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Case Report

A long slanted transseptal accessory pathway

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Abstract

A 63-year-old male with Wolff-Parkinson-White syndrome was admitted for ablation of accessory pathway. Intracardiac electrogram revealed a left-side accessory pathway during tachycardia, which was successfully ablated from the right posterior tricuspid annulus because of a long slanted transseptal accessory pathway (2.2 cm).

Keywords: Catheter ablation; Intracardiac electrogram; Slanted accessory pathway

1. Introduction

Wolff-Parkinson-White syndrome is the most common form of ventricular preexcitation.[1] Radiofrequency catheter ablation has emerged as a curative approach to the treatment of most types of sustained cardiac arrhythmias since its first introduction for cardiac use in 1987.[2–4] The electrocardiogram (ECG) localization of accessory AV pathways is presented with delta wave morphology correlated with the site of ventricular insertion of accessory atrioventricular (AV) pathways. Accessory pathways are formed embryologically during cardiogenesis and may be broad, slanted, and occasionally particularly challenging to ablate.[5,6] In this case, many features highlighted the difficulties that may be encountered with accessory pathway ablation.

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2. Case report

A 63-year-old male patient, with no prior history of cardiac disease or symptoms, stated that his first episode of tachycardia developed in March 2008 and lasted for several hours after the symptom occurred. He visited our hospital in December 2008. ECG showed pre-excited-type ECG (Fig. 1). He was admitted for electrophysiological study in February 2009. During the electrophysiological study, the earliest activation of ventricle was located at the proximal coronary sinus (CS) during sinus rhythm (Fig. 2, Panel A). Burst pacing and extra stimulations in the high right atrium were able to induce sustained orthodromic atrioventricular reentry tachycardia with an average cycle length of 364 ms and the earliest activation site located at the proximal CS (CS 2) (Fig. 2, Panel B) with ventriculo-atrial (VA) interval 10 ms earlier than at the ablation site (Fig. 3). Ablation was initially performed from the left side; however, it was not successful because of tortuosity of the abdominal aorta. Hence, right-side approach was attempted using the local intracardic electrogram of the ablation catheter, which showed the near fusion of A and V

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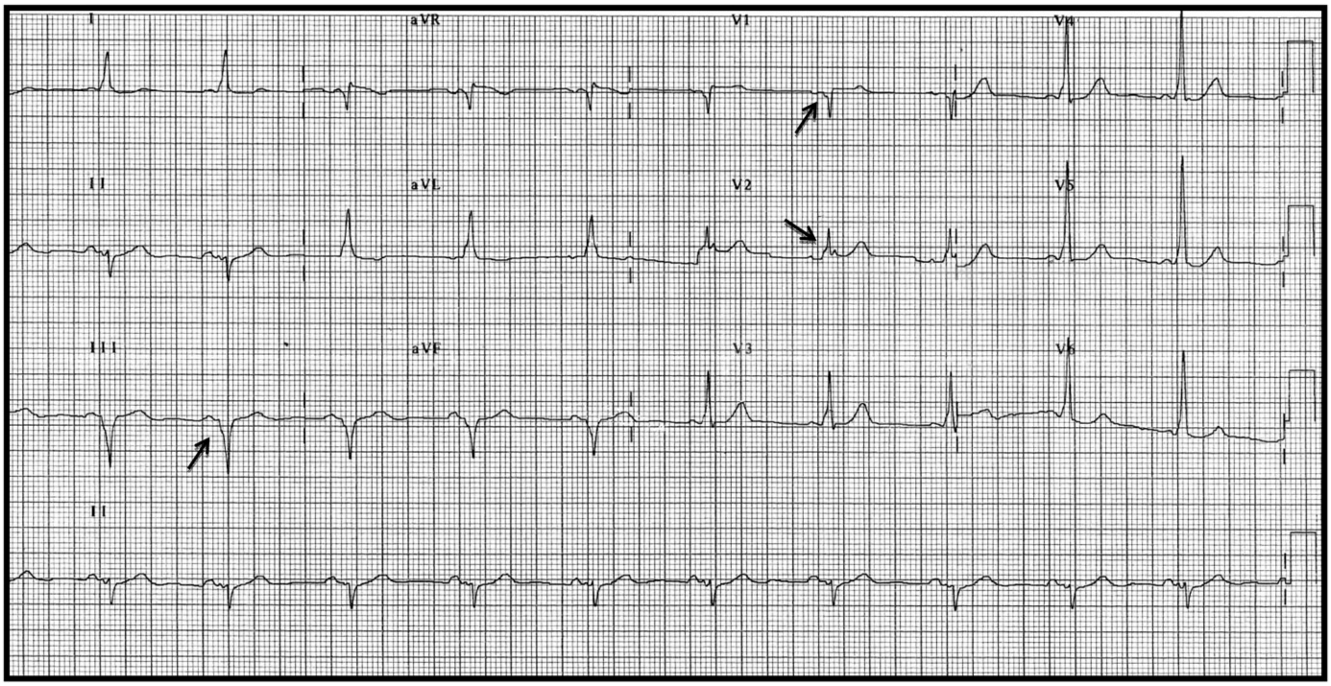

