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Case Report

A case of premature ventricular complexes/ventricular tachycardia from the left ventricular outflow tract successfully ablated from the distal great cardiac vein

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ABSTRACT

We experienced a 41-year-old male with premature ventricular complexes/ventricular tachycardia from the left coronary cusp and distal great cardiac vein of the left ventricular outflow tract successfully treated by radiofrequency catheter ablation utilizing a 3D mapping system (EnSiteNavX/Velocity™ Cardiac Mapping System, St. Jude Medical, St. Paul, MN, USA) without any complications.
<**Learning objective:** The approach from the distal great cardiac vein should be considered as a potential approach and may be one of the effective strategies for ablation of left ventricular outflow tract-premature ventricular complexes/ventricular tachycardia (PVC/VTs). Radiofrequency catheter ablation of frequent PVC/VTs may improve the clinical status and cardiac function.>

Introduction

Premature ventricular complexes (PVCs)/ventricular tachycardia (VT) from the left ventricular (LV) outflow tract (OT) is observed in about 12% of all idiopathic PVC/VTs [1], and such foci are sometimes found to be originating from epicardial sites. The ablation of such foci is most often performed from the aortic valve cusps (AVCs), and most often the left coronary cusp (LCC) [1]. Because its incidence may be as high as about 10% [2], the use of an epicardial approach may improve the success rate of radiofrequency catheter ablation (RFCA) of epicardial PVC/VTs.

Case report

A 41-year-old male was admitted to our hospital with a chief complaint of palpitations due to frequent PVCs/VT to undergo RFCA. His physical examination yielded pretibial pitting edema, and his laboratory analysis demonstrated an elevated serum brain natriuretic peptide (BNP) up to 180 pg/dl (Table 1). His 12-lead electrocardiogram (12-ECG) (Fig. 1A) and 24-h Holter monitoring (Fig. 1C) revealed frequent PVCs of 35% (Table 1) and non-sustained VT. His chest X-ray and echocardiograms exhibited cardiomegaly (Fig. 2A) and a reduced LV ejection fraction of 48% (Table 1). His New York Heart Association (NYHA) functional class was III (Table 1). There were two types of PVC/VTs, one with a left bundle branch block (PVC/VT1) (Fig. 1 Dl and Dp), and the other with a right bundle branch block (PVC/VT2) (Fig. 1 Fl and Fp), and both had an inferior axis in the frontal plane. After a 5-French deflectable catheter was inserted into the coronary sinus, electro-anatomical mapping during PVC/VT1 was performed utilizing a 3D mapping system (EnSiteNavX/Velocity™ Cardiac Mapping System, St. Jude Medical, St. Paul, MN, USA) and an open irrigated 3.5-mm-tip ablation catheter (FlexAbility™, St. Jude Medical). Further, it demonstrated that the earliest activation site of the V wave was at the LCC located below the left main trunk (LMT) of the left coronary artery (yellow arrows in Fig. 2C–F). Findings of a suboptimal pace map during pace mapping at 9.9 V (Fig. 1El and

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Table 1 Parameters before and after the RFCA.

	Before RFCA	3 months after RFCA
%PVCs by 24-h Holter monitoring (%)	35	0.3
Cardio-thoracic ratio (%)	62	50
Ejection fraction by echocardiography (%)	48	68
Left ventricular dimension; diastole/systole (mm/mm)	64/45	52/38
Serum brain natriuretic peptide (pg/dl)	180	5
NYHA functional class	III	I

Ep), unipolar potentials of the ablation catheter demonstrating a QS pattern, and bipolar potentials of the tip of the ablation catheter proceeding the QRS in the 12-ECG by 52 ms (Fig. 1H) during the PVC/VT1 were obtained. After left coronary angiography, radiofrequency energy was delivered with a maximal temperature of 42 °C, maximum power of 35 W, and irrigation rate of 13 ml per minute. Then, PVC/VT1 was steadily terminated within 10 s. However, PVC/VT2 frequently appeared soon after (Fig. 1Fl and Fp), and it was impossible to ablate PVC/VT2 from the AVCs. Thus, electro-anatomical mapping during PV/VTC2 was once again performed around the distal great cardiac vein (d-GCV), demonstrating that the earliest activation site of the V wave was in the d-GCV (red arrows in Fig. 2C, D, G, and H). Findings of a suboptimal pace map during pace mapping at 9.9 V (Fig. 1Gl and Gp), unipolar potentials of the ablation catheter demonstrating a rQS pattern, and bipolar potentials of the tip of the ablation catheter proceeding the QRS in the 12-ECG by 49 ms (Fig. 1I) were obtained. The position and orientation of the ablation catheter were adjusted so that the impedance of the ablation catheter decreased to below 120 ohm. Then, PVC/VT2 was steadily terminated within 5 s after carefully delivering the radiofrequency energy with a maximal temperature of 42 °C and maximum power of 20 W. The minimum distance measured by the EnSiteNavX/Velocity™ system between the successful ablation sites of PVC/VT1 and 2 was 20 mm, and between the left coronary artery and successful ablation sites of PVC/VT1 in the LCC or PVC/VT2 in the d-GCV were about 10–15 mm. His serum BNP concentration, NYHA functional class, echocardiographic and 24-h Holter monitoring, and 12-ECG

