JAE JOURNAL OF ARRHYTHMIA AND ELECTROPHYSIOLOGY

CASE REPORT

Ablation of Idiopathic Premature Ventricular Arrhythmias Originating from the Basal Cardiac Crux Region: A Case Report

Kadir Karacali, MD[1]; Ibrahim Etem Celik, MD[2]; Fatih Oksuz, MD[3]; Esra Varol, MD[3]; Muhammed Karadeniz, MD[4]; Mustafa Duran, MD[2]

Summary

Ablation of the idiopathic ventricular arrhythmias (VAs) originated from the basal crux is a challenging procedure. Due to the presence of contiguous structures, performing ablation in this region requires the use of different approaches and strategies. We have performed the ablation using high-power short-duration (HP-SD) radiofrequency delivery for premature ventricular contractions (PVCs) that originated from the basal crux from the endocardial aspect. Ablation of PVCs originated from basal crux of the heart requires detailed mapping of proximal coronary venous system and the adjacent structures such as right ventricle (RV), left ventricle (LV) and right atrium (RA). Understanding this complex anatomical relationship is important for achieving successful ablation and avoiding complications. Different technical strategies could be used for both endocardial and epicardial approaches.

Keywords: cardiac crux, high-power short-duration (HP-SD) ablation, premature ventricular contractions (PVCs)

Correspondance

Kadir Karacali, MD

kadir.karacali@hotmail.com

[1]Golbasi Sehit Ahmet Ozsoy State Hospital, Ankara, Turkey

[2]Ankara Etlik City Hospital, Ankara, Turkey

[3]Ankara Education and Research Hospital, University of Health Sciences, Ankara, Turkey

[4]Kirikkale University, Faculty of Medicine, Kirikkale, Turkey

Received: 24 November 2025
Accepted: 27 December 2025

DOI: 10.5281/zenodo.18684542

Introduction

Idiopathic ventricular arrythmias (VAs), which by definition occur in structurally normal hearts, may originate from right ventricle outflow tract (RVOT), left ventricle outflow tract (LVOT), mitral and tricuspid annuli, papillary muscles and cardiac crux region. Radiofrequency ablation of these arrhythmias is safe and effective treatment method. Cardiac crux is a quadrangular pyramidal space where the right atrium (RA), left atrium (LA), left ventricle (LV) and right ventricle (RV) intersect. Because of its anatomic complexity, ablation of VAs originated from this site is a challenging procedure. Here, we present a case of radiofrequency ablation for premature ventricular contractions (PVC) originating from basal crux.

Case presentation

A 53-year-old female patient who had hypertension and heart failure has presented to outpatient cardiology clinic with long-standing palpitation, shortness of breath and fatigue. Transthoracic echocardiography was showed a reduced ejection fraction of 35% with globally hypokinesia and left chamber dilatation, suggesting potential PVC-induced cardiomyopathy. A 12-lead electrocardiography (ECG) shown frequent PVCs demonstrating left bundle branch block (LBBB) pattern with abrupt precordial transition R wave in V2 and a QS pattern in the inferior leads. The maximum deflection index (MDI) and pseudo-delta wave were 0.62 and 50 ms, respectively (Figure 1).

After informed consent, the patient was scheduled for the ablation procedure. Standard multielectrode catheters were positioned under fluoroscopic guidance through the femoral vein and placed in the coronary sinus (CS). LV access was achieved by retrograde aortic approach (Figure 2, Supplementary Video). In line with surface ECG, it was considered that PVCs are originated from the crux or left side. There dimensional electro-anatomic mapping (EnSite Precision™ Cardiac Mapping System, St. Jude

