

CASE REPORT

A Case of Premature Ventricular Complexes from the Proximal Left Bundle Branch Successfully Ablated from the Right Coronary Cusp

Qiong Wu¹, Jianfeng Qian¹, Qingjun Liu¹ and Jianhua Fan¹

¹Department of Cardiology, Kunshan Hospital of Traditional Chinese Medicine, Kunshan Affiliated Hospital of Nanjing University of Chinese Medicine, Suzhou, Jiangsu 215300, China

Received: 21 April 2022; Revised: 26 April 2022; Accepted: 9 May 2022

Abstract

Background: Premature ventricular complexes (PVCs) from the proximal left bundle branch (LBB) can be ablated in the left ventricular outflow tract but can easily damage normal conduction bundles. Here, we report a case of successful ablation of PVCs from the proximal LBB within the right coronary cusp (RCC).

Case presentation: Our patient was a 70-year-old woman with PVCs from the proximal LBB that were successfully ablated via the RCC through radiofrequency catheter ablation with a 3D mapping system; she had a complication of incomplete right bundle branch block (RBBB) and remained asymptomatic during follow-up.

Conclusion: The RCC provides an alternative approach for ablating PVCs originating from the proximal LBB, owing to the close relationship between the RCC and proximal LBB.

Keywords: premature ventricular complexes; right coronary cusp; proximal left bundle branch

Introduction

Ablation of PVCs originating from the proximal LBB in the left ventricular outflow tract may easily damage normal conduction bundles, such as the atrioventricular block and left bundle branch block (LBBB). The His-bundle passes below the non-coronary cusp (NCC) and RCC and divides into right and left bundle branches. Herein, we

present a successful case of ablation of PVCs originating from the proximal LBB through the RCC.

Case Report

A 70-year-old woman was admitted to our hospital because of palpitation. Her physical examination findings and vital signs and laboratory tests were unremarkable. No structural heart disease was detected on transthoracic echocardiography. Her electrocardiogram (ECG) showed a sinus rhythm with frequent PVCs. The PVCs showed narrow QRS and an incomplete RBBB morphology pattern with

Correspondence: Jianhua Fan, Kunshan Hospital of Traditional Chinese Medicine, 189 Chaoyang Road, Kunshan City, Jiangsu Province, China, Tel.: (+86) 15335254629, E-mail: fjhheart@126.com

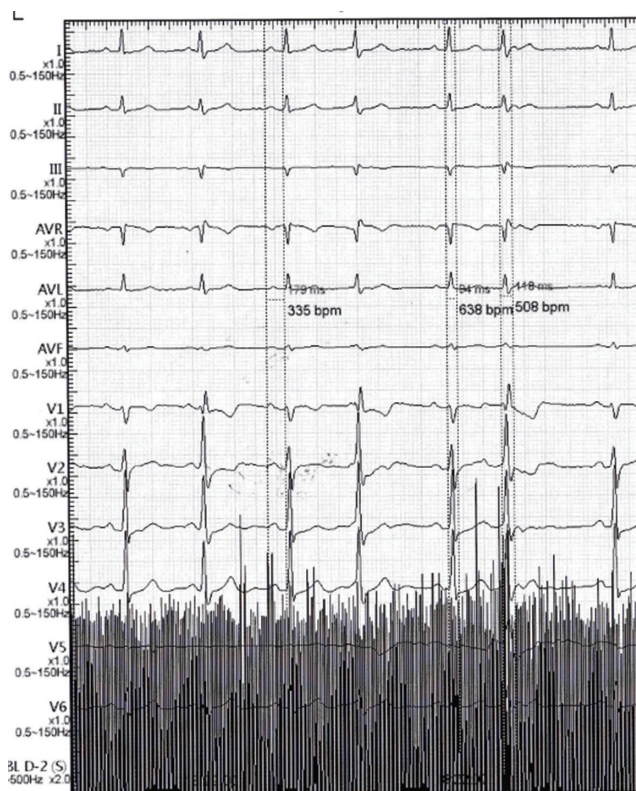


Figure 1 A 12-lead electrocardiogram during sinus rhythm and premature ventricular contraction. The PR duration was 179 ms and the QRS duration was 94 ms in sinus rhythm and 118 ms in premature ventricular complexes.