Fig. 1. Baseline electrocardiogram shows R/S > 1 in V2 and negative delta at leads III and V1, suggesting the location of the accessory pathway to be at the right posterior septum.

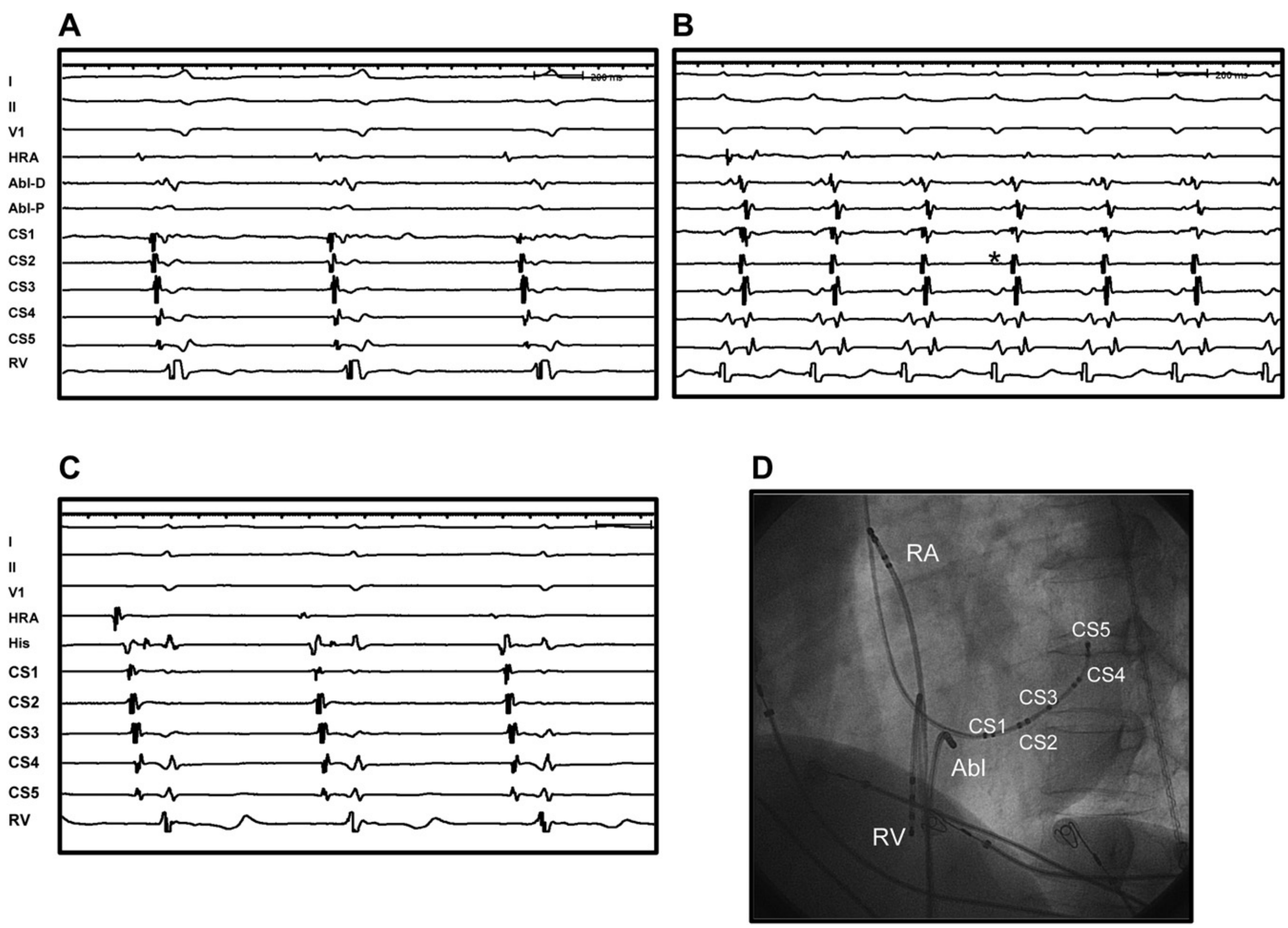

Fig. 2. Panel A shows the baseline electrocardiogram and intracardiac electrograms (IEGM) during sinus rhythm with A and V wave fusion at the ablation site. Panel B shows the earliest atrial activation at the paroxysmal coronary sinus (CS2) during tachycardia. Panel C: disappearance of delta wave after ablation. Panel D: location of the coronary sinus catheter and ablation catheter. Abl-D = local IEGM at the distal part of ablation catheter; Abl-P = local IEGM at the proximal part of ablation catheter; HRA = local IEGM at the high right atrial catheter; RA = right atrial catheter in Panel D; RV = local IEGM at the right ventricular catheter in Panels A−C and right ventricular catheter in Panel D.

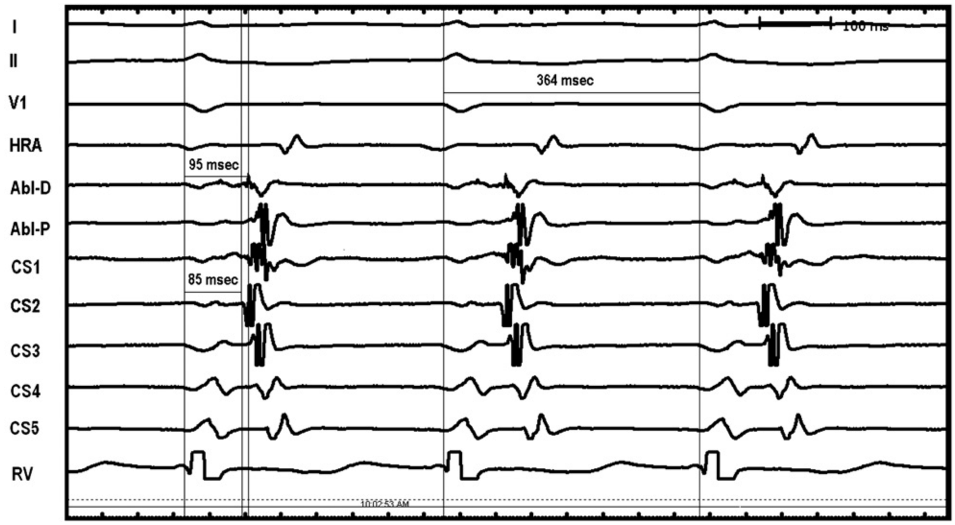

Fig. 3. Amplification of the intracardiac electrograms during tachycardia. The earliest atrial site was found at CS2 (VA interval = 85 ms) and 10 ms earlier than at the ablation site (VA interval = 95 ms). Abl-D = local IEGM at the distal part of ablation catheter; Abl-P = local IEGM at the proximal part of ablation catheter; HRA = local IEGM at the high right atrial catheter; RV = local IEGM at the right ventricular catheter.

waves. Radiofrequency catheter ablation over the right posterior tricuspid annulus was performed and successfully ablated the accessory pathway. One minute after the ablation, disappearance of delta wave and ventriculoatrial dissociation during RV pacing were observed. In this case report, the distance between atrial and ventricular insertion was 2.2 cm (Fig. 4).

3. Discussion

