



Case report

Three dimensional epicardial mapping and ablation of recurrent non-ischaemic ventricular tachycardia

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KEY WORDS

Electroanatomic mapping
Epicardial approach
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A B S T R A C T

Radiofrequency ablation is a therapeutic option for recurrent ventricular tachycardia (VT) in both ischaemic and non-ischaemic subsets. Usually this is attempted by mapping endocardially; however, in some situations epicardial approach may be needed to access the VT circuit. We report two cases in which epicardial approach was used to successfully ablate the VT, when endocardial ablation was ineffective.

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Case 1

A 50-year-old female was evaluated for recurrent symptomatic ventricular tachycardia (VT). Ventricular tachycardia was of right bundle branch block (RBBB) type morphology with superior axis, QRS duration of 204 ms, pseudo-delta wave and intrinscoid deflection of 132 ms suggesting a possible epicardial origin (Figure 1). Left ventricular (LV) function was preserved on echo and angiogram revealed normal major epicardial coronaries. Contrast-enhanced cardiac magnetic resonance imaging (MRI) demonstrated a mid-myocardial and epicardial scar in anterolateral LV wall. A diagnosis of non-ischaemic scar VT was made and patient was taken up the patient for electrophysiology study.

An initial endocardial approach was used using electroanatomic mapping system (CARTO, Biosense Webster). The equipment used for recording was an EP-TRACER (Cardio Tek, Maastricht, Netherlands). Ventricular tachycardia was induced by programmed extra stimuli (PES) from right ventricular (RV) apex. The VT was haemodynamically unstable necessitating prompt cardioversion. A substrate map of LV endocardium in sinus rhythm (SR) revealed low voltage potentials (<0.5 mV) in anterolateral wall with inability to pace at 10 mA, 2 ms pulse width suggestive of electrically unexcitable scar. Signals in the vicinity of this scar were fragmented suggestive

of far field potentials and no mid or late diastolic potentials or areas of continuous electrical activity were recorded. Pace-maps from endocardial surface were unsatisfactory. All this pointed towards a likely epicardial location of the re-entry circuit and a decision to approach the pericardial space was made.

Heparin was reversed using intravenous protamine and the pericardial space was accessed using a percutaneous subxyphoid approach using technique previously described by us.¹ A standard 8F sheath mounted over a guidewire was then introduced into the pericardium and an externally irrigated 4 mm ablation catheter (F curve, Thermocool Celsius, Cordis Webster) was introduced through the sheath and carefully advanced into the pericardial space.

At an epicardial location facing the presumed site of endocardial scar (anterolateral LV), voltage map during SR showed multiple areas of low voltage electrograms with mid-diastolic potentials (MDP) (Figure 2) representing slow conducting channels. A good 12/12 pace map from these areas with a short stimulus to QRS suggested exit site of the VT circuit (Figure 3). A coronary angiogram was done to ensure the tip of the ablation catheter was far away from the coronary arteries. Tachycardia was induced and radio frequency (RF) ablation was performed at the mapped epicardial site which promptly terminated the tachycardia. Radio frequency was, then, applied at all the low voltage channels in the scar area using 40 W and 20 mL/min irrigation to create a linear lesion. Post ablation, the tachycardia could not be induced on PES even after isoprenaline challenge. A pigtail catheter was left

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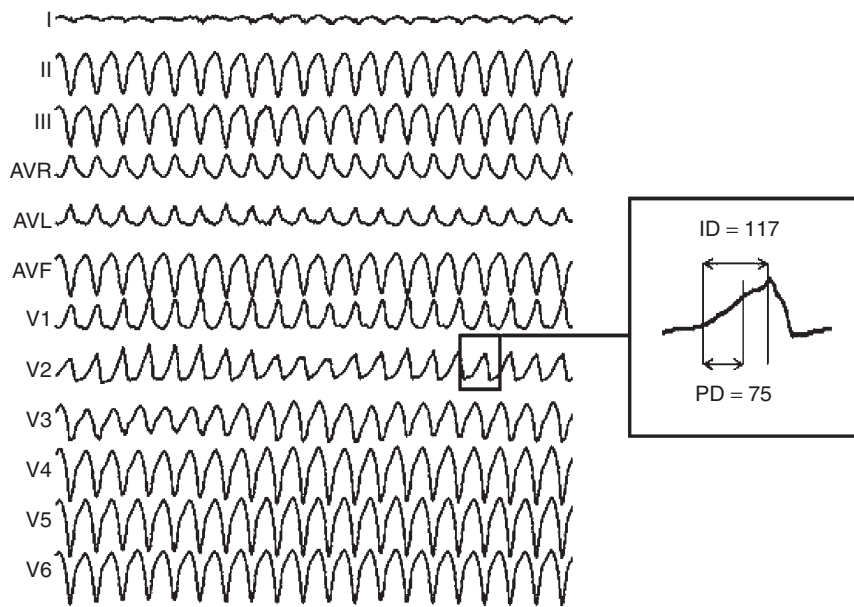


