

Case Report

Left lateral accessory pathway successfully ablated from within the coronary sinus, a case report

Eyad Alhaj, Ali Alhaj

Franciscan Hospital, 3500 Franciscan Way, Michigan City, IN 46360, USA

Received November 27, 2022; Accepted March 10, 2023; Epub April 15, 2023; Published April 30, 2023

Abstract: WPW (Wolff-Parkinson-White) syndrome is a congenital heart condition characterized by an abnormal accessory electrical pathway in the heart that can cause rapid heartbeat (supraventricular tachycardia). Radiofrequency ablation is considered the first-line treatment, it can be curative in almost 95% of patients. Sometimes ablation therapy can fail when the pathway is close to the epicardium. We hereby report a case of a patient with a left lateral accessory pathway. Several attempts of ablation from the endocardium targeting a clear pathway potential failed. Subsequently, the pathway was safely and successfully ablated from within the distal coronary sinus.

Keywords: Accessory pathway, left lateral, ablation

Introduction

WPW (Wolff-Parkinson-White) syndrome is a congenital heart condition characterized by an abnormal accessory electrical pathway in the heart that can cause rapid heartbeat (supraventricular tachycardia). The diagnostic standard for WPW is a 12-lead-electrocardiogram (ECG), which can reveal the presence of a short PR interval and a delta wave, which are characteristic of the condition.

Typical symptoms of WPW include palpitations which can be associated with chest pain, shortness of breath, and fainting. However, some people with WPW may not have any symptoms at all.

Treatment options for WPW include medications, ablation, and surgery. Medications such as beta-blockers can be used to slow the heart rate and control symptoms, however, medications frequently fail. Radiofrequency ablation is a procedure in which a small amount of energy is used to destroy the abnormal electrical pathway and is considered the first-line treatment in symptomatic patients. Surgery is typically only recommended in cases where ablation is not possible. While catheter ablation can be curative in almost 95% of patients, sometimes this

therapy can fail due to the location of the pathway, such as one close to the epicardium. The overall prognosis for people with WPW is generally considered to be good, particularly if the condition is identified and treated early. However, some people with WPW may be at an increased risk for sudden cardiac death.

Case presentation

21-year-old male with no significant past medical history presented to our hospital with an episode of palpitation. The episode lasted several hours and was associated with dyspnea and lightheadedness. The patient described recurrent and similar episodes over the preceding nine years. Some of these episodes were associated with presyncope.

Physical exam, laboratory results, chest radiography and echocardiography were normal. A 12-lead electrocardiogram at the time of presentation showed narrow complex tachycardia (**Figure 1**). Patient failed Valsalva maneuvers, however, he responded to 6 mg of intravenous Adenosine. A 12-lead electrocardiogram after tachycardia termination (**Figure 2**) showed the diagnosis of WPW with R wave larger than S wave in lead V1 and positive delta wave in leads II, III and AVF with negative delta wave in leads I

