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AB1130 RELIABILITY OF ULTRASOUND MEASUREMENT OF HYALINE CARTILAGE THICKNESS IN RHEUMATOID ARTHRITIS

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Background: Only few studies investigated the role of ultrasound (US) in the assessment of hyaline cartilage in rheumatoid arthritis (RA).

Recently, a positive correlation was found between the US measurement of the metacarpal head cartilage thickness (MCT) and both the anatomical MCT and the radiographic joint space width¹.

Objectives: To evaluate inter- and intra-observer reliability in the assessment of MCT in RA patients and healthy subjects; to compare the agreement of the sonographers in the assessment of the MCT using different methods (i.e. semiquantitative and quantitative); to determine the inter-observer smallest detectable difference (SDD) of MCT measured by US.

Methods: US assessment was performed by two rheumatologists on 160 metacarpophalangeal (MCP) joints of 10 healthy subjects and 10 patients with RA (according to 2010 ACR/EULAR classification criteria) using a MyLab Twice (Esaote Biomedica, Genoa, Italy) equipped with a linear very high frequency probe (i.e. 10-22 MHz)

To assess inter-observer reliability, the hyaline cartilage of metacarpal head from II to V digits of both hands were examined independently on the same day by two rheumatologists (an experienced musculoskeletal sonographer and an investigator with limited US training).

To assess intra-observer reliability, all the subjects were re-scanned using the same scanning protocol and the same US setting by one sonographer after a week.

Hands were scanned with the MCP joints in maximal flexion (approximately 90°). The hyaline cartilage of all the metacarpal heads was scanned in longitudinal and transverse views in the central portion of the metacarpal head. Particular attention was paid on maintaining the probe in a position providing an angle of 90° between the direction of the US beam and the cartilage surface².

MCT was scored both semi-quantitatively (using a five-grade scoring system³) and quantitatively (using the average value of the longitudinal and transverse measures).

The inter- and intra-observer agreements for assessing the MCT with the semiquantitative scoring system were calculated using Cohen's kappa and interpreted according to Landis and Koch.

The inter- and intra-observer agreements for assessing the MCT with the quantitative scoring system were calculated using intraclass correlation coefficients (ICC) and their 95% confident intervals (95%CI).

The SDD was determined using Bland-Altman 95% limits of agreement method.

Results: The inter- and intra-observer agreements for the semiquantitative assessment of the MCT were moderate [$k=0.59$ (95%CI 0.35-0.83) and $k=0.63$ (95%CI 0.39-0.87), respectively].

Considering all the measurements, a substantial inter-observer [ICC= 0.88 (95%CI 0.82-0.92)] and intra-observer [ICC= 0.88 (95%CI 0.87-0.94)] agreements for the quantitative assessment of MCT were found.

The SDD of the MCT measurement was: 0.11 mm for both longitudinal and transverse scans and 0.09 mm for the average of the two measures.

Conclusion: This study provides evidence in favor of the reliability of semiquantitative and quantitative US methods for assessing MCT in RA. Further studies are required to determine standard reference values of MCT by US in healthy subjects.

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AB1131 HIGH-RESOLUTION ULTRASOUND ASSESSMENT OF CARTILAGE THINNING IN RHEUMATOID ARTHRITIS

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Background: Conventional radiography is the standard imaging modality to detect joint damage in rheumatoid arthritis (RA). Ultrasound (US) allows for a direct visualization of hyaline cartilage. To date, only few studies investigated the role of US in the assessment of cartilage damage in RA.

Objectives: To compare US qualitative and quantitative assessments of cartilage thinning at metacarpal head (MH) in RA patients and in an age-, sex- and height-matched healthy controls (H). To correlate cartilage damage and clinical parameters in RA.

Methods: US examination was performed on 318 metacarpophalangeal (MCP) joints of 40 consecutive RA patients and on 320 MCP joints of 40 age-, height- and sex-matched H using a MyLab Twice (Esaote Biomedica, Genoa, Italy), equipped with a high frequency linear probe (up to 22 MHz).

RA patients were enrolled according to the 2010 RA classification criteria. The hyaline cartilage of MH from II to V digits of both hands was examined with the MCP joints in maximal flexion.

Each MH was scanned in longitudinal and transverse views. Particular attention was paid on maintaining the probe in a position providing an angle of 90° between the direction of the US beam and the cartilage surface¹.

Cartilage thickness (CT) was assessed both semi-quantitatively (using a reliable qualitative five-grade scoring system²) and quantitatively (using the mean value of longitudinal and transverse measurements of the CT). Finally, association between cartilage damage and clinical parameters was assessed.

