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OP0346

MRI OF THE WRIST IN EARLY RHEUMATOID ARTHRITIS AFTER 1-YEAR TREAT-TO-TARGET STRATEGY

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Background: There are two types of remission in rheumatoid arthritis. The first, and most commonly applied, is clinical remission. Imaging remission is another aspect to consider given that (a) the correlation between clinical and imaging at presentation is only modest, (b) imaging can show subclinical inflammation not evident clinically and (c) imaging evidence of inflammation can predict structural damage (1). In this study, we compared clinical and imaging remission in early rheumatoid arthritis (ERA) patients after one year of standard treatment.

Objectives: To semi-quantitatively and quantitatively measure the degree of inflammation (synovitis, tenosynovitis, bone marrow oedema) and structural change (erosions, joint space narrowing) on MRI in early RA patients following treat-to-target strategy treatment for one year and to compare this with changes in clinical parameters.

Methods: Prospective cross-sectional study of 70 ERA patients underwent treat-to-target strategy treatment for one year. DAS28-ESR remission (DAS28-ESR score ≤ 3.2), 2011 ACR/EULAR definition of remission, SDAI remission (SDAI ≤ 3.3) and Boolean remission was measured before and after treatment. High resolution MRI of the most symptomatic wrist was performed before and after treatment. MRI parameters including RAMRIS subscores, synovial volume (synovitis and tenosynovitis), synovial perfusion (max enhancement, enhancement slope) were measured.

Results: 55 (%) out of 70 ERA patients completed baseline and one-year clinical and MRI assessments. Remission rates for DAS28-ESR, SDAI and Boolean were 60% (33), 44% (24) and 33% (18) respectively. Eight (24%) out of 33 patients with DAS28-ESR remission, showed progression in bone erosion. Four (16.7%) of 24 patients with SDAI remission showed progression in bone erosion while 1 (5%) of 18 patients with Boolean remission showed progression in bone erosion. Patients who achieved remission after treatment had a greater reduction in all MRI-evident inflammation as well as bone erosion. At month 12, MRI-evident joint synovitis, tenosynovitis and bone marrow oedema was still frequently seen in ERA patients with clinical remission though patients who achieved Boolean remission had the lowest levels of joint synovitis (RAMRIS Synovitis= 2.6 ± 0.8 (2.9 ± 1.3 for SDAI remission and 3 ± 1.2 for DAS28-ESR remission); synovitis volume= 1298 ± 1217 mm³ (1480 ± 1367 mm³ for SDAI remission and 1520 ± 1584 mm³ for DAS28-ESR remission); synovitis perfusion of max enhancement= $38 \pm 22\%$ ($41 \pm 24\%$ for SDAI remission and $41 \pm 25\%$ for DAS28-ESR remission)), bone marrow oedema (RAMRIS BME score= 0.9 ± 1.1 (1.3 ± 2.6 for SDAI remission and 1.4 ± 2.3 for DAS28-ESR remission)) as well as bone erosion (RAMRIS bone erosion score= 4 ± 5.8 (4.6 ± 5.5 for SDAI remission and 4.3 ± 4.9 for DAS28-ESR remission)) for all patients at one year.

Conclusion: MRI detected inflammation is common even in patients with clinical remission. Patients with Boolean remission had overall less residual inflammation than DAS28-ESR or SDAI remission patients as well as lowest number of patients who had bone erosion progression in remission group at month 12. Treat to target protocols should ideally target Boolean remission.

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SATURDAY, 15 JUNE 2019

Restless lives: Managing fatigue, sleep and pain

OP0347-PARE

THE INFLUENCE OF PAIN ON SLEEP PROBLEMS, MENTAL HEALTH AND USE OF STRONG PAINKILLERS AMONG PATIENTS WITH ARTHRITIS

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Background: Chronic pain is a part of daily life for many people with RMD and leads to reduced quality of life, high risk of losing work ability, impaired functions and a poor social life. The chronic pain also means that many patients need painkillers. In Denmark there is a very high consumption of strong painkillers (opioids) compared to the other countries in Scandinavia. Therefore, the authorities have a great focus on reducing this and are urging the doctors to reduce the prescription of strong painkillers to patients with chronic pain, including patients with RMDs.

In the Danish Rheumatism Association, we have many inquiries to our professional helpline from patients regarding pain. Especially about the use of painkillers, sleeping problems caused by pain, and the negative influence that pain has on one's mood. The patients experience side effects and discomfort associated with the painkillers. Some must phase out their consumption of strong painkillers, because of the authorities' focus on this - and have problems with this. In order to get a more detailed knowledge about the influence of pain among patients with RMD, the Danish Rheumatism Association made this study.

Objectives: To investigate the influence of pain on sleeping problems, mental health and the use of strong painkillers among members of a user-panel.