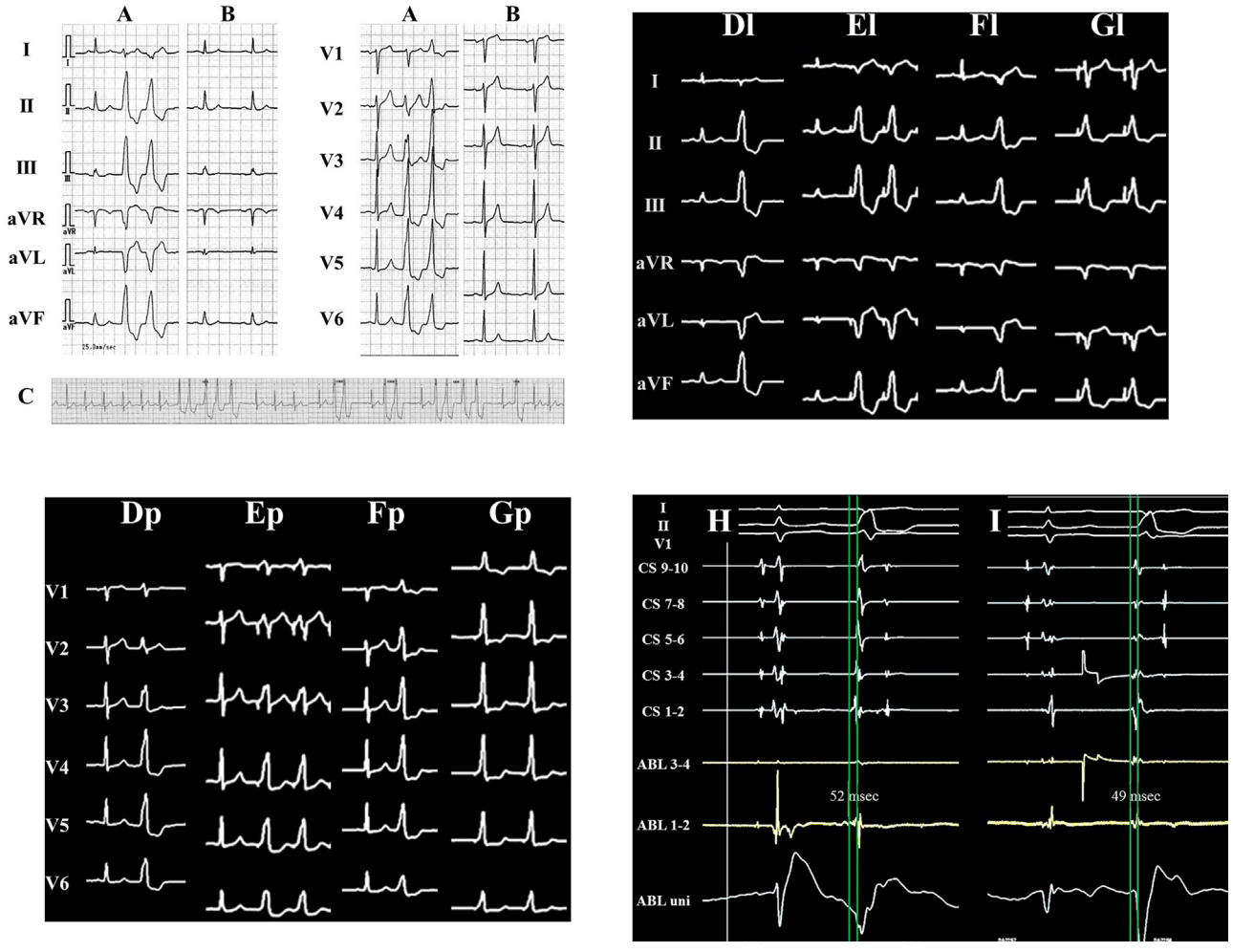

Fig. 1. The 12-lead electrocardiogram on admission (A), 2 months after the radiofrequency catheter ablation (B), and 24-h Holter monitoring (C). The 12-lead electrocardiograms of PVC/VT1 (Dl and Dp) and PVC/VT2 (Fl and Fp), and of a suboptimal pace map during pace mapping of PVC/VT1 (El and Ep) and PVC/VT2 (Gl and Gp). The intra-cardiac electrocardiograms of PVC/VT1 (H) and PVC/VT2 (I), demonstrating that the unipolar potential of the ablation catheter demonstrated a QS pattern and the bipolar potential of the tip of the ablation catheter preceded the QRS in the 12-lead electrocardiogram by 52 and 49 ms during PVC/VT1 (H) and PVC/VT2 (I), respectively. Dl, El, Fl, and Gl indicate the limb leads. Dp, Ep, Fp, and Gp indicate the precordial leads.
PVC/VT, premature ventricular complex/ventricular tachycardia.

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