Results:

Semiquantitative score: Cartilage thinning (grade 2, 3 and 4) was found in at least one MH in 23 RA patients (57.5%) and in 4 H (10.0%) ($p<0.01$). A significantly higher prevalence of cartilage damage (grade 2, 3 and 4) at joint level was found in RA patients (86 MCP joints, 27.0%) in comparison with H (13 MCP joints, 4.1%) ($p<0.01$).

Quantitative assessment: CT of the MH ranged from 0.0 to 1.10 mm (0.60 ± 0.26 mm, mean $\pm$ SD) in RA patients and from 0.41 to 1.08 mm (0.67 ± 0.12 mm, mean $\pm$ SD) in H. Male had a thicker hyaline cartilage than female, both in RA patients ($p<0.01$) and in H ($p<0.01$). No significant difference was found between left and right side, both for RA patients ($p=0.48$) and healthy subjects ($p=0.94$).

Detailed quantitative measurements of CT of MH are reported in table 2.

Abstract AB1131 Table 2. US cartilage thickness measurement for each digit in RA patients and healthy controls.

	RA patients (n=39)	Healthy subjects (n=40)	Mean difference, 95% CI (mm)	P value
	Mean (mm)	Mean (mm)		
II MH	0.62	0.75	0.13; 0.06-0.21	<0.01
III MH	0.57	0.64	0.07; 0.02-0.13	0.01
IV MH	0.61	0.64	0.03; -0.03-0.09	0.35
V MH	0.62	0.65	0.03; -0.02-0.09	0.20
Sum	2.43	2.68	0.25; 0.03-0.46	0.02

95%CI: 95% confidence interval; L: left; MH: metacarpal head; R: right; RA: rheumatoid arthritis; SD: standard deviation; US: ultrasound.

A significant association was found between the CT value and age ($r=0.528$, $p<0.001$), disease duration ($r=-0.376$, $p=0.005$) and grade of the semiquantitative scoring system ($r=0.80$, $p<0.001$). No association was found between CT and BMI, weight, ACPA positivity and RF positivity.

Conclusion: This study demonstrated that a significantly higher prevalence of cartilage damage was found in RA patients using both the semiquantitative score and the quantitative assessment. In particular, in RA patients the hyaline cartilage of II and III MH is thinner in comparison with H. Finally, a significant association was found between the CT values and disease duration and age.

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AB1132 THE ROLE OF PET/CT IN THE MANAGEMENT OF GIANT CELL ARTERITIS

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Background: Giant cell arteritis (GCA) is a large vessel vasculitis that affects the aorta and/or its major branches including the superficial temporal artery. Together to cranial symptoms such as headache and visual disturbances, extra cranial manifestations have been widely reported, sometimes as unique clinical presentation. Several imaging modalities are available to evaluate aortic involvement including fluorodeoxyglucose (FDG) positron emission tomography (PET), however there are few reports that analyzed the impact of the findings of this advanced imaging in predicting outcomes of the disease.

Objectives: To assess the utility of PET in disease extension assessment to predict, together to clinical manifestations, the disease evolution.

Methods: We retrospectively reviewed all the clinical records of patients receiving a diagnosis of large vessel vasculitis from 1st January 2010 to 1st January 2016 at a tertiary immunorheumatology clinic of a university Hospital, who underwent a PET. Clinical, laboratory, and imaging data were collected. Non-parametric analysis was performed.

Results: We recruited 19 patients (10 females, 52.6%). The median age was 74.0 [65.5-76.0]; at the diagnosis, the median erythrocyte sedimentation rate (ESR) was 65.5 [49.0-86.0], while C-reactive protein (CRP) was 8.5 [5.5-14.0]. 12 patients showed a typical cranial GCA (63.2%), while 7 (36.8%) were diagnosed with extracranial GCA. The two groups were comparable at diagnosis for age, gender, median ESR and CRP. Interestingly, the PET was significative for aortitis not only in the 7 patients with extracranial involvement, but also in 7/12 patients with cranial GCA (58.3%). Along a median follow-up of 15 months [4.5-26.5], 4 relapses were reported. Notably, all the relapsers were males and showed both aortic and cranial involvement. In a multivariate model, male gender was the only predictor of relapse ($p=0.02$), while age at onset, clinical subset (cranial vs. extracranial) and steroid dose did not fit the model

Conclusion: The use of PET in GCA is relevant in the assessment of extension of disease since a significative number of patients without cranial symptoms in the end resulted to have large vessel involvement. In addition, PET is useful in identifying patients with cranial involvement that have also aortic inflammation since they seems to have worse prognosis.

