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Usefulness of late gadolinium enhancement cardiac magnetic resonance to predict appropriate therapies in implantable cardioverter defibrillator patients in primary prevention

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OnBehalf: VT and sudden cardiac death

Background: The scar and the amount of border zone measured by late gadolinium enhancement cardiac magnetic resonance (LGE-CMR) has been proposed as an independent predictor of ventricular arrhythmias in patients with ischemic and non-ischemic cardiomyopathy. However, at the present time, the guidelines are based only on the ejection fraction to recommend an implantable cardioverter defibrillator (ICD) in primary prevention, and only a minority of these patients receive appropriate therapies. So, prevention needs to be improved.

Purpose: To identify predictors of appropriate therapies in patients with a primary prevention ICD using cardiac magnetic resonance imaging and a dedicated software (ADAS-3D) to characterize the scar.

Methods: All consecutive patients who underwent a LGE-MR prior to ICD implantation in primary prevention were prospectively included. Clinical and cardiac imaging characteristics were collected. The myocardium was segmented with ADAS-3D software in 10 layers (from endocardium to epicardium). The scar, border zone, core and conducting channels were automatically measured in grams by the software.

Results: Since 2008 to 2017, 206 patients were included. Mean age was 67 +/- 28 years, 80% men, mean ejection fraction 26%+/-9, 52% with ischemic cardiomyopathy and 48% non-ischemic. The primary endpoint was appropriate therapies and/or sudden cardiac death (SCD). Median follow-up was 46,33 months. 46 patients (22%) reached the primary endpoint. Greater scar mass (36,05 grams vs 21,5 grams; HR 1.04; 95% CI (1.03-1-05), p <0.001), core mass (9,8 grams vs 5,6 grams; HR 1.06; 95% CI (1.04-1-09), p <0.001), border zone mass (26,2 grams vs 15,9 grams; HR 1.05; 95% CI (1.04-1-09), p <0.001) and channel mass (3,0 grams vs 1,6 grams; HR 1.15 95% CI (1.06-1.25), p <0.001) were associated with appropriate therapies and SCD. A border zone mass >5.3 grams was independently associated with the primary endpoint (HR: 4.77; 95% CI (1.15-19.73), p = 0.03).

Conclusions: The amount of border zone, core and channel mass measured by LGE-MR and ADAS software are independent predictors of appropriate therapies and SCD in patients with ICD in primary prevention.

Abstract Figure. Scar characterization