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Pure cardiac magnetic resonance-guided ablation of scar-dependent left ventricular tachycardia.

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Topic(s): Ablation of Ventricular Arrhythmias

Citation:

Background: Cardiac Magnetic Resonance-Aided (CMR-Aided) ventricular tachycardia (VT) ablation using pixel signal intensity (PSI) maps from the late gadolinium enhancement-CMR (LGE-CMR) fused with the electroanatomical map (EAM) information, has shown to improve outcomes of VT substrate ablation.

Objective: To assess the feasibility and potential benefit of guiding the VT substrate ablation exclusively by the CMR-derived PSI maps and heterogeneous tissue channels (HTC) (CMR-Guided).

Methods: 78 consecutive patients with scar-dependent monomorphic VT who underwent substrate ablation were included in the study. In the last 26 (33%) patients the ablation procedure was exclusively CMR-Guided. LGE-CMR was segmented using a pixel signal intensity algorithm at 10 concentric layers from endo to epicardium. A 3D color-coded shell map was obtained for each layer to depict the scar core and border zone distribution. HTC were identified and segmented from LGE-CMR maps. LGE-CMR maps and HTC were imported into the CARTO navigation system and registered with a fast activation map of the Aorta. Radiofrequency ablation (RFA) was delivered at all the CC entrances identified on LGE-CMR. Procedural data as well as acute and follow-up outcomes were compared between the CMR-Guided and two additional control groups: 1) patients in whom PSI maps were available but the electroanatomical map was acquired and used to select the ablation target (CMR-Aided) 2) patients without CMR-derived PSI maps (No-CMR).

Results: Mean procedure duration was lower in CMR-Guided when compared to CMR-Aided and No-CMR substrate ablation (109±61 vs. 206±70 and 233±48 min, respectively; p<0.001 for both comparisons). CMR-Guided required less fluoroscopy time than CMR-Aided and No-CMR (11±4 vs. 23±2 and 26±11 min respectively; p<0.001 for both comparisons) and less radiofrequency (RF) time (15±8 vs. 20±15 and 26±11min; p=0.16 and p<0.001 respectively). After substrate ablation, VT inducibility was lower in the CMR-Guided compared with CMR-Aided and No-CMR (19 vs. 35% and 46%; p=0.21 and p=0.04 respectively), without significant differences in end-procedure inducibility and complications. After a mean follow-up of 15.63 ± 4.06 months, there was a tendency to lower recurrence rate between CMR-Guided and No-CMR groups 2/26 (8%) vs 8/26 (31%) p=0.09. There were no statistically significant differences between CMR-Guided and CMR-Aided groups 2/26 (8%) vs 4/26 (16%) p=0.767.

Conclusion: CMR-Guided VT ablation is feasible and safe, significantly reduces the procedure, fluoroscopy and RF time, and is associated to a higher non-ducibility rate after substrate ablation and probably to a lower recurrence rate.
Abstract: Pure cardiac magnetic resonance-guided ablation of scar-dependent left ventricular tachycardia.

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