tibia using the Bindex scanner

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Introduction: The Bindex system utilises a novel ultrasound method that calculates a bone density index by measuring the thickness of cortical bone at peripheral skeletal sites with a handheld device. This study aimed to assess the short-term intra-operator precision of the Bindex on combined measurements from the distal radius, proximal and distal tibia.

Methods: Fifteen participants (13 male & 2 female), mean age 35.86 (SD ±7.61) years, were included in this study. All participants underwent three scans with the Bindex® device in the same session with repositioning between each scan. In all scans, the thickness of cortical bone at the distal radius as well at the distal and proximal tibia was measured in order to analyze intra-operator precision. The measurements were performed according to manufacturer's instructions and by the same investigator. The data were analysed using the root mean square standard deviation (RMSSD) and the room mean square coefficient of variation (RMSCV%), as is recommended by international society for clinical densitometry (ISCD) [1].

Results: For the bone density index score, based on scans at all anatomical sites, RMSSD was 0.035g/cm² and RMSCV% was 3.14%.

Conclusion: The precision error rates in this study were higher but in line with the Behrens et al, 2016 study [2]. Further studies are required to investigate the medium and long-term precision errors of Bindex, as well as inter-operator precision results.

1. Baim, S., Wilson, C.R., Lewiecki, E.M., Luckey, M.M., Downs Jr, R.W. and Lentle, B.C., 2005. Precision assessment and radiation safety for dual-energy X-ray absorptiometry: position paper of the International Society for Clinical Densitometry. Journal of Clinical Densitometry, 8(4), pp.371-378. 2. Behrens, M., Felser, S., Mau-Moeller, A., Weippert, M., Pollex, J., Skripitz, R., Herlyn, P.K., Fischer, D.C., Bruhn, S., Schober, H.C. and Zschorlich, V., 2016. The Bindex® ultrasound device: reliability of cortical bone thickness measures and their relationship to regional bone mineral density. Physiological measurement, 37(9), p.1528.

P013 Unexpected features of transient patellar dislocation on MRI knee examinations

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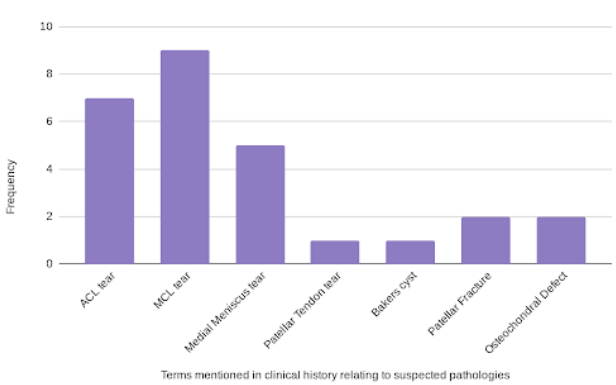
Objectives: To investigate the incidence of clinically occult/ unsuspected recent patella dislocation on MRI knee examinations performed in a large teaching hospital. To establish the mechanisms of injury commonly associated with occult/ unexpected transient patella dislocation specifically.

Methods: A retrospective review of MRI knee studies performed from January 2019 to November 2019 with CRIS reports containing the phrase " patella dislocation" was performed. Those MRI reports stating features of patella dislocation were present were assessed for mention of patella dislocation/ patellofemoral instability in the radiological request. Of those without mention of this in the request, an analysis of the mechanism of injury, suspected pathologies and previous imaging was performed.



Results: Of 51 MRI knee studies showing features of recent patella dislocation, 17 (33%) did not mention patella dislocation or patellofemoral joint instability as a suspected pathology in the radiological request. The most common mechanisms of injury were "twisting" or "valgus" injuries where MCL/ ACL/ medial meniscus injuries were suspected.

Conclusions: This study demonstrates that a significant proportion of MRI-confirmed patella dislocations are clinically unsuspected. Prompt use of MRI early in the clinical pathway in those with a typical mechanism of

injury can help prevent delayed diagnosis in these patients, which can have a significant deleterious effect on long term functional outcome.

P014 Pictorial review: Common non-degenerative causes of hip pain

Claire Giles[1]; Scott Harrison[2]; Carol Phillips[1]; Gary Cross[2]; Ynyr Hughes-Roberts[2]

[1]University Hospitals Bristol and Weston NHS Foundation Trust; [2]Royal United Hospitals Bath NHS Foundation Trust

Background: The authors of this poster issued a survey to reporting radiographers throughout Southwest England. Of the 30 respondents, 70% (n=21) stated they would benefit from additional support and knowledge in the accurate identification of non- degenerative MSK disorders requiring an orthopaedic referral, particularly in the pelvis.