Methods: The study was carried out in November 2018 as an online questionnaire survey sent to 1328 members of a user-panel in The Danish Rheumatism Association. 69% answered the questionnaire. The user-panel consists of people with at least one RMD. It is not representative of patients with RMD in Denmark.

Results: The most important results are:

Sleep: 67% rarely or never feel fully rested when they wake up in the morning, and 36% takes painkillers to improve their sleep. 69% have experienced that the quality of their sleep has affected their pain negatively.

Mental health: During the past four weeks, 58% have felt that everything is unmanageable for them due to pain, 11% indicated having had thoughts of taking their own life due to pain, and 45% have not wanted to be together with other people because of their pain.

Use of strong painkillers: 83% have pain on a daily basis or several times a week. Among these, 46% have received strong painkillers over the last year, and 78% have not been offered alternatives to strong painkillers.

More results from the survey will be presented on EULAR.

Conclusion: The study indicates that pain and poor quality of sleep, has surprisingly large influence on patient's daily life. More than one third takes painkillers to improve their sleep. Pain seems to have a severe negative influence on their sleep and reversed - poor sleep worsens their pain. Surprisingly many are still using strong painkillers, despite the authorities focus on reducing prescription of strong painkillers, and the patients' state, that they are not been given an alternative to strong painkillers. Finally, the study shows that pain has a surprisingly negative influence on mental health and the patients' hope for the future. In general, it has been a surprise for the Danish Rheumatism Association, that pain has such a huge impact on the participants' daily life, especially on their mental health. Therefore, the organization has been using the result of this study in our political work for better treatment and support to patients with chronic pain in our healthcare system, and in our political campaigning about the importance of a focus on pain among patients with RMDs. It is to be explained on EULAR, how we more concrete have applied the results of the study in our political work.

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OP0348-PARE

FACE ARTHRITIS: WHAT SITUATIONS AFFECT EMOTIONALLY THE PATIENT WITH RHEUMATOID ARTHRITIS AND HOW TO RESOLVE THEM EFFECTIVELY

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Background: WHO defines health as a state of physical, psychological and social well-being. However, patients with rheumatoid arthritis (RA) declare that

treatment is mainly aimed at combating physical affectation and hardly focusses on emotional and social aspects.

Objectives: To identify the situations that produce the greatest negative emotional impact in RA patients and to assess the coping strategies used.

Methods: A previous phase (Project OpinAR) (1) identified situations with negative emotional and social impact. In this project, 2 stages were developed: a) A nominal group of patients, following the McMillan method, selected the most emotionally affected situations from the previous list; b) Voting of patients and rheumatologists to assess the assumed effectiveness of 8 coping strategies for each situation with a Likert scale of 1 to 10 (minimum and maximum): proactive resolution, self-criticism, emotional expression, desiderative thinking, social support, cognitive restructuring, avoidance of problems and social withdrawal. The median, interquartile range (IQR), and statistical significance of the differences between patients and physicians (Student's T test) were calculated with a cut-off value of $p=0.05$. The strategies valued with 8, 9 and 10 were recommended and those valued as 1, 2 or 3 were discouraged. The study was approved by the Ethical Research Committee of the Hospital of La Princesa.

Results: 107 patients from all the Autonomous Communities and 31 expert rheumatologists from 13 Autonomous Communities were recruited, of which 100 (93%) and 17 (55%) participated in the study in a valid way, respectively.

The four situations that most negatively affect them, in the opinion of patients and their doctors are: i) The patient feels that his disease evolves worse than what the doctor says, ii) The patient does not know aspects of the control and monitoring of his disease, iii) The patient feels that he does not really participate in the decision making, and iv) The patient is dissatisfied with the overall treatment received. Regarding coping strategies, doctors recommended using proactive resolution in all situations more frequently than patients ($p<0.05$ for all situations, low variability, with $IQR \leq 2$ among physicians) as well as emotional expression ($p<0.05$ for 3 situations, high variability, with $IQR \geq 3$). Other strategies were less valued by doctors and patients, but with similar responses. There was a lot of dispersion ($IQR > 1$) in most cases.

Conclusion: The situations with the greatest negative emotional impact on RA are those that put the doctor and the patient at odds with regard to the perception of the disease and its control and should be treated during visits. The most recommended strategies are proactive resolution and emotional expression. The most discouraged are self-criticism and the avoidance of the problem. Anyway, there is a great variability of opinions and doctors tend to give more extreme responses. Doctors and patients should have a space and willingness to discuss and exchange opinions on how they emotionally face RA.

