CARDIOVASCULAR MAGNETIC RESONANCE TAGGING DETECTS MYOCARDIAL CHANGES IN ACTIVE RHEUMATOID ARTHRITIS

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Purpose of the study was to evaluate the effects of one year of medical treatment on myocardial function in active rheumatoid arthritis using cardiovascular magnetic resonance imaging and quantitative image analysis. The image analysis was done for early (n=25) and chronic (n=14) rheumatoid arthritis patients before and after treatment. This study is follow-up to a previous study [1].

Cardiovascular magnetic resonance tagging was used to derive strain parameters of the left ventricle in short-axis and long-axis directions. The analysis was performed using a dedicated software [2] by manually segmenting the boundaries of the ventricle different planes and directions. The strain tagging analysis resulted in the calculation of segmental circumferential, radial and longitudinal strain (%) curves as function of time (ms), covering the entire cardiac cycle. The strain data of each segment was used to derive the time derivative, i.e. the strain rate of the corresponding segment. The segmental peak short-axis systolic strain and diastolic strain rate were determined as the momentary maximum value of the strain and strain rate curves. In long-axis direction, the peak mean systolic strain and diastolic strain rate were calculated as the mean across all seven long-axis segments. Results for before and after treatment were compared using Wilcoxon signed-rank test and Pearson and Spearman correlations were used to test for correlations between the changes in strain and strain rate in different segments and directions of the left ventricle.

Based on the results, peak diastolic mean mid short-axis circumferential strain rate was improved ($83.7 \pm 12.1\%$ vs $93.1 \pm 20.8\%$, $p = 0.05$), particularly in the anterior segment (79 ± 21 %/s vs 92 ± 24 %/s, $p = 0.013$) in early rheumatoid arthritis. No significant changes were found in chronic rheumatoid arthritis. Changes in peak systolic strain and strain rate correlated in mid short-axis ($p < 0.001$) and long-axis ($p < 0.001$) directions in the entire patient group.

[1] M. Holmström et al, Clin Exp Rheumatol 34 (2016) 3.
[2] E. Heiberg et al, BMC Medical Imaging 10 (2010) 1.