Quantitative assessment: A significantly thicker cartilage was found in males [0.71 ± 0.10 mm (mean $\pm$ SD)] than in females [0.68 ± 0.12 mm, (mean $\pm$ SD)] ($p < 0.01$). No significant difference was found between left and right side for each digit ($p > 0.05$).

CT value of the II MH was significantly greater than the one of the other fingers ($p < 0.01$). No difference was found between the CT values of III, IV and V MH ($p > 0.05$).

There was a significant association between the CT value and gender ($r = 0.39$; $p < 0.01$), age ($r = -0.33$; $p < 0.01$), height ($r = 0.28$; $p = 0.01$) and grade of the semiquantitative scoring system ($r = -0.19$, $p < 0.01$). No correlation was found between the CT value and weight ($p = 0.20$).

Conclusion: This study confirms the presence and provides data on the prevalence of US abnormalities at MH level in healthy individuals. Moreover, normal values for US CT of MH were reported.

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FRI0635

ULTRASOUND IN THE ASSESSMENT OF TENOSYNOVITIS IN JUVENILE IDIOPATHIC ARTHRITIS: SYSTEMATIC LITERATURE REVIEW

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Background: Tendon involvement is common in patients with juvenile idiopathic arthritis (JIA). Differentiating tenosynovitis and underlying arthritis may be challenging on the basis of clinical examination (CE) alone. In daily clinical practice, ultrasound (US) imaging with Doppler information can be more versatile as it allows a dynamic assessment of joint inflammation and can be done quickly at the bedside. US can reliably evaluate the location of inflammation and provide direct visualization when local steroid injection is considered as treatment for children with JIA.

Objectives: To present the published data concerning the US assessment of tenosynovitis and the US metric properties investigated in JIA.

Methods: A systematic literature review (SLR) was conducted comprising PubMed, Embase and the Cochrane Library (before June 2018). Search terms: "arthritis, juvenile" AND, "tenosynovitis OR tendinopathy" AND "ultrasonography" OR "Doppler" AND "diagnosis OR therapy management". Selection criteria: Original articles published in English reporting US, tenosynovitis and tendinopathy in the paediatric population (up to 18 years old) with JIA. Data were extracted from manuscripts meeting the selection criteria, with particular focus on the definition used, scoring system applied and the US metric properties investigated. The quality of the studies was assessed using the same methodology developed for the SLR on paediatric synovitis [1].

Results: After selection, 11 articles were analysed. The tibialis posterior tendon group and peroneal tendons were the most commonly evaluated. Most authors applied the OMERACT definition proposed to rheumatoid arthritis (RA) [2] for evaluating paediatric tenosynovitis. Binary scoring

system on both grey scale and Doppler was applied in most of studies. Doppler function was commonly included, with only five specifying the Doppler parameters that were used. Construct validity was reported in roughly 50% of articles, including the CE as the main comparator. However, some of those articles have shown that clinical evaluation underestimates tendon involvement. US reliability and responsiveness for tenosynovitis in JIA was rarely included.

Conclusion: Although US seems a promising image modality to assess tenosynovitis in JIA, this SLR emphasizes the definitions of US elementary lesions of RA are frequently used in children. Moreover, there is insufficient evidence of studies exploring the construct validity of the US-determined tenosynovitis in JIA. Further validation studies are needed for implementation in clinical practice and trials.

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FRI0636

SUSCEPTIBILITY WEIGHTED SEQUENCES IN MAGNETIC RESONANCE IMAGING CAN CREATE COMPUTED TOMOGRAPHY-LIKE IMAGES AND IMPROVE THE ACCURACY OF STRUCTURAL LESION DETECTION OF THE SACROILIAC JOINT IN AXIAL SPONDYLOARTHRITIS

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Background: In patients with axial spondyloarthritis (axSpA) the accurate depiction of structural lesions in magnetic resonance imaging (MRI) is impeded because MRI – while gaining signal from the bone marrow – allows only an indirect depiction of the cortical bone and sclerotic areas. Computed tomography (CT) is considered to be the gold standard as it displays the calcium-containing cortical and trabecular bone substance. However, the exhibited radiation exposure in CT limits its application in the clinical routine. Susceptibility weighted imaging (SWI) is an advanced MRI technique, that is able to visualise calcium due to its magnetic properties and allows a reconstruction of CT-like images without radiation exposure. (1)

Objectives: To investigate the diagnostic accuracy of CT-like images generated from SWI for the detection of structural lesions of the SI-joint.

Methods: Twentytwo patients with suspicion of or known axSpA were included. All patients underwent a 1.5-Tesla-MRI including T1 and SWI sequences and a low-dose CT of the sacroiliac joints. CT images were reconstructed in 4 mm oblique coronal reconstructions matching the orientation and slice thickness of the MRI. MRI and CT images were scored for erosions, sclerosis and joint space alterations applying the 24 regions method, a modification of the Berlin score. (2) Using CT as standard of reference, sensitivity (SE) and specificity (SP) values were calculated on patients' level. A score of 2 or higher in any quadrant was considered positive. The sumscores of T1 and SWI were compared to CT using Pearson's test.

