FRI0631

MUSCLE STIFFNESS AND WEAKNESS IN RHEUMATOID ARTHRITIS – A SHEAR WAVE ELASTOGRAPHY STUDY

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Background: Myopathy is a recognised but less investigated symptom of rheumatoid arthritis (RA) compared to other extra-articular manifestations. To date, the documentation of myopathic features in RA is poorly detailed. No studies have yet utilised a non-invasive quantitative method to define and investigate these features. Shear wave elastography (SWE), a novel ultrasound technology, can measure muscle stiffness to provide insight into the biomechanical properties of skeletal muscle.

Objectives: 1- To investigate muscle stiffness (using SWE) and strength in three cohorts of RA patients compared to healthy controls.

2- To study the association between muscle strength and stiffness in RA. **Methods:** Shear wave velocity (SWV), as a measure of muscle stiffness, was evaluated in the quadriceps, hamstrings and biceps brachii in 80 RA patients from three disease activity groups newly diagnosed treatment naïve RA [n=29; mean age 56.8 ± 10.6 years], persistent active RA for at least 1 year [n=18; 60.9 ± 15.9 years] and remission RA for at least 1 year [n=33; 65.9 ± 11.6 years], and compared them to 40 healthy controls (56.8 ± 10.6 years). The participants performed various muscle tests (handgrip strength, expanded timed get up and walk test (ETGUGT), chair stand and isokinetic knee extension/flexion) to assess their strength and physical performance. One-way ANOVA was used to compare SWV and muscle assessment results, and Pearson's correlation was used to evaluate the correlation between muscle stiffness and strength.

Results: Mean SWV was not significantly different amongst the RA groups or compared to the healthy controls (p>0.05). For example, the rectus femoris SWV was 1.69±0.15 m/s for healthy controls, 1.68±0.18 m/s for new RA, 1.70±0.16 m/s for active RA and 1.68±0.14 m/s for remission RA (p=0.96). The muscle assessment results are presented in table 1 and compared to healthy controls in figure 1. Overall, the active and new RA groups showed significant muscle weakness compared to healthy controls. The remission RA group did not show a significant difference except in the isokinetic knee strength (-21%; p=0.027). The correlations between SWE and the muscle assessment results were weak and insignificant (r<0.30; p>0.05).

Table 1. Muscle assessment results for all participants.

Test	Healthy controls (a)	New RA (b)	Active RA (c)	Remission RA (d)	p-value	Post hoc [*]
ETGUGT, Total time (sec)	16.6 (4.3)	20.7 (5.7)	21.5 (6.3)	18.2 (4.5)	0.002	a>b,c
Number of chair stands in 30 sec	17.0 (5.8)	12.3 (6.0)	9.5 (6.3)	14.0 (5.4)	<0.001	a>b,c
Handgrip strength (kg)	31.5 (13.7)	17.3 (8.1)	17.3 (8.4)	26.6 (10.9)	<0.001	a,d>b,c
Knee extension torque (Nm/kg)	1.29 (0.42)	1.06 (0.45)	0.93 (0.47)	1.20 (0.40)	0.026	a>c
Knee flexion torque (Nm/kg)	0.75 (0.27)	0.53 (0.27)	0.60 (0.29)	0.59 (0.25)	0.006	a>b,d
Knee extension power (W/kg)	0.75 (0.29)	0.58 (0.30)	0.52 (0.32)	0.68 (0.28)	0.029	a>c
Knee flexion power (W/kg)	0.47 (0.18)	0.32 (0.19)	0.34 (0.21)	0.34 (0.18)	0.005	a>b,d

* The signs > or < indicate that the group(s) are significantly higher or lower at 0.05 significance level compared to others.

Figure 1. The difference percentages in muscle assessment results for the RA patients relative to the healthy controls.

Conclusion: Muscle stiffness, as determined using SWE, does not appear to be altered or associated with muscle weakness in RA patients. The remission RA group showed significantly better strength and physical performance compared to new untreated or persistently active RA groups. Future research should investigate the significant muscle weakness in RA in addition to developing prevention and therapeutic strategies.

