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Successful ablation of premature ventricular contractions originating from the ascending aorta

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A 60-year-old woman underwent catheter ablation of symptomatic, frequent premature ventricular contractions (PVC) with left bundle branch morphology and inferior axis, consistent with left ventricular (LV) outflow tract (OT) origin (Fig. 1A) [1,2]. Activation mapping of PVC was performed in search of the earliest ventricular activation site, though the optimal site of ablation was found neither in the right ventricular (RV) OT, nor the pulmonary artery (PA), the LVOT or the aortic cusps of Valsalva. We failed to ablate the PVC at the site of the earliest activation inside the RVOT (Fig. 1B). The earliest ventricular activation site with a local ventricular-QRS interval of 0 ms was found in the anterior wall of the ascending aorta, above the aortic cusp, 9.1 mm above the sino-tubular junction (Figs. 1C and 2), where the high-frequency electrogram that preceded the low frequency ventricular electrogram of the PVC and, conversely, followed the low frequency electrogram of sinus complexes (Fig. 1B) was recorded. High-output pacing at that site was associated with a pace map very similar to the spontaneous QRS, though did not produce a variability in the QRS morphology that suggested the presence of multiple channel and exits in the origin (Fig. 1D and E). The first application of radiofrequency (RF) energy with a maximum output of 30-W and a maximum temperature of 42 °C by using non-irrigated 7-French catheter immediately eliminated the PVC (Fig. 1F). We did not perform the RF delivery inside the RVOT adjacent to the successful ablation site. During a 13-month follow-up, the patient remained asymptomatic and free from recurrences of PVC.

Catheter ablation of ventricular tachyarrhythmias originating from the OT remains challenging. While potentially arrhythmogenic ventricular myocardial extension have been observed in the ascending aorta, beyond and between the aortic cusps, they have not been described beyond the sino-tubular junction [3,4], suggesting that the adjacent posterior RVOT rather than the ascending aorta was the origin of the PVC. The high frequency electrogram (unfilled and filled arrow in Fig. 1C) that preceded the low frequency ventricular electrogram (thin arrow in Fig. 1C) of the PVC and, conversely, followed the low frequency ventricular electrogram (thin arrow in Fig. 1C) of sinus complexes, was consistent with a far-field activation of RVOT. The low frequency ventricular electrogram preceding RVOT potential of sinus complexes or following RVOT potential of the PVC appeared to reflect the far-field anisotropic propagation within interventricular septum. Poor earliness of the RVOT electrogram at the successful ablation site (Fig. 1C) and inside the RVOT (Fig. 1B) might reflect subepicardial origin in the RVOT wall. This is,

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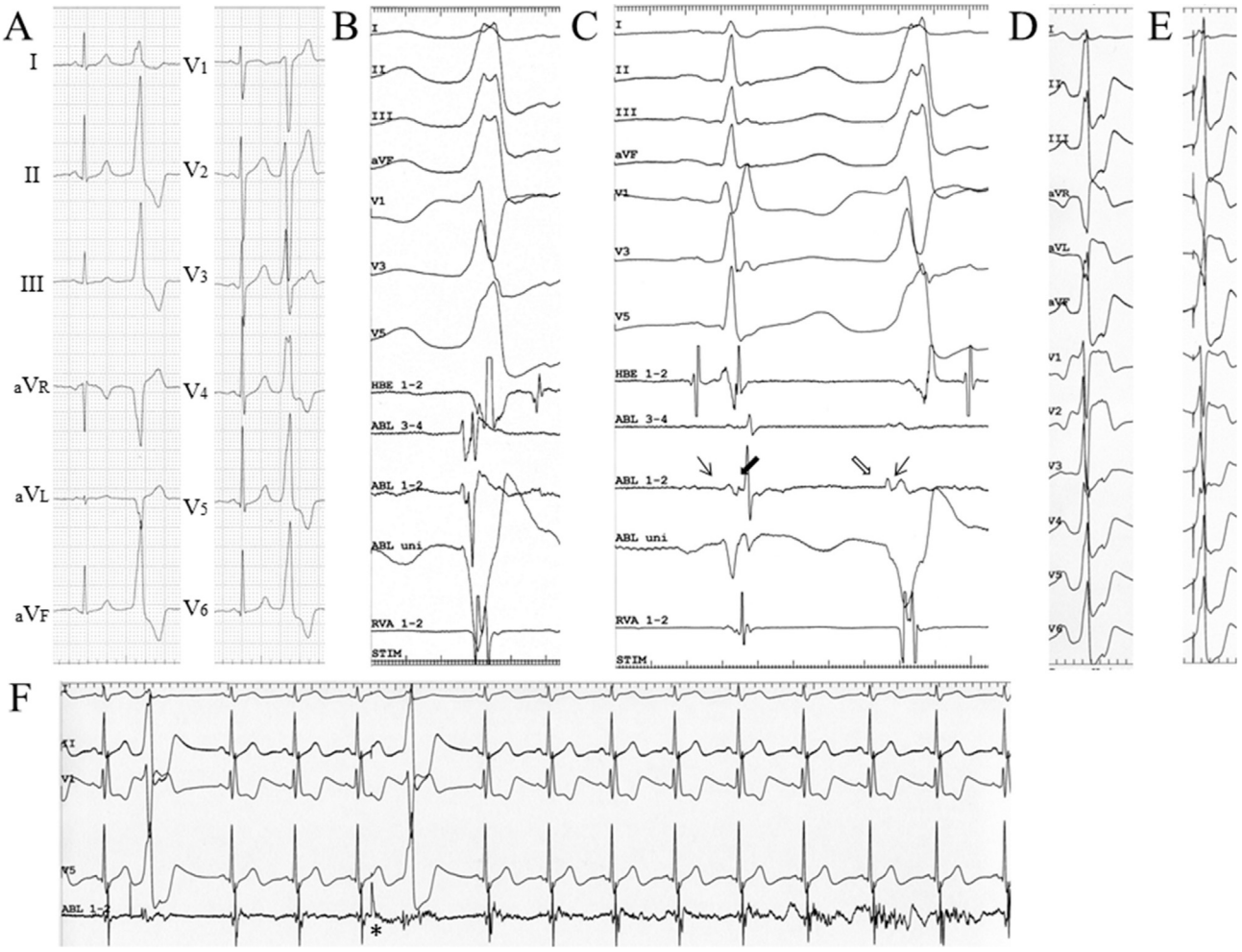