rs wave in II and AVF and qr wave in III (Figure 1). A total of 25290 monofocal PVCs, including 556 coupled beats, were detected by Holter ECG. From the ECG, we inferred that the PVCs probably

originated from the proximal LBB. Because of the anatomic characteristics of the conduction bundle, ablation of arrhythmias may potentially increase the risk of injuring the conduction system, such as the atrioventricular block and LBBB. Activation mapping with a 3D navigation system (Carto 3™, Biosense Webster) was performed. The earliest activation site during PVCs was observed at the RCC (Figure 2). Radiofrequency energy was delivered with an initial power of 20 W, then was up-titrated to a maximum power of 30 W with an irrigation rate of 18–30 mL/min for almost 180 seconds while the surface ECG and conduction intervals were carefully monitored. The frequency of spontaneous PVCs gradually decreased. Ablation was stopped when RBBB occurred in a sinus rhythm.

Incomplete RBBB remained after the operation, but the PR duration (178 ms) was not prolonged with respect to that before operation (179 ms; Figure 3). During follow-up, after 1 month, Holter ECG showed only eight PVCs, and incomplete RBBB was still observed, but no further aggravation of the atrioventricular block was present.

Discussion

In our patient, ECG showed typical incomplete RBBB in lead V1 and positive waves in lead I and II. According to a study by Im Si [1], PVCs can be inferred to have characteristics allowing for

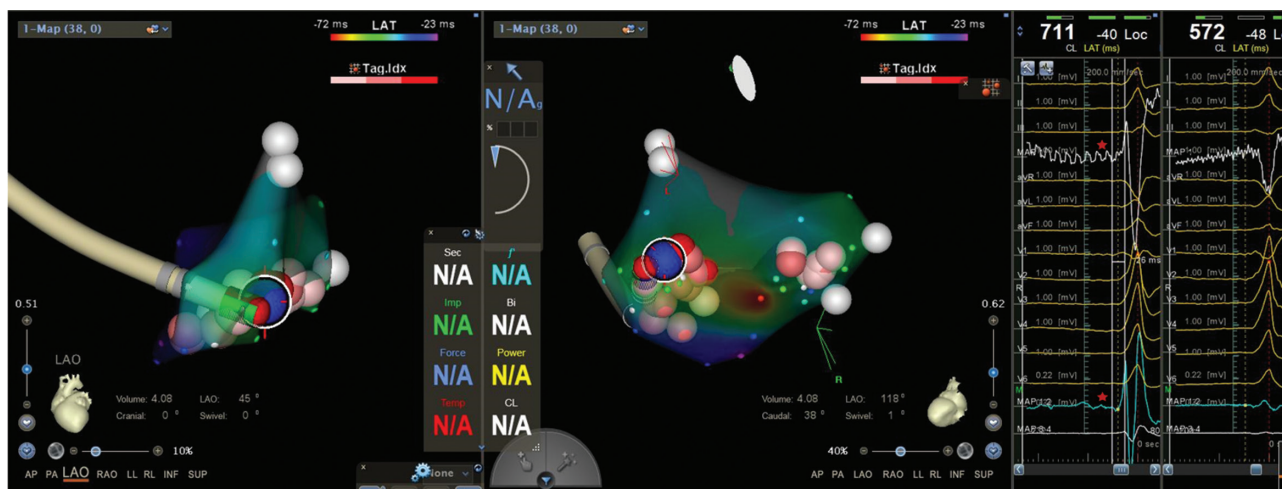


Figure 2 Three-dimensional anatomic reconstruction and mapping of aorta cusps. The blue dot indicated ablation target and the red dots indicated ablation sites. Mapping and ablation of the premature ventricular complexes in right coronary cusp and the local potential precede the QRS by 26 ms during ventricular extrasystoles.