Results: The mean erosion sumscore was 5.5 ± 5.5 , 6.3 ± 8.2 and 5.9 ± 9.2 for T1, SWI and CT respectively. The mean sclerosis sumscore was 0.78 ± 1.5 , 5.5 ± 6.5 and 6.9 ± 6.9 . Five patients had joint space alterations (pseudowidening or ankylosis) in CT. Both, T1 and SWI showed an SE of 100% and a SP of 84.5% for erosions, however, the erosion sumscore correlated better for SWI (Pearson's r : 0.93) than for T1 (r : 0.64). With respect to sclerosis T1 (SE 30%, SP 100%, r 0.42) was inferior to SWI (SE 90%, SP 92%, r 0.81). It was also less

sensitive to joint space alterations (T1: SE 40%, SP 94%; SWI: SE 80%, SP 100%).

Conclusion: While T1 weighted MRI provides sufficient diagnostic accuracy for the detection of erosions, the CT-like images derived from SWI allow for a more accurate depiction of structural lesion of the SI-joint. SWI provides additional information identifying sclerosis. However, it is not suited to replace T1-weighted imaging because fatty metaplasia of the bone marrow or inside an erosion cavity cannot be detected.

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FRI0637

MUSCLES IN MYOSITIS PATIENTS WITH NORMAL MRI APPEARANCE HAVE HIGHER QUANTITATIVE T2 COMPARED TO THOSE IN HEALTHY CONTROLS

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Background: Myositis is an autoimmune disease which can cause a decrease in quality of life and increased mortality. Clinical presentation includes muscle weakness, myosteatosis, raised muscle enzymes and myalgia. Currently, diagnosis is reliant on subjective clinical examinations, blood tests, conventional MRI and invasive muscle biopsies. Quantitative T2 imaging offers a non-invasive measurement of muscle oedema which could help improve the understanding of muscle pathology and potentially inform diagnosis ⁽¹⁾.

Objectives: To evaluate whether quantitative T2 MRI of muscles is sensitive enough to be able to detect differences in myositis patients compared to healthy controls, and how it compares with current radiologist scoring methods.

Methods: 19 active myositis patients (12 female, mean age 55 ± 18) diagnosed according to the Bohan and Peter myositis criteria (Mean CK 1511 ± 11291) and 19 age and gender matched healthy controls had an MRI scan of their dominant thigh. Imaging was performed using a fat-suppressed turbo-spin echo (TSE) sequence with 16 echo times, evenly spaced from 9.9ms to 153.4ms. Quantitative T2 measurements were obtained from regions of interest (ROI) drawn manually within the individual muscles that make up the quadriceps and hamstrings with no distinction made between affected and unaffected muscles. A mono-exponential fit was used to obtain an estimate of the T2 from each ROI. Two radiologists semi-quantitatively scored by consensus the muscles on a 4-point visual scale as either no oedema (0), mild oedema (1), moderate oedema (2) or severe oedema (3). In addition to MRI, all participants had knee extension and flexion measured as power and torque on an

isokinetic dynamometer. Differences were assessed using independent T-tests.

Results: Quantitative T2 values were significantly higher (P=0.001) in myositis patients compared to healthy controls with mean measurements in the hamstrings (figure 1) of 47ms in patients and 40ms in healthy controls, and in the quadriceps 52ms in patients and 41ms in healthy controls, whilst muscle strength and power were significantly reduced (P=0.001). Interestingly, 8 myositis patients scored as having no oedema in the muscles by the radiologists (score = 0) still had significantly higher T2 values than 8 age and gender matched healthy controls (P=0.003 in hamstrings and P=0.001 in quadriceps) with mean T2 measurements in the hamstrings (figure 2) of 43ms in patients with no oedema and 37ms in healthy controls and in the quadriceps 43ms in patients with no oedema and 40ms in healthy controls. These results were consistent across both muscle groups and the individual muscles.

Conclusion: Quantitative T2 measurements can detect muscle differences between myositis patients and healthy control groups. They are also sensitive to differences between the muscles of myositis patients which are assessed to have no oedema by radiologist scoring, and healthy controls. This suggests that subtle systemic changes in muscle in myositis patients, which go undetected in semi-quantitative scoring, can be detected using quantitative T2 measurements. This shows the potential for T2 measurements to be a diagnostic measure in the diagnosis and management of myositis.

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Figure 1. T2 measurements in myositis patients compared with healthy controls in the hamstrings

Figure 2. T2 measurements compared to semi-quantitative scores in myositis patients and healthy controls

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