Late gadolinium-enhanced cardiac magnetic resonance in repaired tetralogy of Fallot: characterization of the right ventricular arrhythmogenic substrate

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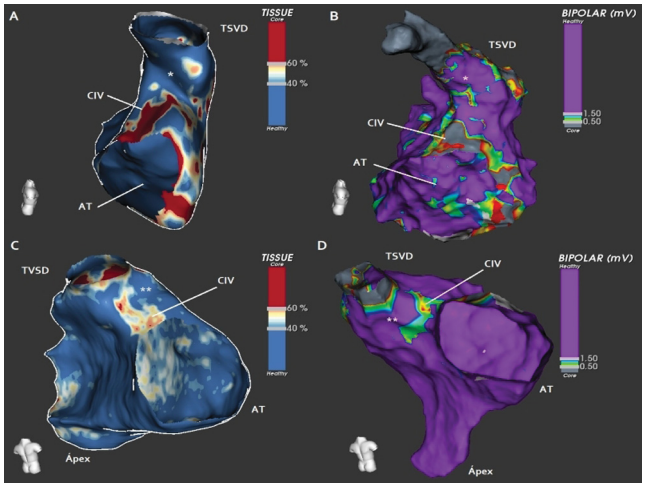
Introduction: Ventricular arrhythmias are one of the main causes of morbidity and mortality in patients with repaired tetralogy of fallot (rTF). These life-threatening arrhythmias are related to specific isthmuses of viable tissue between areas of scar and/or valve rings of the right ventricle (RV) that have been already described in the literature. Late gadolinium-enhanced cardiac magnetic resonance (LGE-CMR) has proven useful in characterizing the arrhythmogenic substrate in several heart diseases. Nevertheless, LGE-CMR evidence in patients with rTF is scarce.
Purpose: To compare the characterization of the ventricular arrhythmogenic substrate by means of LGE-CMR and electroanatomic mapping (EAM) of the right ventricle (RV) in patients with rTF.
Methods: Unicentric and observational study of consecutive patients with rTF who underwent LGE-CMR performed with 1.5T equipment and RV high-density voltage map, performed with multipolar catheter and completed with contact force-sensing catheter. The LGE-CMR segmentation was performed with dedicated software. The extent (area and percentage) and location of the dense scar (defined as $<$0.5 mV in EAM and $<$40% of the maximum intensity pixel in LGE-CMR) were compared, as well as the location of the isthmuses of viable tissue.
Results: Eight patients were included (45.7±10.4 years; 50% male). The extent of the scar was 20.7±13.6 cm^2 (15.1±9.3%) by EAM and 21.7±8.8 cm^2 (11.8±7.6%) by LGE-CMR. There was an absolute correlation regarding the location of the dense scar and the distribution of the isthmuses of viable tissue. The quantification of the dense scar evidenced a positive linear correlation between both techniques (area correlation: ρ = 0.71, p=0.047; percentage correlation: ρ = 0.88; p=0.004). The average time spent for the segmentation of the LGE-CMR with the dedicated software was 19.9±3.0 minutes.
Conclusions: Characterization of the RV arrhythmogenic substrate in patients with rTF with LGE-CMR is feasible. An absolute association regarding the location of the dense scar and the distribution of the isthmuses of viable tissue was observed when compared to the RV high-density EAM. In the same way, a statistically significant linear correlation in the quantification of the dense scar between both techniques was documented.



LGE-CMR and EAM of two patients with rTF