Left lateral accessory pathway ablation

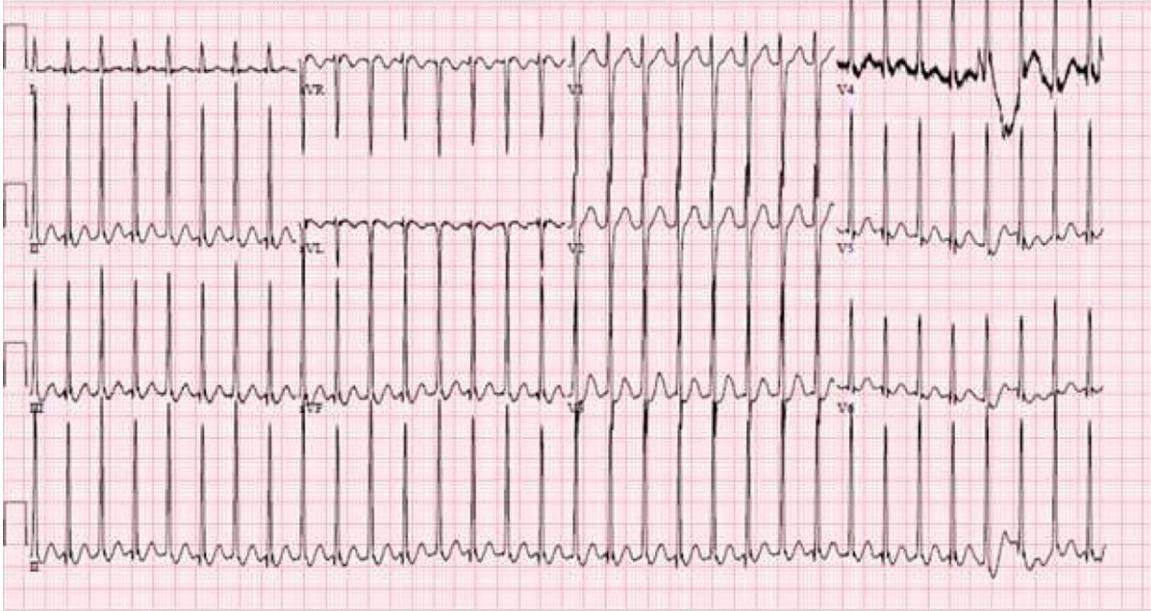


Figure 1. 12-lead electrocardiogram on presentation showing supraventricular tachycardia.

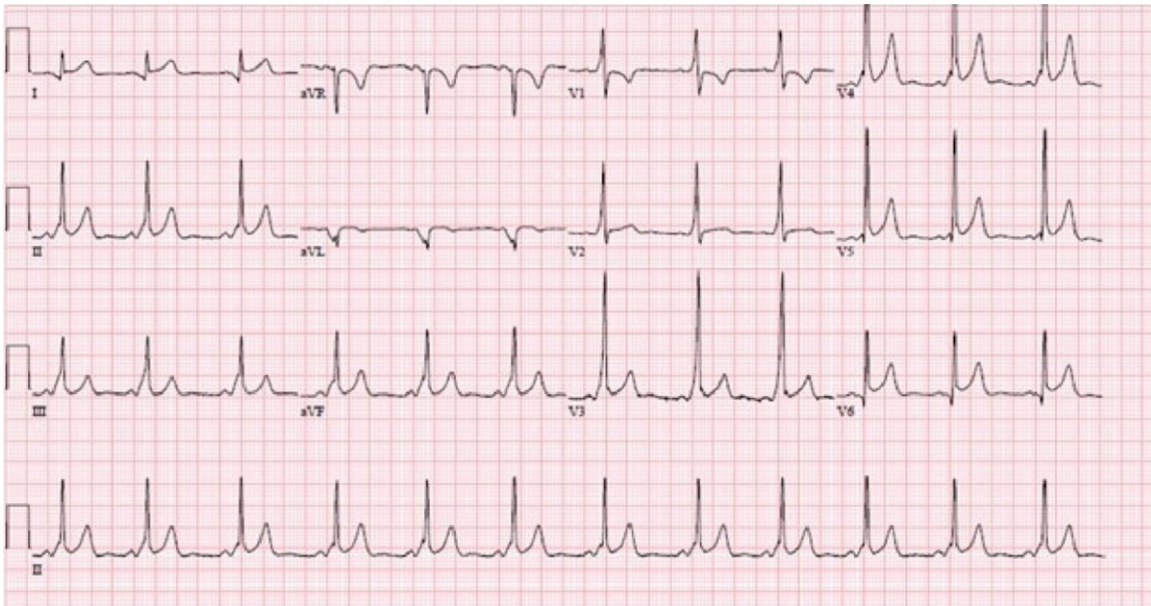


Figure 2. Baseline EKG demonstrating WPW (left lateral accessory pathway).

and AVL. Findings were indicative of left lateral accessory pathway.

An electrophysiological study was performed after we obtained an informed written consent. A decapolar catheter was advanced into the coronary sinus and a quadripolar catheter was positioned in the right ventricular apex.

Patient was in normal sinus rhythm at baseline with distal to proximal coronary sinus acti-

vation. Programmed atrial stimulation showed an antegrade accessory pathway refractory period of 270 ms. Programmed ventricular stimulation showed no decremental ventriculoatrial conduction using a pacing cycle length of 600-300 ms.