The possibility of the existence of atrioventricular accessory pathways was first raised by Kent et al. in 1913. In this case, one of the challenges that may be encountered during accessory pathway ablation was shown in the baseline ECG presenting the R/S > 1 in V2 and negative delta at leads III and V1, which suggested the location of an accessory pathway at the right posterior septum under the algorithm documented by Chiang et al.[7] However, the earliest atrial activation was located at the left posterior portion during tachycardia. This discrepancy of antegrade and retrograde accessory pathways included double accessory pathways and slanted accessory pathway. Because the earliest atrial activation was found at the left side, the first approach of ablation was performed from the femoral artery to the left ventricle. It failed because of severe tortuosity of the abdominal aorta. Right-side approach was successful. In this case, it would be a better choice to perform the ablation from right-side approach, depending on the analysis of resting delta wave. According to a previous study by Tai et al.[6] the atrial insertion site of the accessory pathway was defined from the cinefilms as the site with the earliest retrograde atrial activation bracketed on the CS catheter during tachycardia, whereas the ventricular insertion site was defined as the site where successful ablation of the pathway was achieved. The distribution of accessory pathways is not homogeneous. Statistically, 25% are found within the posteroseptal space, another 46–60% of accessory pathways over the left free wall space.[7,8] Although the accessory pathway was often slanted, the length was less than 20 mm according to previously documented cases.[9,10] The wide disparity (2.2 cm) between the atrial insertion site and ventricular insertion site seen in our case is rare. However, a single ablated lesion was able to terminate activation conduction, implying a single long slanted pathway.

