

## Predictors of the presence of septal late gadolinium enhancement in follow-up cardiac magnetic resonance imaging and its relation to acute myocarditis prognosis

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**Introduction:** Acute myocarditis (AM) is generally a self-limited and benign disease. However, a minority of patients (pts) present or develop adverse outcomes. It has been proposed that the presence of late gadolinium enhancement (LGE) in the septum is associated with worse prognosis. Also, the presence of LGE without oedema in follow-up cardiac magnetic resonance imaging (CMR) seems to reflect more permanent lesions.

**Purpose:** The aim of this study was to determine if the presence of septal LGE in acute-phase CMR was associated with higher extent of disease in follow-up CMR and if initial laboratory tests help to predict the evolution to more permanent lesions.

**Methods:** Prospective single-centre study of pts admitted with AM diagnosed according to clinical findings, troponin T elevation and CMR criteria (Lake Louise), since 1/2013. Selection of those who underwent acute-phase (CMR-I) and follow-up CMR (CMR-II).

**Results:** Of 88 pts admitted with AM, 46 fulfilled our inclusion criteria: median age  $31 \pm 13$  years, 85% males. CMR-I was performed at  $6 \pm 5$  days and LGE was present in 43 pts (93.5%). CMR-II was performed at  $8 \pm 4.3$  months and 29 pts (63%) improved the number of LGE-positive segments, 10 pts (21.8%) had stable disease and 7 pts (15.2%) worsened CMR findings. Septal-LGE was detected in 10 pts (21.7%) in CMR-I and in 6 pts (13.0%) in CMR-II. Logistic regression analysis identified septal-LGE in CMR-I as a predictor of higher extent of LGE in CMR-II (OR 1.4, 95%CI 1.1-1.9,  $p = 0.020$ ). Although median values of maximum high-sensitivity troponin and reactive-C protein (RCP) were not associated with septal LGE in CMR-I, increasing values of such tests were univariate predictors of a higher likelihood of septal involvement in CMR-II: maximum troponin (886 vs 1852 ng/L; OR 1.00, 95%CI 1.00-1.00  $p = 0.017$ ) and RCP (4.2 vs 13.9 mg/dL; OR 1.17, 95%CI 1.04-1.33,  $p = 0.012$ ). After multivariate analysis, RCP was the independent predictor of septal LGE in CMR-II (AUC 80.8, 0.97-0.91,  $p = 0.012$ ). RCP cut-off value  $>10.2$  mg/dL identified patients with septal LGE in CMR-II with a sensitivity and specificity of 83.3% and 85.0%, respectively. The presence of cardiovascular risk factors, clinical presentation and B-type natriuretic peptide values were not predictors of septal LGE in either CMR. In a mean clinical follow-up of  $757 \pm 476$  days, no patient died, 3 pts (6.5%) developed new-onset heart failure (NYHA class II functional symptoms) and 2 pts (4.3%) developed ventricular arrhythmias. Due to a small number of adverse events, neither laboratory tests nor LGE septal pattern predicted adverse outcomes.

**Conclusions:** In this population, septal LGE pattern was able to predict higher extent of LGE in follow-up CMR. Increased cardiac biomarkers and inflammatory proteins in the acute setting were also associated with septal involvement in follow-up and can potentially help to establish the risk of adverse events for patients admitted with acute myocarditis.