Using a Visigo sheath and a Baylis needle, we performed a transseptal puncture with the guidance of intracardiac ultrasound. Heparin bolus of 10,000 units were administered and

Left lateral accessory pathway ablation

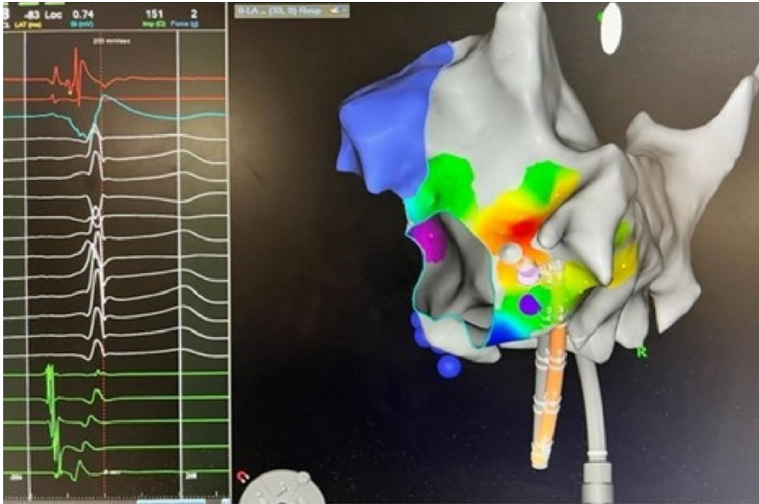


Figure 3. Ablation catheter inside the left atrium at site of earliest ventricular signal.

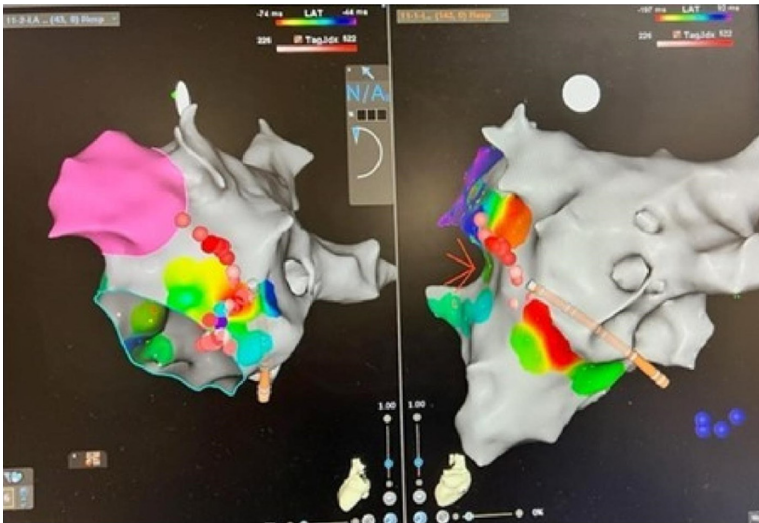


Figure 4. Several endocardial ablation lesions targeting accessory pathway potential failed to terminate the delta wave.

ACT was kept around 300 throughout the procedure while the catheters were in the left atrium. Using the Smarttouch catheter, mapping for the earliest ventricular signal was performed around the mitral annulus. The earliest area was identified in the left atrial lateral region, adjacent to the distal coronary sinus catheter. In that region, an accessory pathway potential was identified (**Figure 3**). However, several ablation lesions with a power of 30 watts failed to terminate the delta wave (**Figure 4**).

Subsequently, the ablation catheter was introduced via the coronary sinus, where an accessory and large pathway potential was again

identified at the distal coronary sinus region. The first ablation lesion there using a power of 20 watts resulted in the termination of the delta wave within one second (**Figures 5, 6**).

As preexcitation returned, a few consolidation lesions were applied with power titrated up to 30 watts under continuous monitoring using the Carto system. Ablation was very effective. We waited 30 minutes with no recurrence of preexcitation; we also used adenosine without reemergence of the delta wave. We also performed ventricular pacing which showed retrograde Wenckebach of 320 ms. Patient denied all symptoms after the conclusion of the procedure. His physical exam was unremarkable and his overnight hospital stay was uneventful.