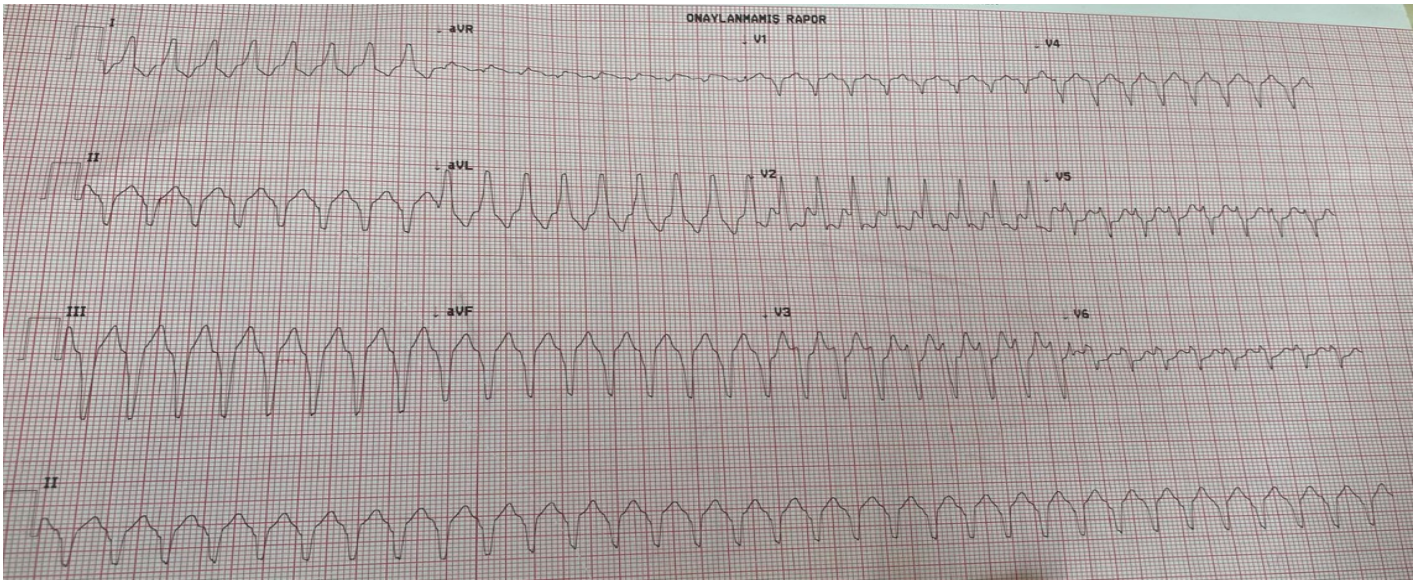

Figure 1. 12-lead electrocardiogram of clinical VT.

Medical) of LV was performed using Advisor™ HD Grid Sensor Enabled™ High Density Mapping Catheter. An early ventricular activation of 32 ms earlier than QRS onset was found in the postero-septal endocardial aspect of LV. Unipolar electrogram was showed QS pattern at the target site (Figure 3). Radiofrequency energy (TactiCathTM Sensor EnabledTM, Abbott, USA) was applied with a power of 40 W and a maximum temperature of 50 °C to the target size; however, in a waiting period of 30 mins, PVCs occurring remained. Then a single high-power short-duration (HP-SD) radiofrequency ablation with >50 W and a maximum temperature of 70 °C for 8 s was applied and completely eliminated PVCs without any complication. After the procedure, the patient was monitored for 24 hours, and no arrhythmic event was occurred. In follow-up, the patient remains asymptomatic. She was also evaluated at the outpatient clinic by ECG and 24-hour Holter monitoring one month later, and no recurrence of PVCs occurred.

Discussion

Cardiac crux is a quadrangular pyramidal space where the right atrium, left atrium, LV, and RV intersect. This area encompasses CS, the posterior descending branch of the right coronary artery, and the epicardial fat. Ventricular arrhythmias (VAs) originating from the cardiac crux may present with

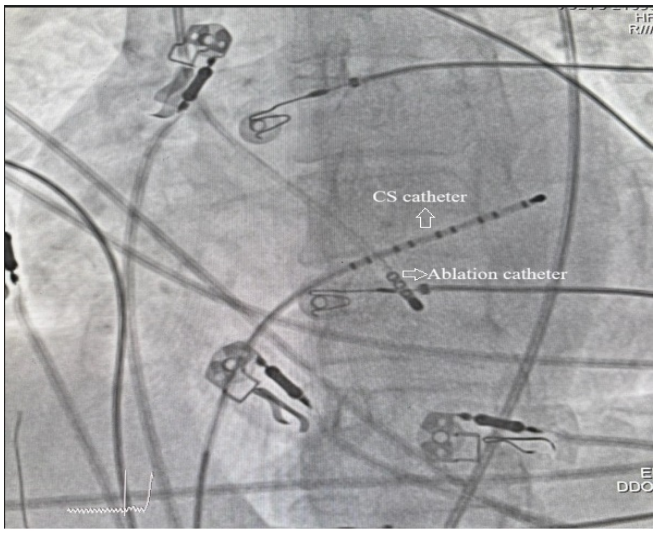

Figure 2. LV accessing by retrograde aortic approach.

