Myocardial extracellular volume by T1 mapping: a new marker of arrhythmia in mitral valve prolapse

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Background: In MVP, MAD has been associated with myocardial replacement fibrosis and arrhythmia, but the importance of interstitial fibrosis remains unknown. We aimed to evaluate the relationship between mitral annular disjunction (MAD) severity and myocardial interstitial fibrosis at the left ventricular (LV) base in patients with mitral valve prolapse (MVP), and to assess the association between severity of interstitial fibrosis and the occurrence of ventricular arrhythmic events.

Methods: Thirty patients with MVP and MAD (MVP-MAD) underwent Cardiac Magnetic Resonance (CMR) with assessment of MAD length, late gadolinium enhancement (LGE), and basal segments myocardial extracellular volume (ECV). The control group included 14 patients with mitral regurgitation but no MAD (MR-NoMAD) and 10 patients with normal CMR (NoMR-NoMAD). Fifteen MVP-MAD patients underwent 24h-Holter monitoring.

Results: LGE was observed in 47% of MVP-MAD patients and absent in controls. ECV was higher in MVP-MAD (30 ± 3% vs 24 ± 3% MR-NoMAD, p < 0.0001 and vs 24 ± 2% NoMR-NoMAD, p < 0.0001), even in MVP-MAD patients without LGE (29 ± 3% vs 24 ± 3%, p < 0.0001 and vs 24 ± 2%, p < 0.0001, respectively), Fig. 1. MAD length was correlated with ECV (rho = 0.61, p = 0.0003), but not with LGE extent. Four patients had history of OHCA; LGE and ECV were equally performant to identify those high-risk patients (area under the ROC curve 0.81 vs 0.83, p = 0.84). Among patients with Holter, 87% had complex ventricular arrhythmia. ECV was above the cut-off value in all while only 53% had LGE.

Conclusion: Increase in ECV, a marker of interstitial fibrosis, occurs in MVP-MAD even in the absence of LGE, and was correlated with MAD length and OHCA. ECV should be part of the CMR examination of MVP patients in an effort to better assess fibrous remodelling as it may provide additional value beyond the assessment of LGE in the arrhythmic risk stratification.

Abstract Figure 1

* p < 0.0001 vs MVP - MAD group
* p < 0.05 vs MVP - NoMAD group