Learning objectives: To correctly identify different causes of femoral acetabular impingement.
To recognise and qualify acetabular dysplasia.
To identify early signs of avascular necrosis.
To understand and recognise the subtle signs of insufficiency fractures.

Application to practice: To confidently identify subtle changes to pelvic morphology whilst reporting radiographs.
To identify subtle pathologies which are recognised to be causes of early onset degenerative changes.

Summary: The poster acts as a quick reference guide for reporters by providing a pictorial review of common causes of non-traumatic hip pain in the adult pelvis. A series of radiographic images paired with illustrations summarise causes of femoral acetabular impingement, avascular necrosis and insufficiency fractures. The identification and quantification of acetabular dysplasia is also included. The poster is designed to improve recognition of commonly overlooked causes of hip pain in the hope of expediting patient pathways.

P015 Pictorial review of the radiographic image in patients with hip arthroplasty

Scott Harrison[1]; Claire Giles[2]; Ynyr Hughes-Roberts[1]; Gary Cross[1]

[1]Royal United Hospitals Bath NHS Foundation Trust; [2]University Hospitals Bristol and Weston NHS Foundation Trust

Background: The authors of this poster issued a survey to reporting radiographers practicing in radiology departments throughout Southwest England. Of the 30 survey respondents, 83% (n=25) stated that they would benefit from additional support and knowledge in the accurate identification of atraumatic radiographic pathologies associated with orthopaedic implants such as hip arthroplasty.

Learning outcome: Correctly recognise the various methods of hip arthroplasty
Identify the physical components of the total hip arthroplasty and recognise their relationships
Explore common atraumatic radiographic pathologies relating to total hip arthroplasty

Application to practice: Confidence to correctly name different hip arthroplasty procedures whilst reporting radiographs.
Apply improved recognition of atraumatic abnormalities to reduce errors when reporting on radiographs of patients with hip arthroplasty.

Summary: The poster gives a pictorial review of total hip arthroplasty intended for utilisation as an *aide-mmoire* for reporters reviewing radiographs of patients who have undergone this procedure. A series of radiographic images summarise the differences between various hip arthroplasty procedures. An additional set of images outline the radiographic features of common atraumatic pathology relevant to hip arthroplasty, for example aseptic loosening, polyethylene wear, and osteolysis. The poster intends to improve the ability of reporters to accurately identify atraumatic radiographic pathology pertaining to total hip arthroplasty, providing prompt diagnosis and improved outcomes for this group of patients.

P016 Fluoroscopically guided joint injections - a pictorial review

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Background: Fluoroscopic guided injections are used widely in radiology departments for the purpose of both diagnosis and treatment of a range of musculoskeletal pathology. The new RCR curriculum states that all radiology trainees should be proficient in image guided injection in musculoskeletal radiology, which is defined as being able to practice independently at the level of a day 1 consultant (1). A recent survey by the British Society of Skeletal Radiologists of UK radiology trainees found that 57% believed training in fluoroscopy could be improved (2).

Purpose: The purpose of this poster is to act as education and practical aid for radiology trainees, displaying a stepwise approach to fluoroscopic guided joint injections commonly performed in a standard outpatient radiology setting including shoulder, wrist, hip and ankle.

Summary: The poster will use both diagrams and fluoroscopic images obtained from our practice to explain the anatomy, equipment, set up, needle placement and distribution of contrast post injection that indicates successful infiltration of the desired joint space.

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P017 Is a lateral hip radiograph useful in detecting complications post hip arthroplasty?

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Background: Hip fractures remain one of the most common serious injuries in elderly patients across the UK. According to the national hip data base, 670 hip fracture patients were admitted to one major trauma center alone in 2020 (1). A significant number of these patients are intra-capsular neck of femur (NOF) fractures, who are commonly treated with hip arthroplasty (2). Historically, the standard practice for these cases was to obtain both post operative AP pelvis and lateral hip check radiographs to detect immediate post operative complications. A change in practice was implemented at the end of June 2021 by eliminating lateral hip radiographs from the standard post-operative checks, as it was felt that it was of no added benefit. This audit was conducted to provide evidence whether this change should be maintained.

Method: This audit was done by conducting a retrospective search for post NOF fracture patients that underwent a hemiarthroplasty or a total hip replacement (THR) who had both AP and lateral radiographs obtained between the 1st January 2021 and 17th June 2021 until 100 cases were met. All the cases were reviewed for complications, and whether they were visible on the AP or lateral alone.

Results: In all cases with complications, there was no additional diagnostic information given by the lateral hip view.

Conclusion: By obtaining only an AP pelvis radiograph, there is a significant reduction in radiation exposure, the cost of an additional x-ray view is saved, and patient dignity and comfort are maintained (3)(4).

