RP have younger age at onset (<30 years), there are no clinical features of a secondary disease, no trophic changes or abnormal capillaroscopic pattern.

Methods: Literature data on quantitative analysis of capillaroscopic parameters in primary RP are limited.

Results: In an own study that included 31 patients with primary RP patients, significantly wider arterial and venous capillary diameters as compared with healthy controls was found in 96.6% of cases. The mean arterial capillary diameter (0.018 ± 0.004 mm) in primary RP patients was significantly larger in comparison healthy volunteers (0.012 ± 0.001 mm, $p < 0.005$). The mean venous capillary diameter was also significantly higher in primary RP (0.026 ± 0.006 mm vs 0.017 ± 0.002 mm in healthy controls, $p < 0.005$).¹ Similarly, Bukhari *et al.* (2000)² also observed greater diameters of arterial, venous limb and apical loop in comparison with control subjects in 15 primary RP patients, but the difference was not statistically significant.² Anderson *et al.* (2005)³ also found greater capillary diameters in 21 patients with primary RP vs healthy volunteers but the difference was statistically significant only for the arterial capillary limb and the apex loop but not for the venous capillary diameter.³

Conclusions: These capillaroscopic observations in primary RP patients suggest that the absence of an abnormal capillaroscopic pattern is diagnostic for primary RP but minor capillaroscopic dilation is a frequent microvascular feature in these patients.

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Disclosure of Interest: None declared

DOI: 10.1136/annrheumdis-2018-eular.4075

AB1219 CONTRIBUTION OF MRI TO CERVICAL INVOLVEMENT IN RHEUMATOID ARTHRITIS: PROSPECTIVE STUDY OF 30 CASES

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Background: Cervical spine involvement is common during RA and is characterised by its potential severity.

Objectives: To determine the prevalence of cervical involvement in RA, to clarify the contribution of MRI to diagnosis and to identify predictive factors for cervical rheumatoid involvement.

Methods: Our study included 30 RA patients with a duration of more than 2 years.

Results: 16 patients (53%) were assessed on the two imaging methods (standard radiographs in 37% and MRI in 53%), of which 2 cases (7%) were asymptomatic. This cervical involvement was dominated by the C1-C2 pannus objectivated in 50% of cases and AAS. Of the AAS, aAAS was the most frequent with a prevalence of 23%, followed by the pAAS found in 10% of the cases, the vAAS present in 7% of the cases then the IAAS and the rAAS objectivated in 3% each. The ASS was found in 3 cases (10%), odontoid erosion in 11 cases (37%), C1-C2 arthritis in 5 cases (16%) and inflammatory spondylodiscitis in 6 cases (20%). MRI resulted in a better study of the C1-C2 pannus and odontoid erosions as well as the evaluation of the impact of rheumatoid lesions on the neural axis: a medullary imprint was noted in 4 cases (13%). Several factors were associated with cervical rheumatoid involvement: the presence of cervicobrachial neuralgia or bulbomedullary signs, duration of PR ≥ 5 years, HAQ score ≥ 1.1 and positive RF. The search for factors associated with AAS has revealed the duration of the disease, DAS $28 > 3.2$ and the presence of a biological inflammatory syndrome.

Conclusions: Cervical involvement accompanies the active and destructive forms of RA. It can be asymptomatic, it is the interest to seek it in a systematic way in RA. The standard radiography with dynamic views is to be realised first-line. The MRI must be indicated in order to make an early diagnosis, to carry out an accurate lesional assessment and to guide the therapeutic decision.

Disclosure of Interest: None declared

DOI: 10.1136/annrheumdis-2018-eular.5730

AB1220

STUDY OF THE RELATIONSHIP BETWEEN TOE DEFORMITIES IN THE FOREFOOT REGION AND THE FLEXOR TENDONS IN RHEUMATOID ARTHRITIS USING 3D VOLUME RENDERING

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Background: Multi-slice computed tomography (CT) is frequently used to evaluate the morphology, arrangement, and other characteristics of bone. Three-dimensional volume rendering (3D-VR) has made it possible to three-dimensionally visualise tendons and other structures by arbitrarily changing CT values. In deformities of the forefoot region in rheumatoid arthritis (RA), dislocation of the metatarsophalangeal (MTP) joints results in the formation of painful calluses that require surgery; however, the toes can sometimes be displaced inwards or outwards by this dislocation. MTP joint dislocation also causes the flexor tendons to dislocate from their original positions, although the relationship with toe displacement is unclear.

Objectives: We therefore used 3D-VR to examine the relationship between the flexor tendons and toe displacement in the dislocated toes of RA patients.

