

Case Report

Recurrent Wolff-Parkinson-White syndrome: A case of coronary sinus diverticulum uncovered during accessory pathway ablation

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Introduction

Wolff-Parkinson-White (WPW) syndrome is a pre-excitation disease characterized by a structural anomaly, with an accessory pathway (AP) between the atria and ventricles which increases the risk of tachyarrhythmias [1]. Radiofrequency ablation (RFA) has become the definitive treatment for patients with symptomatic accessory pathways [2p]. Target sites for ablation of AP's are identified by early ventricular activation in relation to the delta wave onset. Patients with AP-related tachycardias are more likely to have coronary sinus abnormalities like a diverticulum or chronic left superior vena cava. Coronary sinus diverticulum (CSD) is a rare congenital anomaly. CSDs can result in ineffective ablation of the AP in WPW syndrome and cause challenges during electrophysiological studies.

Case Presentation

A 46-year-old male patient with a previous medical history of Wolff-Parkinson-White (WPW) syndrome presented to us with recurrent palpitations for the past 6 months. He previously underwent RFA of a right sided AP in 2011 following similar recurrent episodes of palpitations. On presentation, the patient was on amiodarone 200 mg and bisoprolol 2.5 mg which did not control his symptoms. On examination, he had a pulse rate of 68 bpm. Blood pressure was 130/80mmHg and his cardiovascular examination was normal.

ECG showed a short PR interval and a wide QRS complex with delta waves in all precordial leads (Figure 01). The 2D Echocardiogram revealed a 60% ejection fraction, with no regional wall motion abnormalities and good valvular function.