Fig. 1 – A. Surface 12-lead electrocardiogram recorded during sinus rhythm and premature ventricular complexes. B. Intracardiac electrograms at the site of the earliest activation with ventricular-QRS interval of 0 ms inside the right ventricular outflow tract. C. Intracardiac electrograms at the site of successful ablation. D. 12-lead electrocardiogram of spontaneous PVC. E. Pace map during electrophysiologic study. F. Leads I, II, V1 and V5 of surface electrocardiogram and endocardial electrogram at site of ablation, recorded immediately before and after RF delivery. Note, in B, that a high-frequency ventricular electrogram (unfilled arrow) precedes the far-field electrogram of the PVC (thin arrow) by 15 ms, while it (filled arrow) follows the far-field electrogram of a sinus complex (thin arrow). In E, the QRS morphology of the PVC immediately after RF delivery (asterisk) was slightly changed compared with before RF delivery and before the complete elimination of the PVC, suggesting that the latter were triggered by contact of the tip of the ablation catheter. HBE = His-bundle electrogram; ABL 1–2 and 3–4 = distal and proximal bipoles of ablation catheter; ABL uni = unipolar electrogram recorded from the tip of the ablation catheter; RVA = right ventricular apex.

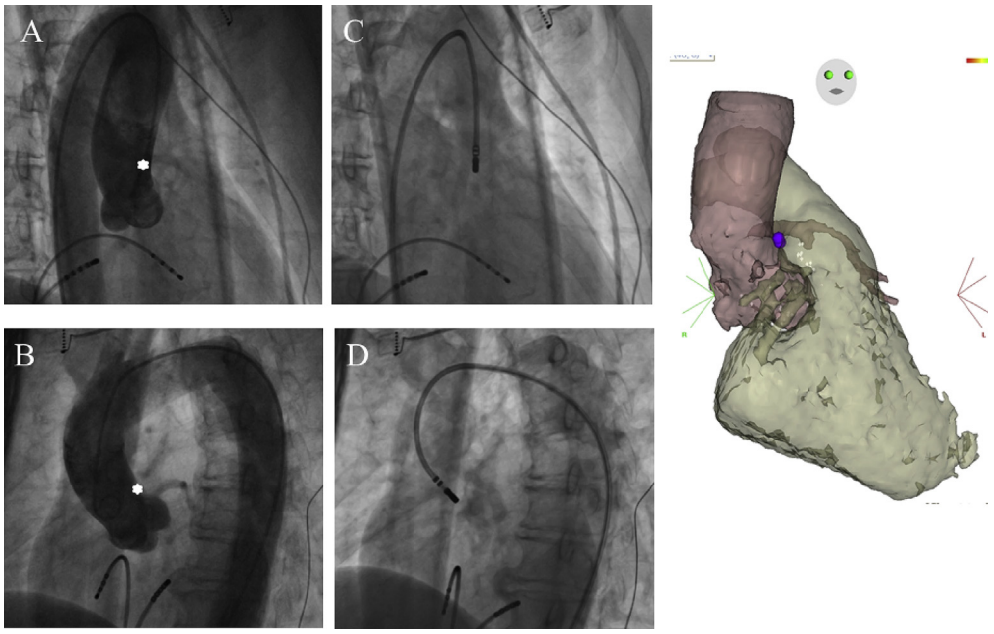

Fig. 2 – A and B. Ascending aortography in the right (A) and left (B) anterior oblique fluoroscopic projections, showing the successful ablation site (asterisk). C and D. Right and left anterior oblique fluoroscopic projections showing the catheter position at the successful ablation site. E. 3-dimensional antero-posterior computed tomographic image integrated into the CARTO mapping system showing the site of successful ablation (purple tag).

therefore, the first report of a successful ablation of PVC originating from the posterior wall in the RVOT by RF delivery from the adjacent anterior ascending aortic wall. Mapping and ablation inside the ascending aorta may be an option to cure PVC originating from OT refractory to be ablated inside the RVOT.

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