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P018 Flexion and extension weight bearing spinal CT

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Purpose: To assess spinal stability in different physiological positions whilst weight-bearing. Methods. A cone beam CT scanner (CBCT) was used to identify any abnormal motion in the spine in different physiological positions whilst weight-bearing. The lumbar spine was assessed in 6 different patients with a comfortable neutral standing position and standing flexion and extension images in selected patients. Seated, weight-bearing flexion and extension images

of the cervical spine were obtained in a further patient. Clinical indications included stability assessment post-trauma, post-surgical fusion and back pain. The projection images were reconstructed using bone and soft tissue algorithms to give isotropic CT images which could be viewed as per conventional multi-detector CT images. The flexion and extension CBCT data were fused to give a representation of any spinal movement between the extremes of motion.

Results: The flexion and extension weight-bearing images gave anatomical detail of the spine. Detail of the surgical constructs was possible. Dynamic structural information about spinal alignment, facet joints, exit foramina and paraspinal musculature was possible. The effective dose from the neutral position was equal to that of supine, multi-detector CT.

Conclusion: CBCT can be used to image the lumbar and cervical spine in physiological weight-bearing positions and at different extremes of spinal motion. This novel application of an existing technology can be used to aid surgical decision making to assess spinal stability and to investigate occult back and leg pain. Its use should be limited to specific clinical indications, given the relatively high radiation dose.

1. Falkowski AL, Kovacs BK, Benz RM, et al (2021) In vivo 3D tomography of the lumbar spine using a twin robotic X-ray system: quantitative and qualitative evaluation of the lumbar neural foramina in supine and upright position. European Radiology 31:3478–3490. https://doi.org/10.1007/s00330-020-07355-x/Published 2. Harder D, Amsler F, et al (2018) Initial Assessment of a Prototype 3D Cone-Beam Computed Tomography System for Imaging of the Lumbar Spine, Evaluating Human Cadaveric Specimens in the Upright Position. Investigative Radiology 53:714–719. https://doi.org/10.1097/RLI.0000000000000495 3. Jinkins JR, Dworkin JS, Damadian R v (2005) Upright, weight-bearing, dynamic-kinetic MRI of the spine: initial results. European radiology 15:1815–1825. https://doi.org/10.1007/s00330-005-2666-4

P019 Radiographer led MRI MSK reporting

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Ever increasing reporting workloads combined with the need to develop and retain radiographers within the workforce has led Practice Plus Group to start to develop a radiographer led MSK MRI reporting service. The diagnostic radiography workforce census published by the College of Radiographers in April 2021, which showed an average current UK vacancy rate of 10.5% in diagnostic radiographers so retaining trained staff has to be a key service objective for all employers. An important way to retain staff is to encourage role extension as this has the two-fold impact of a quality improvement in the service but also increased job satisfaction for the staff involved. This objective taken in combination with the April 2021 RCR census showing that the NHS radiologist workforce is short-staffed by 33% will allow reporting capacity to be increased and reduce the potential clinical impact of the ongoing radiologist numbers shortfall. Our first fully trained MRI reporting radiographer qualified in March 2022 in MSK reporting and is now beginning his internal preceptorship programme. We are now in the process of extending our existing governance framework for plain x-ray reporting radiographers to embrace this development. This will include a comprehensive job plan with peer review process, MDT and REALM style meetings and CPD opportunities to support further staff development. We are also looking for our next candidate to train so that we can continue to grow this fledgling service.

P023 Siemens VTIQ gives better quantitative estimates of elastic moduli than the older VTI software

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Background: Ultrasound shear wave elastography has been validated as a reliable method for differentiating the elastic moduli of soft tissue lesions (Saavedra et al., 2018). This study is designed to test the upper limit of elastic moduli that can be reliably measured using the Siemens S3000 elastography software Virtual touch Quantification (VTQ) and the new Virtual touch Image Quantification (VTIQ).

Method: A series of aqueous gels were made with concentrations of gelatine ranging from 6% to 18%. These gels were mechanically tested using an Instron to obtain a reference elastic modulus for each gel. The results were then compared with the mean elastic moduli measured using both the VTQ and VTIQ software on the Siemens S3000 machine. The standard error of each set of readings was calculated.

Results: We found that both the VTQ and VTIQ elastography settings were reliable at measuring gels with an elastic modulus of up to 49kPa (12% gel) and VTIQ could measure the elastic moduli of gels up to 62kPa (14% gel). Higher concentration gels were not reliably estimated using either VTQ or VTIQ. In gels with an elastic moduli over 62kPa, VTIQ was slightly more accurate and had a smaller standard error.

Conclusion: The range of elastic moduli that can be measured using Siemens VTIQ is greater than VTQ. The measurement error of VTIQ is less than VTQ particularly at higher elastic moduli.

