AB1142

PROGNOSTIC VALUE OF 18F-FLUORODEOXYGLUCOSE PET-CT SCORE AT BASELINE ON THE THERAPEUTIC RESPONSE TO PREDNISONE IN PATIENTS WITH POLYMYALGIA RHEUMATICA

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Background: Polymyalgia rheumatica (PMR) is one of the most common inflammatory rheumatic diseases. To date, there is no imaging procedure that can be used as a prognostic factor for good or poor response to corticosteroid therapy

Objectives: To evaluate the prognostic value of 18F-fluorodeoxyglucose PET-CT (FDG-PET/CT) score at baseline, on the therapeutic response to prednisone, in patients with polymyalgia rheumatica (PMR).

Methods: This is a monocentric retrospective study realized at the university hospital of Besançon. We included patients with a diagnosis of PMR meeting the 2012 ACR/EULAR criteria, who had performed a FDG-PET/CT at baseline, between december 2012 and december 2017. Patients were treated with an initial prednisone dose of 0.3mg/kg a day, progressively decreased following a standardized tapering dose protocol (10%/month). We excluded patients who received corticosteroids before the FDG-PET/CT, or without baseline FDG-PET/CT. Seventeen specifics previously described hotspots were visually analyzed (1). We realized a semi-quantitative analysis of FDG uptake (4-point score from 0 to 3), following Goerres scoring system (2). Hotspot with 0 indicating no uptake (same as bone); 1, slight uptake; 2, moderate uptake (same as liver); and 3, uptake higher than the liver, with a global range score of 0 to 51. Then we defined two groups of patients according to their resistance to prednisone at 12 months, defined as the reoccurrence of symptoms and/or an increase of systemic inflammation twice during the prednisone tapering.

Results: 33 patients were included: 14 (42%) in the group "resistant" and 19 (58%) in the group "sensitive". There were 57.6% of women, with a mean age of 67.57 ± 11.63 years. The mean CRP at baseline was 45.02 ± 39.59 mg/L. The mean FDG-PET/CT score at baseline was 18/51. The FDG-PET/CT score at baseline was significantly lower in the resistant group (13.1 vs 22.8/51, p = 0.019). Resistant patients were younger (61.1 vs 72.4 years, p < 0.01), and mostly men (66.5% vs 22%, p < 0.02). ROC curve showed a threshold of 9.5/51 with a sensitivity of 61.54% and a specificity of 84.21% [AUC 0.76 (+/- 0.089), p = 0.014]. There was no statistically significant difference concerning CRP at baseline (48.6mg/l vs 44.8mg/l; p = 0.58), and no correlation between CRP and PET/CT score (r = 0.25, p = 0.15). The prevalence of synovitis (21% vs 37%, p = 0.46), and neoplasia (0% vs 15.79%, p = 0.79) were similar between the two groups.

Conclusion: Our results suggest that in patients with PMR, a baseline FDG-PET/CT score over 9.5/51 score is predictive of a good response to prednisone.

REFERENCES

- [1] Sondag M, et al. Utility of 18F-fluoro-dexoxyglucose positron emission tomography for the diagnosis of polymyalgia rheumatica: a controlled study. *Rheumatology* 2016 Aug;55(8):1452-7.
- [2] Goerres GW, Forster A, Uebelhart D, et al. F-18 FDG whole-body PET for the assessment of disease activity in patients with rheumatoid arthritis. *Clin Nucl Med* 2006;31:386-90.

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AB1143

SUBCLINICAL MICROVASCULAR INVOLVEMENT IN SYSTEMIC LUPUS ERYTHEMATOSUS PATIENTS

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Background: Peripheral microcirculation is well studied in primary Raynaud's phenomenon (RP), but poorly investigated in systemic lupus erythematosus (SLE) (1-3).

Objectives: To investigate morphological and functional aspects of microcirculation in different skin areas of the hands in SLE patients in comparison with primary RP (PRP) patients and healthy subjects (CNT).

Methods: 15 SLE patients without RP (ACR 2013 criteria) (mean age 52 ± 13 SD years, mean disease duration 6 ± 3 years), 15 PRP patients (LeRoy 2001 criteria) (mean age 52 ± 16 years, mean RP duration 6 ± 4 years) and 15 sex-matched controls (CNT) (mean age 51 ± 16 years) were enrolled during the winter period. Nailfold videocapillaroscopy (NVC) and laser speckle contrast analysis (LASCA) have been performed in the three groups of patients. The absolute nailfold capillary number (CN) per linear millimeter at first distal row was assessed by NVC (4). Blood perfusion (BP) was detected by LASCA at the level of fingertips, periungual areas, dorsum and palm of both hands (2). Patients were not taking vasoactive drugs since at least one month before study entry. Statistical analysis was performed by non parametric tests.