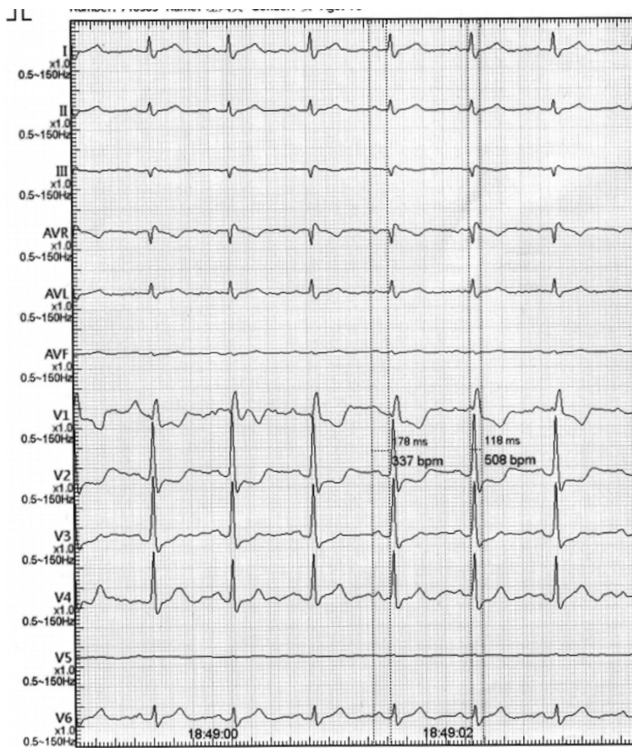


Figure 3 A 12-lead electrocardiogram during sinus rhythm after ablation. The PR duration was 178 ms and the QRS duration was 118 ms and there was incomplete right bundle branch block in lead V1.

successful ablation from the RCC. Elizari's study [2] has shown that the His-bundle penetrates the right fibrous trigone and emerges between the NCC and RCC. RBB appears to be a direct continuation of the His-bundle, and the LBB emerges at the inferior border of the membranous septum between the NCC and RCC of the aortic valve. Within 2 mm of its origin, the LBB subdivides into left anterior and left posterior branches. Chen et al. [3] have reported that the distance from the proximal left anterior fascicle origin to the RCC (3.9 ± 0.8 mm) in the proximal group is shorter than 6 mm, thus theoretically making the penetration of radiofrequency induced conductive lesion to the proximal LBB. Previous

research [4] has shown that the dead-end tract starting at the summit of the ventricular septum after the bifurcation of the bundle branches may be a possible source of ventricular arrhythmias, and can be mapped at or beneath the RCC. The RCC is close to the origin of these arrhythmias, and ablation within the RCC is an option providing better stability and easier manipulation. Left anterior hemiblock is still seen in 12.5% of patients during ablation within the RCC [3]. Incomplete RBBB persisted in our patient during the follow-up period, thus underscoring the need for caution regarding changes in atrioventricular conduction during ablation through the RCC. The RCC approach may be an effective strategy for ablation of PVCs originating from the proximal LBB.

Conclusion

RCC provides an alternative approach for ablating PVCs originating from the proximal LBB, owing to the close relationship between the RCC and proximal LBB.

Ethics Statement

The patient/participant provided her written informed consent to participate in this study.

Conflict of Interest

The authors declare no conflicts of interest.

Author contributions

Wu Qiong collected related data. Qian Jianfeng and Fan Jianhua performed operations and wrote the first draft. Liu Qingjun and Fan JianHua edited and corrected the article.

REFERENCES

1. Im SI, Lee SH, Gwag HB, Park Y, Park SJ, Kim JS, et al. Electrocardiographic characteristics for successful radiofrequency ablation of right coronary cusp premature ventricular contractions. *Medicine (Baltimore)* 2020;99:e19398.
2. Elizari MV. The normal variants in the left bundle branch system. *J Electrocardiol* 2017;50(4):389–99.
3. Chen S, Lu X, Peng S, Xue Y, Zhou G, Ling Z, et al. Ablation at right coronary cusp as an alternative and favorable approach to eliminate premature ventricular complexes originating from the proximal left anterior fascicle. *Circ Arrhythm Electrophysiol* 2020;13(5):e008173.
4. de Vries L, Hendriks A, Szili-Torok T. The “Dead-End Tract” and its role in arrhythmogenesis. *J Cardiovasc Dev Dis* 2016;3(2):11.