Simultaneous Pace During Ablation Approach to Achieve Scar Non-Excitability as a Substrate-Based Catheter Ablation Endpoint of Ventricular Tachycardia

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Introduction: Background A simultaneous pace-ablate strategy to achieve electrical non-excitability has not previously been evaluated in the VT ablation cohort. In this study, we outline an additional ablation endpoint for targeting scar-related VT substrate. Objectives To summarise the procedural characteristics and outcomes of patients with structural heart disease (SHD) undertaking a substrate-based catheter ablation of ventricular tachycardia (VT) until high-output pacing loss-of-capture with simultaneous ablation.

Methods: Substrate-based catheter ablation was performed where loss of pacing capture was used as the ablation lesion endpoint using bipolar pacing at a fixed output of 600ms with 10mA and a 9ms pulse width.

Result: Twenty-three VTs were inducible in 7 patients with a total of 868 ablation lesions applied using simultaneous bipolar pacing with the acute ablation endpoint of tissue loss-of-capture. The mean age was 72±3 years (all men, mean LV ejection fraction of 29%±7%; ischaemic cardiomyopathy, 6; recurrent ICD shocks and electrical VT storm, 5) with a median endocardial bipolar scar of 64.8cm² (IQR25-75 52.1-136.3cm²), equating to 47% (IQR25-75 42-56%) of the total ventricular surface. The median ablation area was 22.2cm² (IQR25-75 16.3-68.1cm²) which converted to a median percentage of bipolar scar ablated to be 41% (IQR25-75 27-66%). Overall, the median ablation lesions per patient was 101 lesions (IQR25-75 80-173) and the total ablation time was 51 minutes (IQR25-75 41-72 minutes) with average duration per lesion of 30.3 seconds (IQR25-75 23.7-38.3 seconds). Median total energy was 115,798 joules (IQR25-75 92,081 – 158,163 joules) and average power was 33.2 Watts (IQR25-75 32.2-36.3 Watts). Median impedance drop was 9.7ohms per lesion (IQR25-75 9.1-9.9ohms) and CF was 11.9g (IQR25-75 10.2-12.7g). There was no VF episodes during any pacing and simultaneous ablation session. The median procedure time was 270 minutes (IQR25-75 218-370 minutes). Acute procedural success was seen in 6 patients (86%) and partial success in the remaining patient. After a median follow-up of 246 days, there was no VT recurrence or repeat ablation procedures in any patient. One patient died within 30 days following re-admission with multi-organ dysfunction without recurrent ventricular arrhythmias. In addition, 4 patients (57%) had a reduction in AAD therapy.
Conclusion: Achieving scar non-excitability as an additional endpoint to complete scar homogenisation during catheter ablation of scar-VT is an effective technique to suppress recurrent VT and reduce AAD therapy in a high-risk group of patients with recurrent ICD shocks, severe cardiomyopathy and extensive scar substrate. In conjunction with high-density mapping and guidance with real-time ICE feedback, it appears safe and does not increase procedural or ablation time.