Methods: Thirty-one feet (10 right and 21 left) of 24 patients (5 men and 19 women) were examined. The Tsuboi classification was used to classify MTP joint dislocation into subluxation (Grade 2) or dislocation (Grade 3). CT images taken with no load applied to the feet were used for preoperative evaluation. The mean age of the patients at the time of imaging was 59.0 (36–76) years. A Fujifilm volume analyzer (SYNAPSE VINCENT) was used for 3D-VR reconstruction and CT values were adjusted to visualise the flexor tendons and examine their relationship with the heads of the metatarsal bones. When the flexor tendons were displaced inward or outward from the base of the metatarsal bone head, this was classified as flexor tendon dislocation. Toe displacement was identified when the proximal phalanx was displaced inward or outward from the extended line of the metatarsal axis.

Results: MTP joint dislocation was seen in 80 toes (63 cases of dislocation and 17 cases of subluxation). The flexor tendons were dislocated in 27 s toes (15 inward and 12 outward), 27 third toes (21 inward and 6 outward) and 16 fourth toes (15 inwards and 1 outward). Of the cases of MTP joint dislocation, toe displacement was seen in 12 s toes (1 inward and 11 outward), 12 third toes (12 outward) and 2 fourth toes (1 inward and 1 outward). The flexor tendons were dislocated towards the displaced toes in all cases. No flexor tendon dislocation was seen in any of the cases of subluxation.

Conclusions: RA is often accompanied by hallux valgus and toe displacement is affected by retraction of the first toe. The results of this study demonstrate that the toes are displaced inwards in some cases and can become dislocated independent of the influence of the first toe. All the toes were displaced towards the dislocated flexor tendons and MTP arthritis had resulted in loosening of the joint capsule and ligaments and dislocation of the flexor tendons, which was likely to cause displacement.

Disclosure of Interest: None declared

DOI: 10.1136/annrheumdis-2018-eular.4497

AB1221

THE ASSOCIATION BETWEEN SYNOVITIS IN THE FOOT ON JOINT ULTRASONOGRAPHY AND CLINICAL PARAMETERS IN PATIENTS WITH RHEUMATOID ARTHRITIS

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Background: Treatment of rheumatoid arthritis (RA) has improved dramatically with the widespread use of biological disease-modifying antirheumatic drugs. In this context, the number of RA patients who undergo orthopaedic surgery is reportedly decreasing. However, the number of RA patients who undergo foot surgery is increasing. Joint ultrasonography has been used for early diagnosis and

disease activity assessment in RA, allowing visualisation of synovitis. However, few detailed studies or evaluations of clinical parameters related to synovitis in the foot have been performed.

Objectives: This study investigated the association between synovitis in the foot as observed on joint ultrasonography and the degree of disability on the health assessment questionnaire (HAQ) in RA patients.

Methods: The study included 79 outpatients (101 feet) with RA. Patients who had undergone surgery were excluded. The mean age was 66.0 years (24–92 years), and the mean disease duration was 13 years and 5 months (ranging from 1 month to 49 years). Joint ultrasonography was performed by the same examiner using the same diagnostic instrument in the same room. Synovitis was defined as a power Doppler score of $\geq$ Grade 1. The scanning sites were forefoot (metatarsophalangeal joints of toes 1–5), metatarsus (calcaneocuboid and talonavicular joints), and hindfoot (talocrural and subtalar joints, peroneal tendon, posterior tibial tendon). The presence or absence of synovitis was evaluated at each site, and the association with the HAQ score was examined.

Results: Synovitis was detected in the forefoot of 40 feet (39.6%), in the metatarsus of 34 feet (33.7%), and in the hindfoot of 63 feet (62.4%). Patients with synovitis in the forefoot (PD+: 0.41 ± 0.1 , PD-: 0.80 ± 0.1 , $p=0.018$) and hindfoot (PD+: 0.52 ± 0.1 , PD-: 0.86 ± 0.1 , $p=0.043$) had significantly lower HAQ scores.

Conclusions: Given that assessment of foot impairment is not included in the disease activity index for RA, there may be a delay in diagnosis of foot lesions. Our results showed that patients with synovitis in the forefoot and rearfoot had lower HAQ scores (disability measure), suggesting that increased physical activity may be associated with increasing incidence of synovitis in the foot. The ability of RA patients to perform activities of daily living may have improved with advances in pharmacotherapy, leading to increased physical stimulation, resulting in an increased incidence of synovitis of the foot.