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SATURDAY, 15 JUNE 2019

EULAR Projects in musculoskeletal imaging

OP0349

NEURAL NETWORKS FOR AUTOMATED SCORING OF JOINT DISEASE ACTIVITY ON DOPPLER ULTRASOUND IMAGES

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Background: The development of standardized methods for ultrasound (US) scanning and evaluation of synovitis activity by the OMERACT-EULAR Synovitis Scoring (OESS) system, is a major step forward in the use of US in the diagnosis and monitoring of patients with inflammatory arthritis. The variation in interpretation of disease activity on US images can affect diagnosis, treatment and outcomes in clinical trials.

Objectives: To investigate if we could utilize neural network architecture for the interpretation of disease activity on Doppler US images, using the OESS scoring system.

Methods: Two state-of-the-art neural networks were used to extract information from 1342 Doppler US images from Rheumatoid Arthritis (RA) patients. One neural network that divided images as either healthy (Doppler OESS score 0 or 1) or diseased (Doppler OESS score 2 or 3). The other to score images across all four of the OESS systems Doppler US scores (0-3). The neural networks were hereafter tested on a new set of RA Doppler US images ($n=176$). Agreement between rheumatologist's scores and network scores was measured with the kappa statistic.

Results: For the neural network assessing healthy/diseased score, the highest accuracies compared to an expert rheumatologist were 86.4% and 86.9% with a sensitivity of 0.864 and 0.875 and specificity of 0.864 and 0.864, respectively. The other neural network developed to four class Doppler OESS scoring achieved an average per class accuracy of 75.0%, and a quadratically weighted kappa score of 0.84.

Conclusion: This study is the first to show that neural network technology can be used in the scoring of disease activity on Doppler US images according to the OESS system.

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OP0350

ULTRASOUND POWER DOPPLER SEMI-QUANTITATIVE SCORING, IS IT TIME WE MOVED TO A RED PIXEL DENSITY ALGORITHMIC PROGRAM TO DETERMINE TRUE TREATMENT RESPONSE?

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Background: The introduction of the semi-quantitative (SQ) grey-scale and power Doppler (PD) 0-3 scoring system, as agreed by the EULAR-OMERACT ultrasound (US) working group (1, 2), has undoubtedly been the most recognised and accepted method in both clinical practice and trials. Studies have suggested that the SQ scoring method is reliable as the quantitative when scoring the grey-scale (3, 4). Additional studies have shown that the use of red pixels in determining the PD signal in tenosynovitis, compared to SQ scoring was not different (5). However, the distribution of the SQ PD score over estimated the percentage compared to the quantitative score, which could reflect treatment responses inaccurately (6).

Objectives:

1. To describe how a quantitative pixel density score maps to a SQ PD score.
2. Can using a 0-4 PD grading scale better distribute the PD percentages, as determined by pixel count, than 0-3 scale?

Methods: Patients were selected from an observational study of 122 DMARD naïve patients (PEAC study REC: 05/Q0703/198; IRAS Project ID:60271) and 60 DMARD failure patients treated with anti-TNF (THERAPIST study, MREC: 15/SC/0045; IRAS Project ID:147240). All patients were classified according to the 1987 ACR or 2010 ACR/EULAR criteria for rheumatoid arthritis. In total 334 images were analysed, from a total of 127 patients. The calculator for the US PD signal/synovial area ratio was created on software MATLAB 2018b. PD was scored according to the SQ definitions for the visual grade 0-3 and 0-4 scoring systems (Figure 1A). Agreement between two readers using 80 US images: ICC SH —0.82 (interval 0.79–0.9), ICC PD —0.93 (interval 0.9–0.95), calculated using SPSS software. The results were analysed using R v3.4.2.

Results: The SQ grade 3 score was shown to over estimate PD signal/synovial area ratio, with a mean ratio of only 40.8%. Figure 2A, illustrates how the spread in PD signal varied within a single grade, in this case SQ grade 3. Figure 1B showed that adding a SQ grade 4 reduced the SD in the SQ grade 3 group but increased the SD overall by causing a larger SD in SQ grade 1, 2 and 4 grades.

A k-means (KM) clustering algorithm was used to find the most efficient ratio cut off points for a SQ grade 3 scoring system. The SQ grades are not taken into account for this scoring system, it is based on the mathematically optimum cut off points (Figure 1C). It is seen that the SD dramatically reduced in the KM score and the 95% confidence interval and grade overlaps.

When comparing the KM score with the SQ score it was shown to be significantly dependent (Pearson's Chi squared p -value $<2.2e-16$) and strongly positively correlated (Spearman's 0.84, p -value $<2.2e-16$), this is illustrated in Figure 2B and C. Furthermore, the KM score was seen to have a stronger linear correlation (Pearson's 0.95, p -value $<2.2e-16$) when compared to the SQ score (0.82, p -value $<2.2e-16$).