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Ablation of scar-related ventricular tachycardia: paced electrogram feature analysis (PEFA) is a novel and effective substrate based strategy

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Background

Ablation of scar related ventricular tachycardia (VT) has been shown to be superior to escalation of drug therapy. However, the incremental benefit remains modest, with 42% experiencing recurrent shocks and 64% appropriate anti-tachycardia pacing (ATP) in the VANISH study. Improved ablation strategies are needed. Paced electrogram feature analysis (PEFA) is a novel substrate based ablation technique.

Purpose

To investigate the effectiveness of the PEFA based VT ablation technique.

Methods

A single centre, prospective study. Consecutive cases of scar related VT that had an implantable cardiac defibrillator (ICD) and no prior ablations were recruited. Close coupled pacing was performed at the right ventricular apex and the VT isthmus(es) identified on high density mapping catheters by increased electrogram (EGM) duration and latency. A algorithm was developed to identify the latest EGM component after the S2 pacing artefact,. This millisecond value was displayed on the geometry as a colour (PEFA map)(St Jude Ensite Precision Electroanatomic Mapping). PEFA identified VT isthmus sites were targeted for ablation (Figure 1). Follow up ICD interrogation data was utilized to assess for VT recurrence.

Results

A total of 20 patients were recruited. These comprised ischaemic cardiomyopathy (CM) (17/20), dilated CM (2/20), and arrhythmogenic CM (1/20), male (18/20), and endocardial only approach (19/20). Mean age was 64.3 ± 11.3 years, , ejection fraction 24.4% ± 14.4 , and ablation time was 1989.9 ± 1078.1 seconds. Non-inducibility was demonstrated at the end of the case in 18/20. A class I or III anti-arrhythmic drug was continued in 50%. VT recurred in three cases (Day 28,30,55). One death occurred following a stroke on day 181. Mean follow up was 437.5 ± 231.7 days.

Conclusion

This is the largest study to date on PEFA based VT ablation, the first to include non-ischaemic aetiologies, and reports a longer mean follow up. A high proportion of cases were non-inducible, and low VT recurrence rates
were observed. PEFA appears to be a promising tool to guide VT ablation targets.