Catheter Ablation of Ventricular Tachycardia Beneath an Endoventricular Patch

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A 70-year-old male with a history of ischemic heart disease with a left ventricular ejection fraction of 35% was referred for ablation to control recurrent episodes of ventricular tachycardia (VT) despite amiodarone therapy and a previous failed catheter ablation attempt. He had undergone coronary artery bypass grafting 20 years ago, and reoperation for mitral valve repair and endoventricular patch reconstruction (Dor procedure) of an anteroapical left ventricular aneurysm 10 years ago.

After informed written consent was obtained, catheter mapping and ablation were performed with saline irrigated-tip catheter using electroanatomic mapping (CARTO; Biosense Webster, Diamond Bar, CA). A monomorphic VT with right bundle-branch block morphology in V1 was inducible and hemodynamically tolerated. Intracardiac echocardiography showed a pouch beneath the patch, consistent with dehiscence of a portion of the endoventricular patch, which had been recognized shortly after surgery 10 years previously (Figure 1). No thrombus was evident in the left ventricle (LV) or the pouch. Three-dimensional shells of the LV, the patch, and the apical aneurysmal pouch were separately created using intracardiac echocardiography (Figure 2). During LV mapping the ablation catheter was observed to enter the LV pouch from a site on its lateral aspect. A site with late potentials during sinus rhythm and presystolic fractionated electrograms during VT was found at the septal aspect of the apical pouch. Entrainment of VT at this site showed minimal fusion and the postspacing interval assessment relative to the tachycardia cycle length, consistent with an area in an outer fusion and the postpacing interval assessment relative to the endocardium is usually effective. Surgical left ventricular reconstruction with an endovascular dacron or pericardial patch was described by Dor et al as a method to preserve physiological geometry. It excludes access to the aneurysm and some of the infarct border zone, which may contain the substrate for VT. Ablation of VT can sometimes be achieved at sites along the border of the patch, but if this fails, a surgical approach to reach myocardium beneath the patch may be required.

Percutaneous epicardial ablation is often not possible because of pericardial adhesions that limit pericardial access, and the VT may originate deep to the epicardium in any case. Transcoronary ethanol ablation could also be considered. In this case, dehiscence of a portion of the patch allowed access to a critical region for the VT from an LV endocardial approach. Dehiscence of the endocardial patch appears to be a rare postoperative complication after Dor procedure. In this case the dehiscence was known to be present for several years and was associated with stable cardiac function, such that reoperation was not felt to be required from a hemodynamic standpoint, although it could have been considered for treatment of VT. To the best of our knowledge, this is the first case report of successful catheter ablation of VT originating from the apical side of the endoventricular patch.

Disclosures

None.

References

Figure 1. Intracardiac echocardiography shows a pouch beneath the endoventricular patch (arrow). LV indicates left ventricle.

Figure 2. Separate 3-dimensional shells of the left ventricle (LV), the patch (arrow), and the apical aneurysmal pouch were created using intracardiac echocardiography. The activation map during ventricular tachycardia (VT) showed the earliest site to be located in the pouch. The orange dot indicates the successful site of VT termination during radiofrequency ablation, and red dots indicate other sites where ablation was performed.

Figure 3. A site with presystolic fractionated electrograms during ventricular tachycardia (VT) was found at the septal aspect of the apical pouch (orange dot in Figure 2; A). Entrainment of VT at this site showed minimal fusion (note subtle change in lead I from QRS to QS configuration) and that a postpacing interval at the tachycardia cycle length of 420 ms (dashed arrow) falls within the fractionated electrogram. The following QRS is not fused and the interval from stimulus to that QRS is 440 ms (red arrow). These findings are consistent with pacing in or near an outer loops site near the VT exit as illustrated in the schematics (B, C, and D). B shows the VT circuit. C and D show the path of stimulated wavefronts at a time point early after the last stimulus, and later after the last stimulus, respectively. ABL d indicates bipolar intracardiac recordings from the distal electrode pair of the mapping catheter; ABL p, those from the proximal electrode pair; PPI, postpacing interval; RV, right ventricle; and S, stimulus.
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