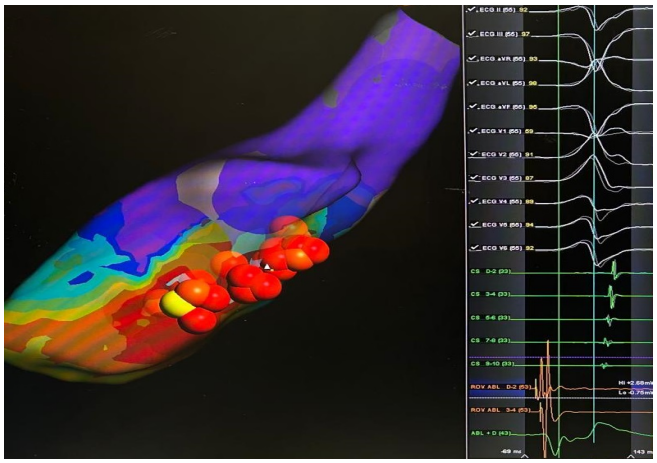

Figure 3. The earliest site of activation at the posteroseptal LV is shown on electroanatomical mapping.

a superior axis and exhibit either a right bundle branch block (RBBB) or left bundle branch block (LBBB) morphology, depending on whether their origin is basal or apical. Because of the epicardial origin of these VAs, QRS is wider than other idiopathic VAs. The surface ECG features suggestive of the epicardial origin also included a maximum deflection index (MDI) ≥ 0.55 and pseudo-delta wave duration ≥ 34 ms.[1,2] Due to its complex anatomical structure, VAs originate from crux ablation is a challenging procedure however contiguous cardiac structures allow for ablation of arrhythmias from crux.[1] Rare cases in which crux VAs ablation was performed with different anatomical approaches were reported previously.[2] Ablation of these arrythmias requires detailed mapping of proximal coronary venous system and the adjacent structures such as RV, LV, and RA. Understanding this complex anatomical relationship is important for ablation success and avoiding complications.[2,3]

Inferoseptal process (ISP) PVCs are also rare significant arrythmias and could be challenging to manage because of anatomical complexity. ISP can cause PVCs that have similar ECG pattern with basal crux and it can be challenge to differentiate these PVCs on the surface ECG.[2] In our case some features of the QRS pattern, including the R wave in D3 being larger compared to in D2 was more consistent with basal crux region. In addition, electroanatomic mapping showed the earliest activation at basal crux region and no earlier signal detected near the ISP.

In this case, we have also used the HP-SD radiofrequency delivery for elimination of PVCs. This strategy aims to create relatively shallow but wide lesions in a short time which is particularly advantageous in anatomical complex area and it is associated with more durable lesions.[4] HP-SD minimize deep conductive heating while providing effective ablation. Therefore, it reduces the risk of collateral injury to adjacent structures such as AV conduction tissue and coronary venous system. Previous trials demonstrated that HP-SD ablation is the effective and safe strategy enabling more controlled lesion formation, shorter procedure times, and more durable lesions compared to conventional power-controlled ablation such as sequential lesions from adjacent chambers, simultaneous unipolar energy delivery, true bipolar ablation, or half-normal-saline irrigation.[5,6] Given that complex anatomical relationship, HP-SD ablation with minimal thermal penetration would be safe and effective method in our patient.

Conclusion

Idiopathic PVCs that originated from basal crux of the heart are rare, and the ablation procedures for these arrhythmias are challenging due to its anatomical complexity. Different technical strategies could be used from both the endocardial and epicardial approaches. In our case, we have performed the PVCs that originated the basal crux ablation via endocardial aspect using the HP-SD strategy.

References

1. Lin CH, Lo LW, Lin YJ, et al. Ventricular arrhythmias originating from the cardiac crux and the basal inferior segment of the interventricular septum in the patients with structural heart diseases: characteristics, mapping, and electrophysiological properties. J Interv Card Electrophysiol. 2018;52(2):225-236.

2. Khmao P, Hwang C, Pak HN. Ablation of idiopathic ventricular arrhythmias originating from basal cardiac crux region. Int J Arrhythm. 2021;22:15.

3. Kawamura M, Gerstenfeld EP, Vedantham V, et al. Idiopathic ventricular arrhythmia originating from the cardiac crux or inferior septum: epicardial idiopathic ventricular arrhythmia. Circ Arrhythm Electrophysiol. 2014;7(6):1152-1158.

4. Heeger CH, Kuck KH, Tilz RR. Very high-power short-duration catheter ablation for treatment of cardiac arrhythmias: Insights from the FAST and FURIOUS study series. J Cardiovasc Electrophysiol. 2024;35(3):547-556.

5. Leftheriotis D, Flevari P, Papathanasiou KA, et al. High-Power Short-Duration Temperature-Controlled Radiofrequency Ablation for the Treatment of Outflow Tract Ventricular Arrhythmias. J Cardiovasc Electrophysiol. 2025;36(5):996-1002.

6. Kotadia ID, Williams SE, O'Neill M. High-power, Short-duration Radiofrequency Ablation for the Treatment of AF. Arrhythm Electrophysiol Rev. 2020;8(4):265-272.

Informed consent

Written informed consent was obtained from the patient for the publication of the manuscript.

Conflict of Interests

None

Funding

The authors state that the current study received no financial support.

You can access the videos mentioned in the article at the following address.

https://jaejournalvideos.com.bilkentaritmi.com.tr/a7videos.html