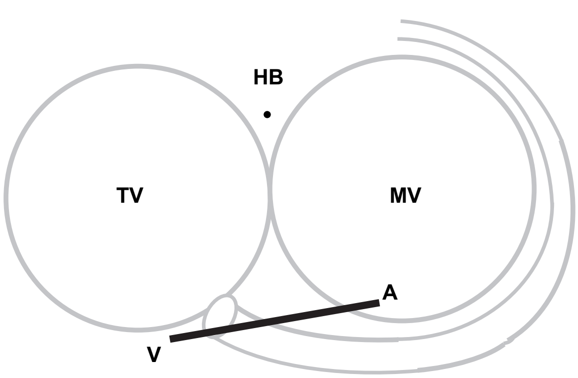

Fig. 4. The distribution of accessory pathway within the tricuspid and mitral annulus. Our case was located in the posteroseptal space with atrial insertion at the mitral annulus and ventricular insertion at the tricuspid annulus. HB = location of His bundle; MV = mitral annulus; TV = tricuspid annulus.

In conclusion, accessory pathways with left-side atrial insertion may be successfully ablated through right-side approach with an unusual and a long slanted transseptal accessory pathway.

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References

1. Kent AFS. The structure of cardiac tissues at the auricular ventricular junction: proceedings of the Physiological Society. *J Physiol (Lond)* 1913; **47**:17−9.
2. Huang SK, Bharati S, Graham AR, Lev M, Marcus FI, Odell RC. Closed chest catheter dissociation of the atrioventricular junction using radiofrequency energy: a new method of catheter ablation. *J Am Coll Cardiol* 1987;**9**:349−58.
3. Chen SA, Chiang CE, Yang CJ, Cheng CC, Wu TJ, Wang SP, et al. Accessory pathway and atrioventricular node reentrant tachycardia in elderly patients: clinical features, electrophysiologic characteristics and results of radiofrequency ablation. *J Am Coll Cardiol* 1994;**23**:702−8.
4. Chen SA, Tai CT, Chiang CE, Lee SH, Wen ZC, Chiou CW, et al. Electrophysiologic characteristics, electropharmacologic responses and radiofrequency ablation in patients with decremental accessory pathway. *J Am Coll Cardiol* 1996;**28**:732−7.
5. Otomo K, Gonzalez MD, Beckman KJ, Nakagawa H, Becker AE, Shah N, et al. Reversing the direction of paced ventricular and atrial wavefronts reveals an oblique course in accessory AV pathways and improves localization for catheter ablation. *Circulation* 2001;**104**:550−6.
6. Tai CT, Chen SA, Chiang CE, Lee SH, Wen ZC, Chen YJ, et al. Identification of fiber orientation in left free-wall accessory pathways: implication for radiofrequency ablation. *J Interv Card Electrophysiol* 1997;**1**:235−41.
7. Chiang CE, Chen SA, Teo WS, Tsai DS, Wu TJ, Cheng CC, et al. An accurate stepwise electrocardiographic algorithm for localization of accessory pathways in patients with Wolff-Parkinson-White syndrome from a comprehensive analysis of delta waves and R/S ratio during sinus rhythm. *Am J Cardiol* 1995;**76**:40−6.
8. Cain ME, Cox JL. Surgical treatment of supraventricular arrhythmias. In: Platia E, editor. *Management of cardiac arrhythmias: the non-pharmacologic approach*. Philadelphia: JB Lippincott; 1987. p. 304.
9. Gallagher JJ, Sealy WC, Kasell J. Intraoperative mapping studies in the Wolff-Parkinson-White syndrome. *Pacing Clin Electrophysiol* 1979;**2**: 523.
10. Zimetbaum Peter J, Josephson Mark E. Wolff-Parkinson-White syndrome and variants. In: *Practical clinical electrophysiology*. Philadelphia: Lippincott Williams & Wilkins; 2008. p. 120.