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AB1133 AUTOMATED ASSESSMENT (AUTOCAP) OF NAILFOLD CAPILLARY NUMBER VERSUS MANUAL COUNTING IN SYSTEMIC SCLEROSIS PATIENTS WITH DIFFERENT CAPILLAROSCOPIC PATTERNS

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Background: The nailfold videocapillaroscopy (NVC) analysis allows microvascular detection of possible markers of severity and progression in systemic sclerosis (SSc), as reduced capillary number, which has been associated with a high risk of developing disease complications (i.e.

digital ulcers over time) (1-2). A recent study validated an automated counting system (AUTOCAP) for the absolute nailfold capillary number in SSc patients by analysing the capillaroscopic images (3).

Objectives: To evaluate the performance of this automated software for absolute nailfold capillary number counting, in SSc patients with different NVC patterns of microangiopathy.

Methods: 183 random SSc patients collected at both Genova and Ghent Divisions of Rheumatology were enrolled (LeRoy 2001 or ACR 2013 criteria, mean age 55±13 year, mean disease duration 5.5±6.8 years) and classified by NVC in the following patterns: 28 "not specific", 37 "early", 89 "active", 29 "late". 8 fingers for each patient were analysed, counting the number of nailfold capillaries manually and by the AUTOCAP software (DS Medica, Italy) along a millimetre in each finger image. The mean capillary number value of the eight finger images was calculated. The software reliability was assessed through calculation of the intraclass correlation coefficient (ICC) between automatic and manual counting.

Results: The mean number of capillaries assessed by manual vs automatic counting was as follows: 5.23±1.7 vs 5.47±1.3 in the total group of SSc patients, 5.91±1.2 vs 6.87±1.2 in the "not specific", 7.23±1.4 vs 5.67±1.1 in the "early", 4.67±1.1 vs 5.16±1.2 in the "active" and 3.72±1.5 vs 4.85±1.1 in the "late" pattern of microangiopathy. The higher standard deviation observed for automatic counting was 1.23 in the "not specific" group. The following ICC's were obtained respectively for total patients, "not specific", "early", "active", and "late" NVC patterns: 0.53, 0.51, 0.48, 0.50 and 0.66. The mean values for the manual versus automatic capillary counting assessed by the two centres in all SSc patients were respectively: 5.92±1.8 and 5.02±1.1 for Genova centre, and 4.71±1.5 and 5.83±1.4 for Ghent centre. The automatic counting confirmed that capillary number progressively reduces from "early" to "active" to "late" NVC pattern of microangiopathy in SSc.

Conclusion: This study reports for the first time the good reliability of AUTOCAP software in nailfold capillary number counting in SSc patients with different patterns of microangiopathy. The use of automated counting software need to standardize nailfold capillary assessment among different Rheumatological centres.

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AB1134 IMPROVING THE STANDARDISATION OF DIAGNOSTIC LABORATORY TESTS FOR RF AND ACPA THROUGH THE ESTABLISHMENT OF A NEW INTERNATIONAL REFERENCE MATERIAL

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Background: Rheumatoid arthritis is a debilitating chronic inflammatory disease. Its laboratory diagnosis relies mainly on testing for the presence of two groups of autoantibodies in patient's serum: rheumatoid factor (RF) and anti-citrullinated protein antibodies (ACPA). Most RF assays are standardised against W1066, the WHO international standard rheumatoid arthritis serum established in 1968, or 64/002, the British Standard rheumatoid arthritis serum, which is the same material. Stocks of W1066 are becoming exhausted which triggered a decision by NIBSC and WHO to prepare a new standard preparation intended to replace W1066.

Objectives: Primarily, we have a responsibility to ensure the continuity of W1066 as a calibrator in RF agglutination-based assays. However, science has progressed and ACPA are now recognised as equally important to RF in the diagnosis of rheumatoid arthritis which is reflected in the ACR/EULAR 2010 classification guidelines. Therefore, we intend to assign the new standard values in international units to both RF and ACPA. In addition, some assays look at isotype-specific RF, so we will assess whether we can establish nominal values for the most common isotypes, IgM-RF and IgA-RF.

Methods: A pool of rheumatoid arthritis serum was prepared and dispensed into ampoules, lyophilised and sealed under an inert nitrogen atmosphere. An international collaborative study was organised with expert laboratories, including commercial kit manufacturers and medical