References 1. Saavedra, A. C. et al. (2018) Breast elastography: Identification of benign and malignant cancer based on absolute elastic modulus measurement using vibro-elastography, in Nishikawa, R. M. and Samuelson, F. W. (eds) Medical Imaging 2018: Image Perception, Observer Performance, and Technology Assessment. SPIE, p. 48. doi: 10.1117/12.2293664.

P024 The Linear Hallux Valgus Index - a novel way to measure Hallux Valgus

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Introduction:

Hallux Valgus is a complex deformity of the first ray of the forefoot and several radiological measurements.

Purpose:

To describe a new radiological linear hallux valgus index (LHVI) of measuring Hallux Valgus (HV) deformity.

Patient and methods:

Antero-posterior weight bearing radiographs of 100 consecutive patients were reviewed. HVA (hallux valgus angle) and LHVI were measured, and data was analysed using student 't' test.

Results: T

here was statistically significant difference of LHVI between normal and hallux valgus cohorts with a p- value of 0.0001.

Conclusion:

LHVI can be an additional measure of assessing hallux valgus.

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P025 Iyengar Botchu Panchal (IBP) Calcaneal Offset Index to measure hindfoot alignment in pes planus

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Introduction: Pes planus is a common three-dimensional deformity characterised by forefoot abduction, collapse of medial longitudinal arch and hindfoot valgus. Several radiological measurements exist to calculate the degree of hindfoot alignment in these patients with variable intra- and inter-observer reliability.

Purpose: To describe a new radiological ancillary method of measuring hindfoot alignment, the Iyengar Botchu Panchal (IBP) Calcaneal Offset Index.

Material and methods: Antero-posterior (Mortise) and lateral view weight bearing ankle radiographs of 100 consecutive patients referred for ankle pain were reviewed. Calcaneal Offset Index calculation was undertaken on the mortise view along with the measurement of 'Calcaneal pitch angle'. A one-way analysis of variance (ANOVA) was performed. Intraclass Correlation Coefficient (ICC) analysis was undertaken to assess the intra-class reliability between observers.

Results: There was a female preponderance in the study population with a mean age of 51.21 years (13-86 years). The calcaneal offset was increased in pes planus (hindfoot valgus). The p -value was 0.017 on ANOVA. The 'Calcaneal

Offset Index' (COI index) gave moderate intra-observer reliability on Intraclass Correlation Coefficient (ICC) analysis of 0.55.

Conclusion: The Calcaneal Offset Index (COI) can be an additional index of measuring hindfoot alignment in patients with pes planus. In contrary to the traditional angular measurements, this linear measure is easier to calculate and reproducible. COI measurement has shown a moderate inter-observer reliability in the study to complement clinical evaluation of hindfoot valgus alignment.

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P026 Lateral femoral condyle CRATER sign of Iyengar - Botchu an ancillary sign of lateral patellar dislocation

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Introduction: Acute lateral patellar dislocation is a common knee injury pattern seen in the young athletes and tall, young adolescent females. Such injuries may be associated with bone contusion or an osteochondral fracture of the articular and peri-articular structures around the knee joint. However, co-incidental osseous defect may be present in normal knees.

Purpose: Evaluate the characteristics of osseous bone defect and describe a new ancillary sign associated with lateral patellar dislocation.

Material and methods: Magnetic Resonance Imaging (MRI) of 50 consecutive patients referred following a traumatic lateral patellar dislocation of the knee joint and 50 patients with knee pain without MR features of patellar dislocation were obtained for evaluation over a 7-year period. They were analysed for location of bony defects in the periarticular region.

Results: Of the 50 patients (25 male: 25 female) aged with a mean age of 23 years (12-57 years), who underwent MRI following a reduced traumatic lateral patellar dislocation, three patients had an osseous 'Crater' of more than 2 mm in depth on the non-articular surface of the lateral femoral condyle. None of control group of patients had an osseous defect measuring more than 2mm in depth.

Conclusion: This associated finding of an osseous 'Crater' of more than 2 mm on the non-articular surface of the lateral femoral condyle following traumatic lateral patellar dislocation is a rare occurrence. It signifies patellar dislocation has occurred with a severe enough force with impaction to create a bony defect.

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P027 To analyse the effects of joint injections and its outcome

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Block selection sampling Metrics used for analysis are: 1. Gender 2. Scan type 3. Outcome (pain diary)

Total patients were 258, out of which 49 were excluded as the procedure got cancelled at the time of appointment due to various reasons. 209 Patients underwent the procedure. 141 females and 68 males. 166 were ultrasound guided and 43 were fluoroscopic guided. Pain diary was submitted by 40% ,84 patients only. 52 patients had a good response to the treatment and 32 had a poor response.

Conclusion: Analysis showed that joint injections do have a great benefit with positive outcome.

Action plan: To make the feedback / pain diary return convenient and easy. To introduce an electronic submission of feedback rather than obsolete paper feedback.