

Cardiac Magnetic Resonance as a diagnostic tool in arrhythmias

Caldeira Da Rocha R.; Picarra B.; Pais J.; Santos AR.; Carrington M.; Dias Claudio F.; Fernandes R.; Trinca M.

Hospital Espirito Santo de Evora, Cardiology, Evora, Portugal

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Introduction: Etiology of cardiac arrhythmias is often difficult to determine. As the gold standard to anatomical and functional cardiac evaluation, Cardiac Magnetic Resonance (CMR) can be a fundamental technique for accurate assessment of myocardial arrhythmic substrates or for arrhythmias management.

Purpose: The aim of this study is to determine diagnostic and arrhythmic risk stratification impact of CMR performed in patients with suspected or confirmed arrhythmias.

Methods: We performed a six-years prospective study of patients with suspected or confirmed arrhythmias which evaluation with other techniques did not provide a definitive diagnosis. These patients underwent CMR for diagnostic and risk stratification assessment. We applied a protocol to evaluate both ventricles' morphology and functional and late gadolinium enhancement (LGE) presence.

Results: A total of 93 patients were included, of which 66% were male, with a mean age of 45 ± 17 years old. The indications for patients with suspected or confirmed arrhythmias performing CMR evaluation were the following: 33% ($n = 31$) of the patients had very frequent premature ventricular complexes, 23% ($n = 21$) had sustained ventricular tachycardia (VT), 5% ($n = 5$) non-sustained VT, 17% ($n = 16$) suspected structural heart disease with high arrhythmic potential, 10% ($n = 9$) unexplained recurrent syncope, 9% ($n = 8$) supraventricular tachycardia and 3% ($n = 3$) aborted sudden cardiac death. Depressed ejection fraction (EF) ($< 50\%$) was present in 10% ($n = 9$) for LV (mean EF $38 \pm 9\%$) and 15% ($n = 14$) for RV (mean EF $42 \pm 7\%$). Dilation of LV was found in 25% of patients ($n = 23$, mean LV volume: $115 \pm 7 \text{ ml/m}^2$), with RV dilation being present in only 1 patient, who had right ventricle arrhythmogenic dysplasia (RVAD) (RV volume: 152 ml/m^2). In total, 16% had interventricular septum hypertrophy (mean $15 \pm 4 \text{ mm/m}^2$). We found slight anterior leaflet prolapse of mitral valve in 10% ($n = 9$) of the cases and mild mitral regurgitation in 15% ($n = 14$). Left atrium dilation was observed in 17% ($n = 16$) of patients (mean area of $18 \pm 2 \text{ cm}^2/\text{m}^2$), as right atrium was dilated in only two. In 20% of the patients, CMR contributed to establish a previously unknown diagnosis: 6% ($n = 5$) have hypertrophic cardiomyopathy, 4% ($n = 4$) a myocarditis sequelae and 2% ($n = 2$) had RVAD. LV non-compaction, a silent myocardial infarction scar and non-ischemic dilated cardiomyopathy were diagnosed in 3% of the cases each. In 15% ($n = 14$) we found nonspecific variations, which deserve follow-up. On the remaining patients, CMR was considered normal.

Conclusion: As a high reproducible, accurate and versatile technique, CMR allowed an increase on diagnosis in 20% of the patients with suspected or confirmed arrhythmias. Consequently, it contributed to the risk stratification of our study population with suspected high arrhythmic potential when the first-line complementary exams were inconclusive.