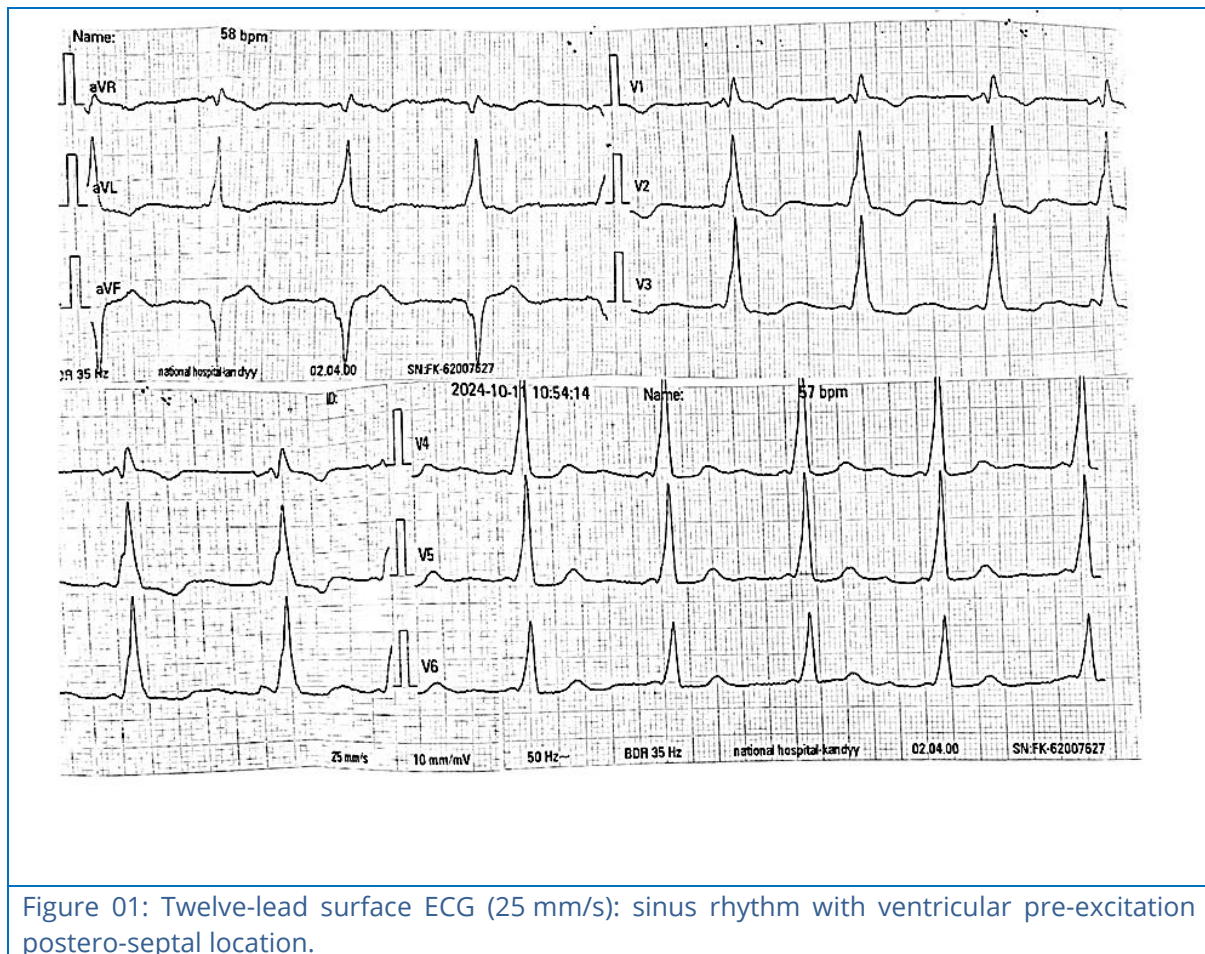


Figure 01: Twelve-lead surface ECG (25 mm/s): sinus rhythm with ventricular pre-excitation postero-septal location.

After the initial evaluation, an electro physiological study was planned with the intent of localizing and ablating the suspected right sided AP. Three catheters were inserted via the right femoral vein. A 7 Fr deflectable decapolar catheter to the coronary sinus, a deflectable quad to the His bundle and a medium curve catheter for RFA were used. The patient was in sinus rhythm with pre-excitation at the start of the procedure. The coronary sinus catheter lead 9,10 showed the earliest pre-excitation. Right sided posteroseptal AP was localized near the coronary sinus osmium. RFA was done and the AP disappeared in 12 seconds. The total ablation time was 272 secs (Figure 02). Post RFA, no pre-excitations were noted after 20 minutes. Venogram of the coronary sinus was obtained which showed a small outpouching originating from the ostium of the coronary sinus (Figure 03).

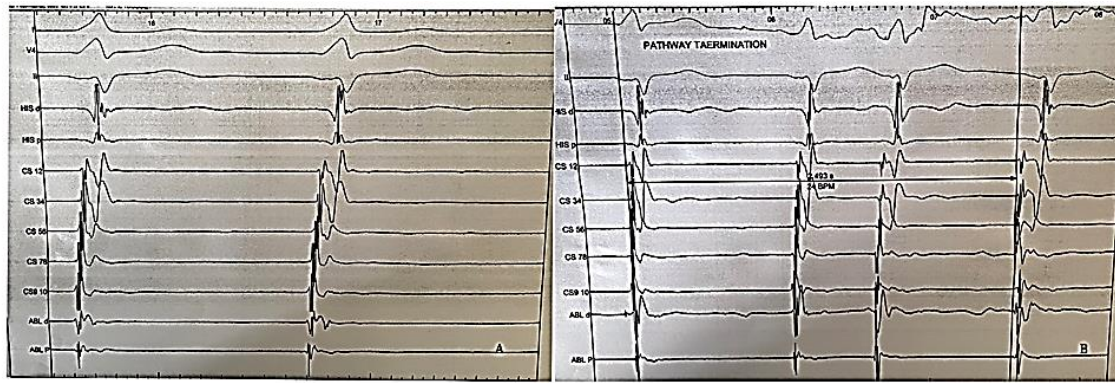


Figure 02: (A) Intracardiac ECG showing eccentric coronary sinus activation in CS catheter lead 9,10. (B) Intracardiac ECG showing termination of the accessory pathway.