A 12-lead electrocardiogram five weeks later was normal. On his six months follow-up appointment, the patient indicated that he had been doing very well with no further palpitations or any other symptoms.

Discussion

The 12-lead-electrocardiogram (ECG) was diagnostic of WPW, as it revealed the presence of a short PR interval and a delta wave, which are characteristic of the condition. The ECG also suggested the location of the accessory pathway in the lateral side of the left atrium.

This case illustrates that accessory pathway ablation can be challenging. Several attempts of ablation from the endocardium targeting a clear pathway potential failed, while limited ablation from within the coronary sinus was very effective, which is suggestive that the pathway was closer to the epicardium in its location.

Left lateral accessory pathway ablation



Figure 5. Accessory pathway potential in the distal coronary sinus.



Figure 6. First ablation lesion in the distal coronary sinus terminated the delta wave within 1 second.

Commonly, the epicardial accessory pathways are found at the neck of diverticulum in the proximal portion of the coronary sinus, along the middle cardiac vein, or the posterior coronary vein [1, 2].

Epicardial pathways in the lateral or anterolateral mitral region have been rarely reported. Haissaguerre et al. [3] described that out of a series of 212 patients with left lateral pathways, there were 8 patients who failed multiple endocardial ablation attempts. Their paper indicated that the mean \pm SD cumulative duration of previous attempts was 12 ± 9 hours,

using DC shocks and/or radiofrequency energy applied both at the atrial and/or ventricular accessory pathway insertions. 7 out of 8 patients were successfully ablated from within the mid or distal coronary sinus.

Sun et al. [4] described a series of 5 patients with left sided pathways who underwent successful ablation from within the coronary sinus. All of these cases had previously failed endocardial attempts performed by very experienced operators via both the transeptal and the retrograde transaortic approaches.

Morady et al. [5] suggested, in a case series of 5 patients who were successfully ablated from within the coronary sinus, that the absence of an accessory pathway potential during endocardial mapping, in combination with a relatively large accessory pathway potential within the coronary sinus may be a useful marker of an epicardial pathway, which can be ablated successfully from within the coronary sinus. In contrast to this case series and unique to our case, the accessory pathway potential was still present during endocardial mapping,

however, it was larger when mapped from the coronary sinus.

Conclusion

Left lateral accessory pathway can be successfully ablated from within the distal coronary sinus when endocardial ablation fails.

Disclosure of conflict of interest

None.

Address correspondence to: Dr. Eyad Alhaj, Franciscan Hospital, 3500 Franciscan Way, Michigan

Left lateral accessory pathway ablation

City, IN 46360, USA. Tel: 513-227-3354; E-mail: alhajmd@gmail.com

References

- [1] Sun Y, Arruda M, Otomo K, Beckman K, Nakagawa H, Calame J, Po S, Spector P, Lustgarten D, Herring L, Lazzara R and Jackman W. Coronary sinus-ventricular accessory connections producing posteroseptal and left posterior accessory pathways: incidence and electrophysiological identification. *Circulation* 2002; 106: 1362-7.
- [2] Becker AE, Anderson RH, Durrer D and Wellens HJ. The anatomical substrates of Wolff-Parkinson-White syndrome: a clinicopathologic correlation in seven patients. *Circulation* 1978; 57: 870-9.
- [3] Haissaguerre M, Gaita F, Fischer B, Egloff P, Lemetayer P and Warin JF. Radiofrequency catheter ablation of left lateral accessory pathways via the coronary sinus. *Circulation* 1992; 86: 1464-8.
- [4] Sun M, Wang Z, Liang M, Yang G, Jin Z, Liang Y, Yu H and Han Y. Electrophysiological identification and ablation of left lateral pathways in the medial-distal coronary venous system. *JACC Clin Electrophysiol* 2019; 5: 865-866.
- [5] Langberg JJ, Man KC, Vorperian VR, Williamson B, Kalbfleisch SJ, Strickberger SA, Hummel JD and Morady F. Recognition and catheter ablation of subepicardial accessory pathways. *J Am Coll Cardiol* 1993; 22: 1100-4.