Results: SLE patients showed a statistically significant lower nailfold absolute CN than both PRP and CNT (median 9.2 vs 10.2 vs 11.1, respectively, p < 0.0006). Conversely, no statistically significant difference of nailfold CN was observed between PRP and CNT. PRP patients showed a statistically significant lower BP than SLE and CNT, and SLE than CNT, at the level of fingertips (median 90, 113, 186 PU, respectively; p < 0.0001), periungual (median 75, 100, 142 PU, respectively, p < 0.0001), dorsal (median 63, 73, 126 PU, respectively, p < 0.0001), and palm areas (median 76, 95, 124 PU, respectively, p < 0.0001). A positive correlation between nailfold CN and BP was observed in all areas of hands in SLE patients (p < 0.0001). On the contrary, no statistically significant correlation was observed in both PRP and CNT, between nailfold CN and BP in all examined areas (p = 0.74 and p = 0.23, respectively).

Conclusion: SLE patients, without RP, show a subclinical microvascular impairment, having lower nailfold CN and lower BP than CNT. Conversely, PRP patients show only a functional dysfunction, having lower peripheral skin BP than both SLE patients and CNT. A correlation between morphological and functional microvascular features was also found in SLE patients. These findings seem to suggest interesting microvascular insights in active SLE patients.

REFERENCES

- [1] Ruaro B, et al. *Ann Rheum Dis* 2014;73:1181-5.
- [2] Cutolo M, et al. *J Rheumatol* 2010;37:1174-80.
- [3] Cutolo M, et al. *Autoimmun Rev* 2018;17:344-352.
- [4] Cutolo M, et al. *Arthritis Rheumatol* 2016;68:2527-39.

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AB1144

ULTRA HIGH FIELD MRI MICROARCHITECTURE ANALYSIS IMPROVES THE PREDICTION OF PROXIMAL FEMUR FRACTURE: A COMBINED STUDY WITH EX VIVO BIOMECHANICAL TESTS

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Background: The purpose of this study was to assess cadaveric proximal femurs from the points of view of bone microarchitecture using ultra-high field (UHF) 7 Tesla magnetic resonance imaging (MRI), bone strength using biomechanical tests and bone mineral density (BMD) using Dual-energy X-ray absorptiometry (DXA).

Objectives: We aimed at determining whether bone microarchitecture parameters were related to bone strength and BMD and whether UHF MRI can provide additional information regarding bone strength.

Methods: BMD of ten proximal femurs from five cadavers were investigated using DXA and the bone volume fraction (BVf), trabecular thickness (Tb.Th), and trabecular spacing (Tb.Sp), fractal dimension (FD), Euler characteristics (Euler Ch.), Connectivity density (Conn. D) and Degree of anisotropy (DA) of each femur was quantified using UHF MRI. The whole set of specimens underwent mechanical compression tests to failure.

Results: BMD and all the microarchitecture parameters except ConnD were significantly correlated with failure load (p < 0.05). The

microarchitecture parameters were correlated to each other but not correlated with BMD. Multiple regression analysis demonstrated that the combination of the microarchitecture parameters and BMD improved the prediction of the failure load with for example an improved fracture risk prediction from $R^2 = 0.418$ to 0.688 when combining BMD and Euler Ch. Overall, femur bone microarchitecture assessed with UHF MRI was significantly correlated with biomechanical parameters. The multimodal assessment of BMD and trabecular bone microarchitecture using UHF MRI improved the fracture risk prediction of femoral bone and might be of interest for the future investigation of selected osteoporotic patients.

Conclusion: We demonstrated that femur bone microarchitecture assessed with UHF MRI was significantly correlated with biomechanical parameters. The multimodal assessment of bone mineral density and trabecular bone microarchitecture using UHF MRI improved the fracture risk prediction of femoral bone and might be of interest for the future investigation of selected osteoporotic patients.

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AB1145

FULLY CONVOLUTIONAL NEURAL NETWORK-BASED SEGMENTATION OF INDIVIDUAL MUSCLES IN MR IMAGES USING MUSCLES AND BORDERS PARCELLATIONS

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Background: Segmentation of individual muscles in MR images is challenging considering the poor contrast between muscles and the large variability between and within subjects.

Objectives: The segmentation performance of the Bayesian SegNet network was assessed for the four individual muscles of the quadriceps group. In addition to the classes corresponding to each muscle, we analyzed the effect of adding four additional classes corresponding to muscle borders. We also investigated the network performance taking into account each muscle individually or the whole set of muscles. The corresponding results were compared with those obtained using a conventional multi-atlas method.

Methods: For the training phase, a dataset of 500 images was used while the testing phase was performed for two other datasets with 140 images each. Four different variants of the same network were assayed considering simultaneous segmentation of individual muscles (On5), separate segmentation of individual muscles (Fn2) and the use of additional classes related to muscle borders in both cases (On9 and Fn3).