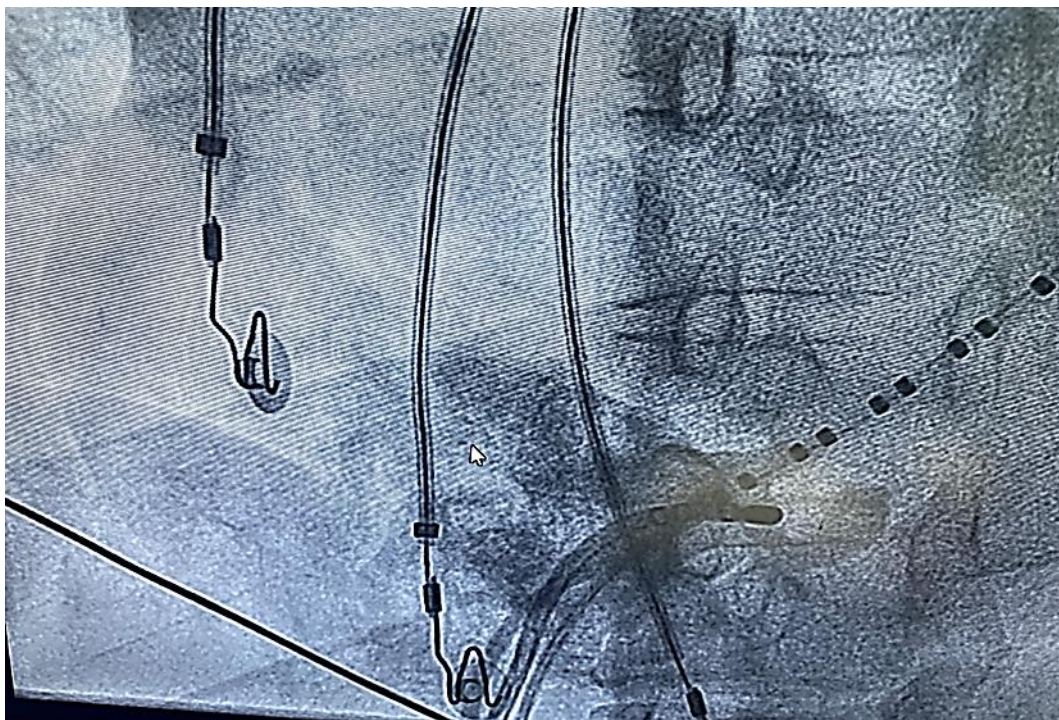


Figure 03: Venogram of the coronary sinus showing the coronary sinus diverticulum. Non selective contrast media injection given in the left anterior oblique view.

Post-procedure, the patient was monitored in the coronary care unit. He was discharged the next day. His symptoms of palpitations resolved, and he remained in normal sinus rhythm without recurrence of the arrhythmia during the hospital stay. No immediate complications related to the RFA were noted. At 1 month follow up, the patient had no recurrence of palpitations. He was successfully weaned off from amiodarone and bisoprolol.

Discussion

Accessory pathways are abnormal conduction tracts that bypass the atrioventricular (AV) node and allow direct electrical communication between the atrium and ventricle [3]. The success of ablating these pathways depends on the accuracy of AP localization. After left free wall APs, posteroseptal APs represent the second most common atrioventricular connection site. Posteroseptal AP poses a diagnostic challenge due to the complex nature of the anatomy at the crux of the four cardiac chambers, in which a narrow area may encompass APs that may require ablation inside the coronary sinus. In rare cases, APs may be located in close proximity to or within abnormal anatomical structures, such as diverticula.

CSDs are rare congenital anomalies, characterized by a localized outpouching of the coronary sinus [4]. The prevalence of coronary sinus diverticula is unknown [5]. Electrophysiological studies estimate that CSDs occur in approximately 0.1% to 2% of patients. The exact pathophysiology behind the development of CSDs is not well understood. Typically, they are considered benign unless they affect nearby electrical or structural components. Diverticulae associated with a posteroseptal accessory atrioventricular connection were first described in 1985 [6].

Studies show that the AP potential is frequently detected in the neck of the CSD [7]. In the diverticulum's neck, the AP fibres may be thinner and narrower and are a potential target for ablation. However, in rare instances, AP may have a circular pathway around the diverticulum's neck, which may be challenging during ablation [8]. Although CS diverticula are proportionately large, the diverticulum's neck might be narrow, in which case RFA may lead to overheating or clot formation. Irrigated-tip catheters and cryoablation were found useful in these cases [9]. Further, ablating these CSDs poses a risk of damage to the AV conduction system and right coronary artery branches as well as cardiac tamponade brought on by the rupture of these thin-walled diverticula.

CSDs are mostly described in the proximal part of the coronary sinus. Our patient had the CSD originating in the ostium. This case highlights the importance of considering coronary sinus anatomical variations during electrophysiological procedures, particularly in cases where WPW syndrome recurs after ablation.

Conclusion

WPW syndrome can be a challenging disease especially during recurrence. Coronary sinus diverticula should be suspected in patients with posteroseptal AP who have had a previous failed ablation, as in our patient. Successful management of such cases requires a combination of advanced mapping techniques, anatomical awareness and careful ablation strategy to avoid complications and achieve optimal outcomes.

Declarations

Ethics approval and consent to participate - All procedures were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki declaration of 1975 and its later versions. Informed consent was obtained from the participant included in this study.

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