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Diagnostic value of cardiac magnetic resonance after aborted sudden cardiac death

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Background: Sudden cardiac death (SCD) is responsible for approximately 40% of the total cardiovascular mortality. The underlying cause is mainly acute coronary syndrome. However in patients with normal coronary angiography (NCA) the etiology often remains unclear.

Purpose: We aimed to investigate patients after aborted SCD but NCA using cardiac magnetic resonance imaging (CMR). Our goal was to evaluate left and right ventricular parameters, presence of late gadolinium enhancement (LGE) and to assess the diagnostic value of CMR in this special patient population.

Methods: We enrolled 87 patients (38±13y, 48% male) after aborted SCD with NCA. CMR examination including long- and short-axis cine and LGE images were performed. Left (LV) and right ventricular (RV) parameters including ejection fractions (EF) and end-diastolic volumes (EDVi) were evaluated. Presence and localization of the LGE was also assessed.

Results: Presenting arrhythmias were ventricular fibrillation (55%), non-specified ventricular arrhythmia (26%), ventricular tachycardia (9%), asystolia (5%), pulseless electrical activity (4%) and ventricular flutter (1%).

Only 17% of the patients showed LVEF lower than 35% (LVEF=52.1 ± 12.0 %), 32 % showed significant LV dilation (LVEDVi>100 ml/m2 in males and >90 ml/m2 in females; LVEDVi=104.0±29.5 ml/m2) and 29% showed LGE. Structural myocardial abnormality was present in 62% (n=54): dilated (DCM n=12), arrhythmogenic right ventricular cardiomyopathy (ARVC n=6), myocarditis (n=5), mitral valve prolapse (n=5), hypertrophic cardiomyopathy (HCM n=4), acute myocardial infarction (n=4), Tako Tsubo cardiomyopathy (n=1), noncompaction cardiomyopathy (n=1), endomyocardial fibrosis (n=1) and aspecific structural alterations with (n=8) and without (n=8) LGE. CMR examination changed the clinical diagnosis in half of the patients.

Eleven patients (28±10y, 91% male) performed competitive sport in the last 6 years with a minimum regular training of 10 hours/week. Three of the 11 athletes showed ARVC based on the current Task Force criteria, but none of them showed HCM. Aspecific structural alteration with nonischaemic LGE was observed in three athletes.

Age-specific incidence rates showed that the most common cardiomyopathy over 35 years was DCM (n=9), while ARVC and HCM occurred more frequently under 35 years in our patient population.

Conclusion: CMR has an important added diagnostic value in patients after SCD but NCA. More than half of these patients showed structural alteration, and CMR examination changed the provisional diagnosis in half of the patients.