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Disclosure of Interest: None declared

DOI: 10.1136/annrheumdis-2018-eular.6050

AB1222 COMPARISON OF QUANTITATIVE MRI FAT-FRACTION MEASUREMENT IN SIJ JOINT ON DIFFERENT SCANNER PLATFORMS

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Background: Quantitative MRI Proton Density Fat Fraction (PDF) measurement can objectively identify areas of active inflammation and structural damage in spondyloarthritis by identifying oedema and fat metaplasia in bone marrow.¹ PDF is typically implemented as a 3D multi-echo Gradient-echo protocol and all of the major MRI equipment manufacturers have PDF imaging products available that combine a complex multi-peak fat-spectrum model with simultaneous determination and correction for T2* signal decay. However, if the appropriate specialist imaging option has not been purchased, as is commonly the case, then the user may have to rely on simpler base-level protocols for fat-fraction measurement. An important step to implementing quantitative fat-fraction measurement as a clinical tool is to demonstrate that measurements are robust to both scanner platform and measurement technique.

Objectives: We aimed to compare quantitative FF measurements obtained using 3 scanners supplied by different manufacturers, and using a range of techniques.

Methods: The sacroiliac joints (SIJ) of 10 healthy volunteers (mean age 42 years, range 23–63) were scanned on 3 scanners: a) 3T Philips Ingenia, using MDixon Quant (MDQ) – a specialist PDF package; b) 1.5T GE Optima MR450W, using IDEAL and LAVA – both base-level options; and c) 3T Siemens Skyra, using DIXON – a base-level option. We also scanned a fat-water phantom constructed using tubes of emulsions of peanut oil and 3% agar. MDQ uses data from 6 different echo-times; IDEAL from 3; and LAVA and DIXON from 2. The excitation flip angle was set to 3 degrees for all acquisitions to minimise the T1 weighting. Each technique yields Fat-only (F) and Water-only (W) images. FF images were calculated using the formula: $FF = F/(W+F)$. Regions of interest (Rois) were drawn in the SIJ as shown in the figure 1. MDQ PDF was used as the 'gold-standard' measurement for comparison to IDEAL, LAVA and DIXON.

Results: The figure shows the results of the RoI analysis. For the phantom measurements, both LAVA and IDEAL correlated well with MDQ, but Siemens DIXON deviated away from the expected linear relationship. The *in vivo* data showed good linear relationships with MDQ for all 3 base-level techniques for FF in the range 0.4–0.8, although all 3 slightly underestimated FF compared to MDQ.

Abstract AB1222 – Figure 1

Conclusions: A clinically useful quantitative image-analysis tool should be applicable to results obtained from several platforms. FF measurement in the bone marrow of the SIJ is robust to both technique and platform. The slight underestimation of FF values on base-level FF measurements is probably due to the influence of T2* weighting. However, these variations are smaller than the FF changes observed in areas of oedema or fat metaplasia.¹ FF measurement is a quantitative and widely applicable method for the diagnosis and assessment of spondyloarthritis.

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Acknowledgements: Funding: BANNAR; TB:ARUK grant 21369/MHC; UCLH BRC;

Disclosure of Interest: None declared

DOI: 10.1136/annrheumdis-2018-eular.5411

AB1223 ULTRASONOGRAPHY EXAMINATION OF ELBOWS IS USEFUL WHEN COMBINED WITH EXAMINATION OF PIP AND WRIST JOINTS

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Background: Because elbows are important joints for the function of upper limbs, the daily activity of the patients with rheumatoid arthritis (RA) may be impaired by synovitis of elbows. Although elbows are included into the 28 essential joints for evaluation of the disease activity of RA, ultrasonography (US) examination of elbows is not routinely performed and there have been a few surveys on the correlation between US scores of elbows and disease activity.

Objectives: To reveal whether there is a correlation between US scores of elbows and disease activity in the patients with RA.

Methods: We recruited 198 patients with RA from KURAMA cohort, which is the database of the patients with RA treated in the Kyoto University Hospital, and performed US examination of proximal interphalangeal (PIP) joints, metacarpophalangeal (MP) joints, wrist joints and elbow joints. Synovial hypertrophy is scored semiquantitatively on a scale of 0–3. We analysed correlations between the total scores of each component (PIP, MP, wrist and elbow) and clinical parameters.

Results: We found weak correlations between DAS28-ESR and the US scores of PIPs, MPs and wrists ($\rho=0.25$, 0.21 and 0.29 , respectively) whereas there was little correlation between DAS28-ESR and the US score of elbows ($\rho=0.16$). However, multivariable analysis showed that the US scores of PIPs, wrists and elbows were independently associated with DAS28-ESR ($p=0.021$, 0.0027 and 0.025 , respectively). US scores of elbows showed little or weak correlations with US scores of PIPs, MPs and wrists ($\rho=0.23$, 0.16 and 0.11 , respectively).

Conclusions: US examination of elbows may be useful to assess the disease activity of patients when combined with US examination of PIPs and wrists although US scores of elbows alone has a weak correlation with DAS28-ESR. US examination of elbows may detect the disease activity which is overlooked by the US examination of joints of hand.