Diastolic Heart Failure in Rheumatoid Arthritis Correlates with Reduction in Global Longitudinal Strain and Occurs Independent From Therapy with Tumor Necrosis Factor Inhibitors. A Study with Tissue Doppler, Strain Imaging, and NTproBNP Measurement.

Ridjab¹, Demian A., Gottwald², Michael, Krause³, Andreas, Schau¹, Thomas, Butter¹, Christian, Zaenker², Michael

Cardiology Dept., Immanuel Klinikum Bernau Heart Center Brandenburg, Bernau, Germany
Immanuel Klinikum Bernau, Rheumatology Center North Brandenburg, Bernau, Germany
Immanuel Krankenhaus Berlin-Buch, Berlin, Germany

**Background/Purpose:**

Risk of heart failure is increased in patients with rheumatoid arthritis (RA) and is more likely to occur in RA patients with a preserved ejection fraction. It has been postulated that fibrosis plays an important role in the structural changes in the heart of patients with RA. Until now little is known about the prevalence of diastolic heart failure and its related structural changes. Therefore we examined RA patients with and without anti-TNFa therapy for diastolic heart failure using measurement of NT-pro-BNP level and echocardiography, including tissue doppler and strain imaging.

**Methods:**

In a prospective consecutive study 74 patients from our outpatient clinic with RA according to ACR-Criteria treated with (n = 38) or without (n = 36) anti-TNFa-therapy were included. The cohort underwent blood sampling for NT-pro-BNP and echocardiography with assessment of left ventricular end-diastolic (LVEDV), end-systolic volume (LVESV), septal thickness, LV ejection fraction, LV diastolic function and global longitudinal strain with speckle-tracking. Diastolic heart failure was diagnosed when (1) E/E'-ratio > 15 or (2) NT-pro-BNP > 220 pg/ml with E/E'-ratio > 8 or in presence of atrial fibrillation.
Results:

Sixty-six percent of the patients (n=49/74) were female. Mean age was 59.8 ± 13 years. RA activity score DAS28 showed a mean of 2.8 (± 0.9) with 32 % of patients in remission (DAS28 <= 2.6). Function score FFbH showed a mean of 66% (± 25). Mean BMI was 29.0 ± 4.7 kg/m². Twenty-three percent of the patients had hypertension (mean blood pressure 130.9 / 79.5 mmHg (± 19.9 /8.1). LV hypertrophy was found in 78 %, with mean septal thickness of 10.8 ± 1.4 mm. The following mean values were present: heart rate 81 ± 13 bpm, GLS –18.7 ± 2.8%, LVEDV and LVESV 70.7 ± 23.2 and 23.9 ± 9.7 ml, reps., LV ejection fraction 67.5 ± 6.4, E/A-ratio 1.03 ± 0.42, E/E'-ratio 8.37 ± 3.02. Only five percent of patients had relevant valvular disease (n=3 tricuspidal regurgitation II°, n=1 moderate aortic stenosis). According to the above mentioned criteria diastolic heart failure was diagnosed in 31 % of patients. Using a GLS value of -19% as a cut off, patients with diastolic heart failure showed a significant reduction in GLS in comparison to those with normal diastolic function (p = 0.02, OR 3.2 (95% CI:1.04–10.3)). There were no significant differences in LVEDV, LVESV, E/A-ratio, E/E`-ratio, NT-BNP, and mean GLS between groups, when anti-TNFa-therapy was considered.

Conclusion:

In the studied RA cohort, there is a surprisingly high rate of diastolic heart failure (31 %) with preserved ejection fraction independent from concomitant anti-TNFa therapy. Imaging data revealed a significant reduction in the global longitudinal strain in patients with diastolic heart failure. This finding suggests the role of fibrotic changes in diastolic heart failure in RA. The endocardium is most susceptible to the deleterious effects of interstitial fibrosis and GLS measurements detect abnormal longitudinal function of the subendocardial level at an earlier stage. We therefore suggest the use of global longitudinal strain measurement in addition to conventional echocardiography in diastolic heart failure.

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