Results: All approaches largely outperformed the results of a multi-atlas strategy. The higher DSI values i.e. 0.96 ± 0.01 for the *rectus femoris* muscle, 0.93 ± 0.01 for the *vastus intermedius* muscle, 0.94 ± 0.03 for the *vastus lateralis* muscle and 0.96 ± 0.01 for the *vastus medialis* muscle were obtained with the On9 and Fn3 networks i.e. taking into account the muscle borders labels in addition to the muscle labels.

Conclusion: Deep-learning based methods are optimal for the segmentation of thigh muscles and the corresponding efficiency can be improved when considering labels for muscles together with borders.

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AB1146

PREVALENCE OF STRUCTURAL CHANGES AT THE POSTERIOR PART OF THE SPINE IN AXIAL SPONDYLOARTHRITIS EVALUATED WITH MR

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Background: In clinical trials radiographic damage is frequently quantified by conventional x-ray but neither the thoracic spine nor the posterior parts of the vertebral column including the intervertebral joints, the vertebral arch and the spinous process can be evaluated reliably with this instrument. Bone inflammation and areas of enthesitis can easily be detected by magnetic tomography imaging (MRI) and the introduction of

high-resolution 3-tesla MRI allows analysis of bone structures more precisely than with x-ray without radiation exposure [1].

Patients with axial SpA frequently present with reduced spinal mobility and functional impairment, but radiographic signs of ankylosis are missing on plain radiographs. These particular clinical findings are reinforced by data in the literature showing, that the relation between radiographic damage, spinal mobility and function is low. Radiographic damage to the posterior parts of the vertebral column may be responsible for the discrepancy found between clinical and radiographic results as suggested by a Dutch group [2].

Objectives: To evaluate the localisation and incidence of new bone formation in the posterior part of the vertebral bodies with MRI.

Methods: In a cohort of 56 patients with diagnosed axial SpA (mean age 50.29y, mean disease duration 14.4y, 76.4% men, 88.7% HLA-B27 positive) we performed a MRI (3 Tesla scanner Skyra, Siemens Healthcare, Erlangen, Germany). The whole spine was scanned with T1 weighted and Turbo-Inversion Recovery Magnitude (TIRM) sequences in sagittal planes and each segment of the vertebral column was divided into four areas (ventral and posterior part of the vertebral bodies, intervertebral joints and spinous processes) to assess osseous changes like sclerosis, erosion, syndesmophytes, ankylosis, (partial) fusion of intervertebral joints and fibroostosis of spinous processes.

Results: Syndesmophytes and ankylosis of the ventral segments were present from C7/Th1 down to L5/S1 with a maximum in Th5/6 (62.5%). In the posterior segments of the vertebral bodies we detected a contrary accumulation inside the cervical and lumbar spine with a max. in C5/6 (55.4%) respectively L2/3 (66.1%). Erosions were mainly found at the ventral edges with an accumulation in middle cervical, lower thoracic and the whole lumbar spine (max. Th9/10 24.5%)

Ankylosis of the intervertebral joints was present over the whole spine with a preference of the cervical (max. C5/6 27.7%) and lumbar column (max. L2/3 47.3%). Fibroostosis of the spinous processes were rarely found in the middle and lower thoracic spine (Th5-11, each 2.7%).

In up to 57.10% of the cervical spine (54.78% for lumbar, 32.18% for thoracic spine) with detectable new bone formation of the posterior segments we found no changes of the ventral part.

Conclusion: With high resolution MRI we were able to detect structural in the dorsal part of the spine, which can hardly be assessed by conventional radiographs. These findings may explain functional disability in patients with non-corresponding findings in x-ray.

REFERENCES

- [1] Lee CH, et al. (2015) Correlation of structural abnormalities of the wrist and metacarpophalangeal joints evaluated by high-resolution peripheral quantitative computed tomography, 3 Tesla magnetic resonance imaging and conventional radiographs in rheumatoid arthritis. International journal of rheumatic diseases
- [2] Maas F, et al. (2015) Comparison of radiographic damage of the zygapophyseal joints and the vertebral bodies of the cervical spine in patients with ankylosing spondylitis before and after 4 years of TNF-alpha blocking therapy. Annals of the rheumatic diseases

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AB1147

VERTEBRAL FRACTURE ASSESSMENT : A SIMPLE TOOL TO DETECT VERTEBRAL FRACTURE IN THE OSTEOPOROSIS ASSESSMENT OF PATIENTS WITH TYPE2 DIABETES MELLITUS

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Background: Vertebral fracture assessment (VFA) has several benefits, including substantially lower radiation dose, lower cost, higher patient convenience, and less operator-dependent variance,VFA can be directly assessed during bone mineral density (BMD) measurement

Objectives: evaluate the accuracy of VFA performed in the supine position by using conventional visual radiography of the spine as the reference standard in patients with type 2 diabetes mellitus

Methods: A total of 207 patients with type 2 diabetes mellitus (mean age, 46.59 $\pm$ 7.53years; range, 21–60 years) consisting of 102 women