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ASSOCIATION BETWEEN ULTRASOUND DIAGNOSIS AND ANALYTICAL AND SEROLOGICAL DATA IN PATIENTS WITH SUSPECTED PRIMARY SJÖGREN SYNDROME

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Background: Pathophysiology of primary Sjögren syndrome (SSp) is characterized by oligoclonal B-cell proliferation and ectopic lymphoid tissue formation. The association between ultrasound glandular parenchyma heterogeneity and hyperproduction of autoantibodies, which in turn represents characteristic B-cell hyperactivity of SSp, is described.

Objectives: To study the association between major salivary gland ultrasound (MSGUS) and their respective pathological grades with the analytical and serological data, and activity indexes obtained in patients with suspected SSp.

Methods: 72 patients were recruited consecutively with clinical and/or analytical suspicion of SSp from the Rheumatology outpatient consultations at the Príncipe de Asturias Hospital (2015-2018). Demographic, serological and validated activity indexes, ESSPRI and ESSDAI, were collected. All of them underwent a MSGUS and their results were classified in three grades according to the *Comec et al system*: normal (grade 0 and 1), mild (grade 2) and moderate-severe (grades 3 and 4). The final SSp diagnosis was made using both 2002 AECG and 2016 ACR/EULAR classification criteria. Data were analyzed using the software STATA. Association between MSGUS and qualitative variables was described according to the number of cases and the percentage by grades of MSGUS; the significance of the associations was tested with the Chi square test. As for the quantitative variables, the association was described with median and interval interquartile (IIQ) by grades of MSGUS and the significance of the association was verified with the non-parametric test of Kruskal-Wallis.

Results: From patients with pathological MSGUS: 51% had antiRo52, 51% antiRo60 and 36% anti-La positive; 62% hypergammaglobulinemia, 40% positive rheumatoid factor (RF), 6% and 13% C3 and C4 hypocomplementemia, respectively. Mean values were obtained: ESR 36, CRP 1.6, RF 12, ESSPRI 5.6 and ESSDAI 2. Statistically significant differences (p<0.05) were only found in antiRo52 and hypergammaglobulinemia variables in patients with normal MSGUS exam compared to those with

mild and moderate-severe pathological MSGUS exam. These data suggest that there could be differences for antiRo60, AntiLa and ESSPRI variables even though statistical significance was not achieved ($p>0.150$ in all associations explored). No differences have been found for RF, C3 and C4 hypocomplementemia, ESR, CRP and ESSDAI variables (table 1).

Conclusion: In this series of patients, a statistically significant association was found between the positivity of anti-Ro antibodies, hypergammaglobulinemia and MSGUS, as well as its subdivision by pathological grades. No statistical significant association was found between MSGUS and positivity of antiRo60 and antiLa antibodies and ESSPRI, probably due to the small sample size. There were no differences for the rest of the variables analyzed (RF, complement, acute phase reactants and ESSDAI).

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TABLE 1. ASSOCIATION BETWEEN MSGUS GRADES AND THE ANALYZED VARIABLES

MSGUS	NORMAL	GRADE 2 (MILD)	GRADE 3 (MODERATE-SEVERE)	p
AntiRo 52%	21	38	71	0.004
AntiRo 60%	32	44	62	0.150
AntiLa%	21	28	48	0.163
Hypergammaglobulinemia	16	53	76	0.001
Rheumatoid factor%	47	31	52	0.460
Hypocomplementemia C3%	11	6	5	0.757
Hypocomplementemia C4%	11	10	19	0.555
ESR mean	31	34	38	0.094
CRP mean	2	1	3	0.059
RF mean	10	9	17	0.229
ESSPRI mean	5	5.6	6.3	0.349
ESSDAI mean	2	1	2	0.078

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FRI0633

POSSIBLE ADVANTAGES OF 18F-FDG PET/CT-MR IN ADULT-ONSET STILL'S DISEASE: A STUDY FROM AN ITALIAN COHORT

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Background: Adult-onset Still's disease (AOSD) is a systemic complex autoinflammatory disorder whose diagnosis is essentially clinical and necessitates the exclusion of potential mimickers. A specific diagnostic test to define the diagnosis or assess the disease activity is still not available.

Objectives: To define the advantages of PET/MR in diagnosis and therapeutic response in AOSD patients and to assess a characteristic uptake pattern of ¹⁸F-FDG at PET/CT-MR images of our cohort.

