ASSESSMENT OF SUBCLINICAL MYOCARDIAL ABNORMALTIES IN RHEUMATOID ARTHRITIS PATIENTS BY TWO-DIMENSIONAL ECHOCARDIOGRAPHY AND MAGNETIC RESONANCE IMAGING

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Introduction

Rheumatoid arthritis (RA) is a systemic autoimmune disease that significantly increases the risk of cardiovascular disease (CVD) due to chronic inflammation. However, diagnosing cardiac involvement in RA is challenging due to prolonged subclinical phase.

Advanced imaging techniques, are essential for evaluating myocardial involvement in RA. Echocardiography, including tissue Doppler and speckle-tracking, assesses LV function and detects subclinical myocardial dysfunction. CMR, however, offers superior tissue characterization, identifying inflammation, edema, and fibrosis.

CMR parametric mapping techniques, such as native T1, T2, and ECV mapping, have transformed the non-invasive assessment of myocardial tissue in RA. Elevated T1 and T2 values indicate inflammation and edema, while increased ECV reflects fibrosis. These tools enable early detection of myocardial involvement, allowing for timely and targeted interventions.

Aim of the Work

The aim of this study was to detect the subclinical myocardial abnormalities using two-dimensional (2D) transthoracic echocardiography and cardiac magnetic resonance in patients diagnosed with rheumatoid arthritis attending the Alexandria Main University Hospital.

Patients and Methods

Patients: The study included two groups: **Patients' Group:** 18 patients diagnosed with Rheumatoid arthritis disease, who were attending the outpatient clinics of Alexandria Main University Hospital. **Control Group:** 15 healthy individuals, age and sex matched.

Methods: All patients underwent detailed history, clinical examination including RA activity (DAS28), and cardiovascular risk assessment (blood pressure, Framingham score). Laboratory tests measured cholesterol, glucose, rheumatoid factor, CRP, ESR, and anti-CCP antibodies.

Echocardiography evaluated LV systolic (LVEDD, LVESD, LVEF) and diastolic function (E/A ratio, LAVI, GLS), while cardiac MRI (1.5 Tesla) assessed anatomy, function, fibrosis (LGE), edema (T2-STIR), and tissue characteristics (T1/T2 mapping, ECV). Controls underwent similar evaluations excluding administration of contrast media in CMR.

Results

There was no significant difference between RA patients and the control group concerning echocardiographic findings. Myocardial edema was not detected using STIR or T2 mapping. However, RA patients exhibited significantly higher average total extracellular volume (30.83 ± 3.14%) and higher average total native T1 values (1080.97 ± 28.34) compared to controls (1047.91 ± 14.57, p<0.001). No significant correlation was found between native T1, T2, or ECV and factors such as age, symptom duration, or RA disease activity.

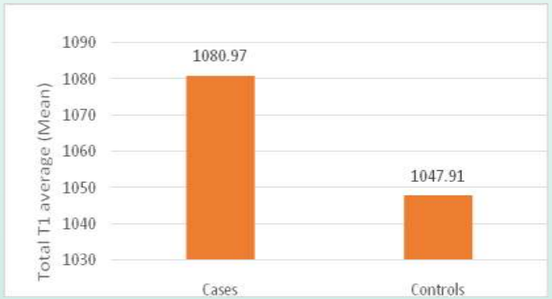

Figure 1: Average native T1 total of the studied groups.

Table 1: Distribution of cases of study as regards ECV

	ECV	
	Mean ± SD.	**Median (Min. – Max.)**
• **Average base**	29.3 ± 3.24	29.1 (22.60 – 35.60)
• **Average Mid**	29.98 ± 3.01	29.7 (25.60 – 37.80)
• **Average Apex**	33.18 ± 3.9529	34.0(26.25 – 43.25)
• **Average total**	30.83 ± 3.14	30.8 (24.95 – 37.02)

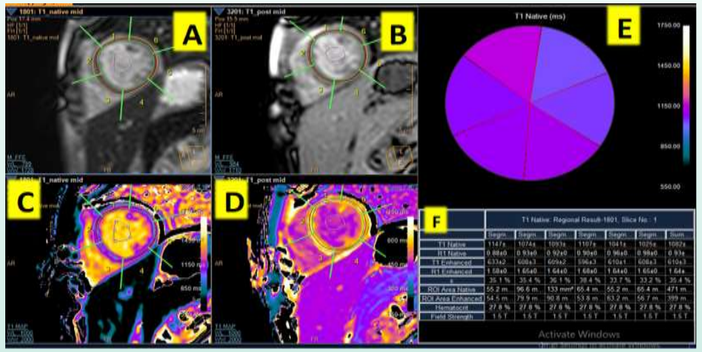

Figure 2: Example of the postprocessing of the LV T1 mapping. **(A)** Grey-scale pre contrast T1 mapping image at the mid-ventricular level. **(B)** Grey-scale postcontrast T1 mapping image at the same level. **(C)** Colour-coded pre-contrast T1 mapping image at the same level. **(D)** Colour-coded post-contrast T1 mapping image at the same level. **(E)** Bull"s eye colour-coded diagram representing the segmental ECV. **(F)** Table representing the segmental values of the native, postcontrast T1 and ECV. (Average ECV= 35.4%).

Conclusion

- Traditional diagnostic techniques frequently fail to detect early myocardial changes, underscoring the enhanced diagnostic capability of CMR.
- The absence of late gadolinium enhancement (LGE) in most RA patients suggests the necessity of advanced CMR parametric imaging for identifying subtle cardiac abnormalities.