Figure 1 Electrocardiogram showing ventricular tachycardia with right bundle branch block, superior axis. QRS duration is 204 ms, pseudo-delta (PD) wave of 75 ms and intrinsic deflection (ID) of 117 ms suggest epicardial location.

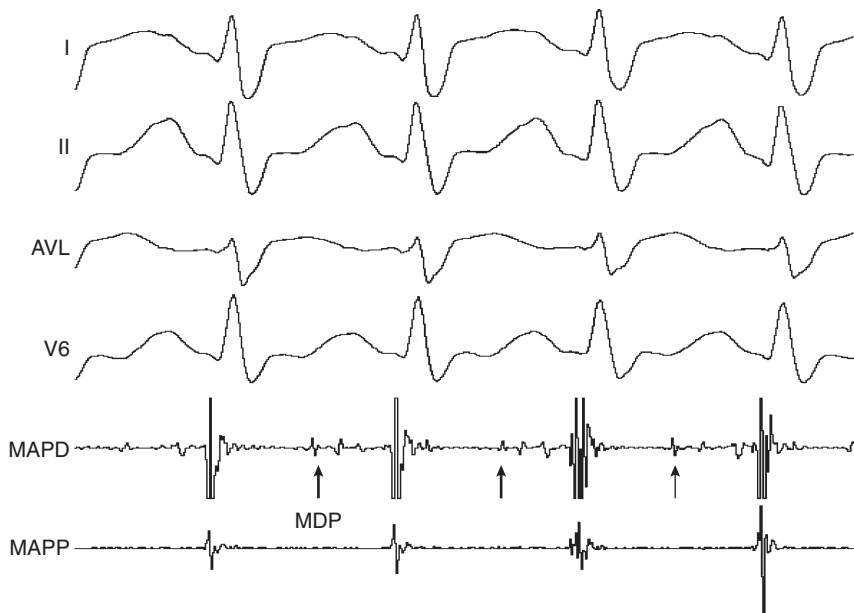


Figure 2 Electrogram demonstrating epicardial mapping catheter showing mid-diastolic potentials (MDP) during sinus rhythm. From top to bottom, surface electrograms I, II, III, aVF, and V6; intracardiac electrograms from distal epicardial mapping catheter (MAPD).

in the pericardial space for 24-hours to drain any residual pericardial fluid.

Case 2

A 46-year-old female with history of recurrent symptomatic VT was evaluated. Clinical VT had RBBB, left superior axis morphology (Figure 4). Two dimension echo and MRI showed normal biventricular function with no evidence of myocardial scar.

Patient was taken up for electrophysiology study using electroanatomic mapping system. Ventricular tachycardia of

cycle length 370 ms which resembled the clinical VT was induced by PES by a quadripolar catheter placed at the RV apex. Activation mapping of the LV during VT was performed using a Navistar (F curve) catheter. Endocardial activation map failed to reveal any good early activation signal. Earliest signal was noted in postero-apical region of the LV (–18 ms to QRS onset). Radio frequency lesions given at this area failed to terminate the tachycardia. After termination of tachycardia, pace-mapping was attempted in this region; however, a satisfactory pace-map was not obtained.

In view of failure to achieve an early activation map from endocardium, it was decided to undertake an epicardial approach. A percutaneous epicardial access was obtained as

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