Methods: 18 AOSD patients and 30 age- and sex-matched controls underwent ¹⁸F-FDG PET/CT-MR between 2008 and 2018. A total of 44 PET/MR and 9 PET/CT performed at Padova University Hospital were analyzed. All AOSD patients were diagnosed according to Yamaguchi's criteria and had a regular follow-up at the Rheumatology Unit. Disease activity was evaluated using Pouchot's criteria. Uptake of affected organs was considered pathological when higher than liver uptake value. In order to analyze possible statistical differences of SUV ratios between the two groups, Mann-Whitney U-Test was applied. The variables considered were SUV ratios of spleen and bone marrow (BM). The SUV ratios were calculated between SUV of spleen-to-liver and of bone marrow-to-liver. We compared PET/MR and PET/CT of AOSD patients, evaluating possible statistical differences on SUV max ratios of bone marrow and spleen with Mann-Whitney U Test. To determine the strength and direction of the relationship between the continuous variables SUV ratios and Pouchot's score in our cohort Spearman's Rank Order Correlation Coefficient was applied.

Results: All our patients presented areas of focal ¹⁸F-FDG uptake. High and homogeneous accumulation of ¹⁸F-FDG was observed at PET/CT-MR in spleen, BM, lymph nodes, pharynx, salivary glands and brown adipose tissue. PET/CT-MR of patients affected presented higher SUV ratios than controls. A statistically significant difference was observed for each SUV ratio in BM. In spleen p-values of 0.014, <0.001 and 0.002 were observed for SUV min ratio, SUV max ratio and SUV mean ratio respectively. Responders to therapy showed lower uptake at PET/CT-MR images during the follow-up. The SUVratios of PET/CT and PET/MR in AOSD were not significantly different.

Conclusion: Our patients presented higher ¹⁸F-FDG uptake at PET/CT-MR images compared to controls. Both PET/CT and PET/MR are not related to the disease activity expressed by Pouchot's score, however PET/CT-MR seems to be more reliable than Pouchot's score in disease activity assessment. PET/MR is more sensitive than PET/CT for the evaluation of BM in patients with low-disease activity and it is a better repeatable analysis compared to PET/CT because of less radiation dosage.

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FRI0634

STANDARD REFERENCE VALUES OF METACARPAL HEAD CARTILAGE THICKNESS MEASUREMENT BY ULTRASOUND IN HEALTHY SUBJECTS

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Background: The hyaline cartilage of metacarpal head (MH) is frequently involved in patients with chronic arthritis. Moreover, in a recent study a high correlation has been found between the anatomical and sonographic (US) measurements of hyaline cartilage¹. However, only very few data are available on the prevalence of pathological findings and the standard reference values in healthy subjects (H).

Objectives: To determine the prevalence of the US abnormalities at metacarpal head (MH) in H, and to measure MH cartilage thickness (CT) in order to provide standard reference values.

Methods: US examinations were performed on 944 metacarpophalangeal (MCP) joints of 118 consecutive H using a MyLab Twice (Esaote Biomedica, Genoa, Italy), equipped with a high frequency probe (up to 22 MHz). H were recruited among the staff of Rheumatology Department of the "Carlo Urbani" Hospital (Jesi, Ancona, Italy), students in medicine and patients' healthy relatives. Exclusion criteria were: hand pain (VAS score >1/10) or stiffness in the previous month or hard tissue enlargement of MCP, proximal and distal interphalangeal joints.

The MH hyaline cartilage from II to V digits of both hands was scanned with the MCP joints in maximal flexion in longitudinal and transverse dorsal views, paying attention on maintaining an angle of 90° between the direction of the US beam and the cartilage surface². CT was scored both semi-quantitatively (using a five-grade scoring system³) and quantitatively (using the mean value of longitudinal and transverse measurements of the CT). Moreover, the presence of osteophytes and bone erosions was recorded.

The association between CT and demographic data was analyzed.

Results:

Semiquantitative score: Cartilage damage was found in 21 out of 118 H (17.8%) and in 59 out of 944 MHs (6.3%): grade 1 and grade 2 in 43 (4.6%) and in 16 (1.7%), respectively. No grades 3 and 4 were detected. Osteophytes and bone erosions were respectively found in 12 (10.1%) and in 8 (6.7%) out of 118 H and in 24 (2.5%) and in 12 (1.3%) out of 944 MHs.

A slight correlation between semi-quantitative score and the presence of osteophytes was found ($r=0.16$, $p<0.01$). No association between bone erosion and cartilage thinning was found.