The role of cardiac magnetic resonance imaging in valvular heart disease: mitral annulus disjunction analysis using cardiac magnetic resonance imaging

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Cardiovascular magnetic resonance (CMR) imaging offers a comprehensive approach to evaluating valvular heart disease which is emphasized in assessing mitral valve prolapse (MVP). The prevalence of mitral annular disjunction (MAD) with MVP is 20-58%. MAD is characterized by a systolic separation between the ventricular myocardium and the mitral annulus supporting the posterior mitral leaflet. MAD may not be associated with mitral regurgitation and patients with MAD may develop symptoms related to ventricular arrhythmias, configuring the MAD arrhythmic syndrome, which may progress to sudden death.[1-5]

First line to the diagnosis is transthoracic echocardiography, complemented with CMR (**Figure 1** and **2**). The arrhythmic mitral valve complex is defined by presence of MVP (with or without MAD), combined with frequent and/or complex VA in the absence of any other well-defined arrhythmic substrate. CMR improved the assessment of this pathology as myocardial fibrosis determined according to late gadolinium enhancement is associated with adverse outcome in patients with MVP without moderate-to-severe mitral regurgitation or left ventricular dysfunction. CMR can distinguish adjacent structures and characterize myocardial tissue, detecting a minimal disjunction of up to 1 mm and can accurately identify the presence of myocardial fibrosis in the posterior region of the papillary muscle and in the inferior basal segment of the LV (**Figure 3**). Even small disjunctions (< 4mm) can cause malignant ventricular events, thus, CMR is a desirable test that can better identify the presence of MAD and MVP with high arrhythmogenic risk.

CMR should be done in patients with unexplained syncope or nonsustained ventricular arrhythmia, for assessment of left ventricle size and function, severity of mitral regurgitation, leaflet thickness, but also should be done in patients with arrhythmic mitral valve prolapse and at least one phenotypical risk feature —palpitations, T-wave inversion in the inferior leads, repetitive documented polymorphic PVCs, MAD phenotype, redundant MV leaflets, enlarged left atrium or ejection fraction ≤50%.

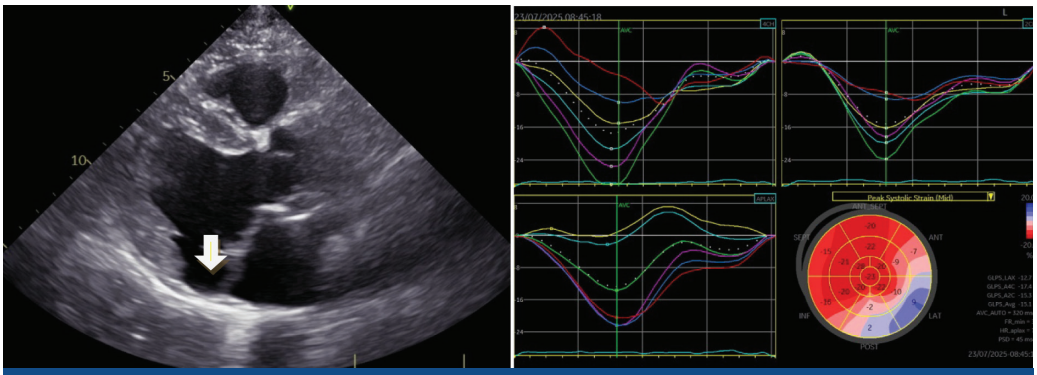

FIGURE 1. Ultrasound image of mitral valve prolapse and mitral annular disjunction (white arrow) (left image); lower values of longitudinal strain in the posterolateral segment of the left ventricle (right image).

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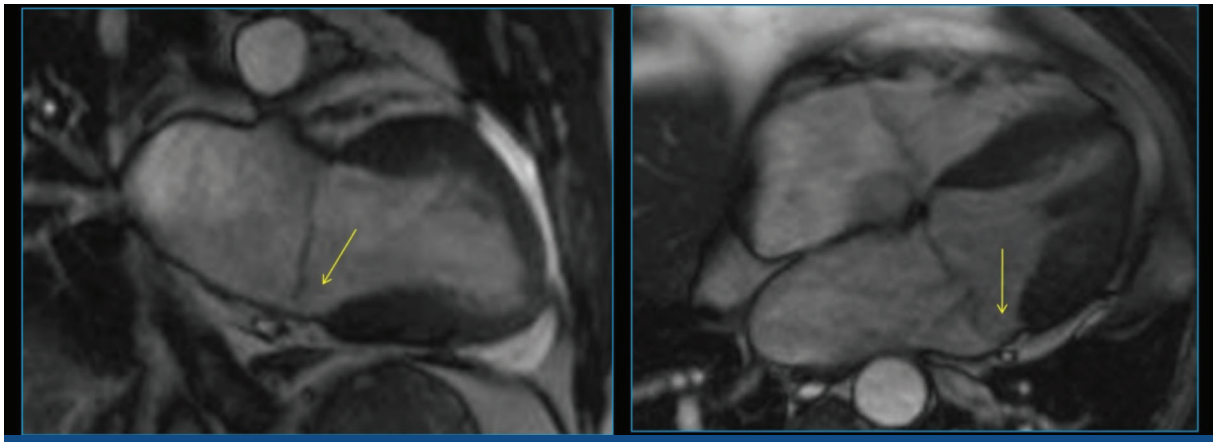

FIGURE 2. Cardiac magnetic resonance imaging: 56-year-old man with prolapse of the mitral valve and mitral annular disjunction (arrows).

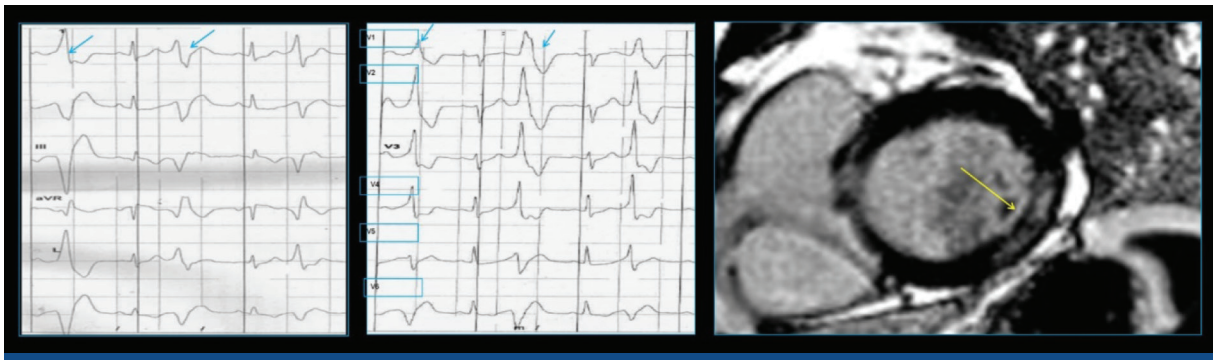

FIGURE 3. A 56-year-old man presenting with frequent premature ventricular contractions (blue arrows), with right bundle branch block morphology and a rS pattern in V5-V6, which corresponds to origin in the posterolateral wall of the left ventricle and evidence on cardiovascular magnetic resonance of a patchy area of midventricular late gadolinium enhancement, involving the basal inferolateral left ventricular segment (yellow arrow).

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