An unusual atrioventricular accessory pathway with an oblique course

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Introduction

Atrioventricular accessory pathways (APs) with oblique courses[1,2] or multiple APs[3,4] are not rare. We report a rare case of AP with an oblique course that comprised dual atrial insertion sites and 1 common ventricular insertion site. This case should be differentiated from dual APs.

Case report

An 18-year-old male patient experienced frequent episodes of palpitations for 6 months. He was referred to our hospital for catheter ablation. This patient had no prior history of structural cardiovascular disease. His chest radiograph and transthoracic echocardiogram showed no abnormalities. The electrocardiogram (ECG) showed Wolff–Parkinson–White syndrome at baseline (Figure 1A) and supraventricular tachycardia (SVT) when symptomatic. A manifest left anterolateral AP was suspected, according to the Arruda algorithm.[5] During electrophysiological study, a 6F decapolar catheter (Biosense Webster, Diamond Bar, CA) was positioned within the coronary sinus (CS) with its proximal electrode pair 9-10 (CS_{9-10}) at CS ostium and distal electrode pair (CS_{1-2}) at lateral mitral annulus (MA), which showed the earliest ventricular activation at electrode pair 5-6 (CS_{5-6}) in sinus rhythm (Figure 2A). Programmed incremental right ventricular apex (RVa) pacing at approximately 500–340 milliseconds revealed eccentric retrograde atrial activation, with the earliest atrial activation at CS_{1-2} and the second earliest at CS_{9-10}. RVa pacing at 300 milliseconds could repeatedly induce the first orthodromic atrioventricular reentrant tachycardia with the same atrial activation sequence as that observed during RVa pacing (SVT_1, cycle length =280 ms; Figure 2B). Dual AV nodal pathways were excluded by programmed right atrial pacing. The diagnosis of left dual APs was initially considered.

A temperature-controlled ablation catheter (Celsius, Biosense Webster) was inserted for ablation. The earliest activation was targeted for ablation on both the ventricular side and the atrial side through mapping with the ablation catheter if no "isolated" AP potentials could be mapped by the ablation catheter. The catheter was initially positioned on the ventricular side of lateral MA via retrograde aortic route (3-o'clock direction at the left anterior oblique view of MA). Radiofrequency (RF) energy delivery at 30 W and 60°C could impair neither antegrade nor retrograde AP conduction. Consequently, an alternative transseptal approach was applied. The ablation catheter was placed on the corresponding atrial side of the lateral MA after transseptal catheterization via an 8F Swartz sheath (Figure 3A). RF ablation at 40 W and 55°C was able to successfully alter the atrial activation sequence during RVa pacing (Figure 2C). The retrograde A wave became "late" at the lateral MA and remained "early" at the very posterolateral MA, indicating the possible blockade of 1 branch of retrograde AP conduction. However, the antegrade AP conduction remained unchanged, and the second SVT ($SVT_{2)}$ with the same cycle length (280 ms) as SVT_1 but different atrial activation sequence could still be induced (Figure 2D). At this time, we came to notice the sequential AP potentials on CS recordings during SVT_1 and SVT_2. The earliest AP potential at middle CS conducted simultaneously to distal CS and to proximal CS during SVT_1 (Figure 2E). However, the distal AP potential conduction disappeared during SVT_2 (Figure 2F).

Based on the above findings, we established the diagnosis of an unusual AP with an oblique course, which comprised 2 separate atrial insertion sites and 1 common ventricular insertion site. Subsequently, AP antegrade conduction abolishment was attempted, but failed, by ablation on the ventricular side of the posterolateral MA (4-o'clock direction) (Figures 2G and 3B). Finally, RF ablation on the atrial side of the very posterolateral MA (5-o'clock direction) via a transseptal approach successfully eliminated the other branch of retrograde AP conduction (Figure 3C). Because

KEYWORDS Wolff-Parkinson-White syndrome; supraventricular tachycardia; atrioventricular accessory pathway; oblique course

ABBREVIATIONS **ABL** = ablation catheter; **AP** = accessory pathway; **CS** = coronary sinus; **ECG** = electrocardiogram; **MA** = mitral annulus; **PAP** = potential of accessory pathway; **RF** = radiofrequency; **RVa** = right ventricular apex; **SVT** = supraventricular tachycardia

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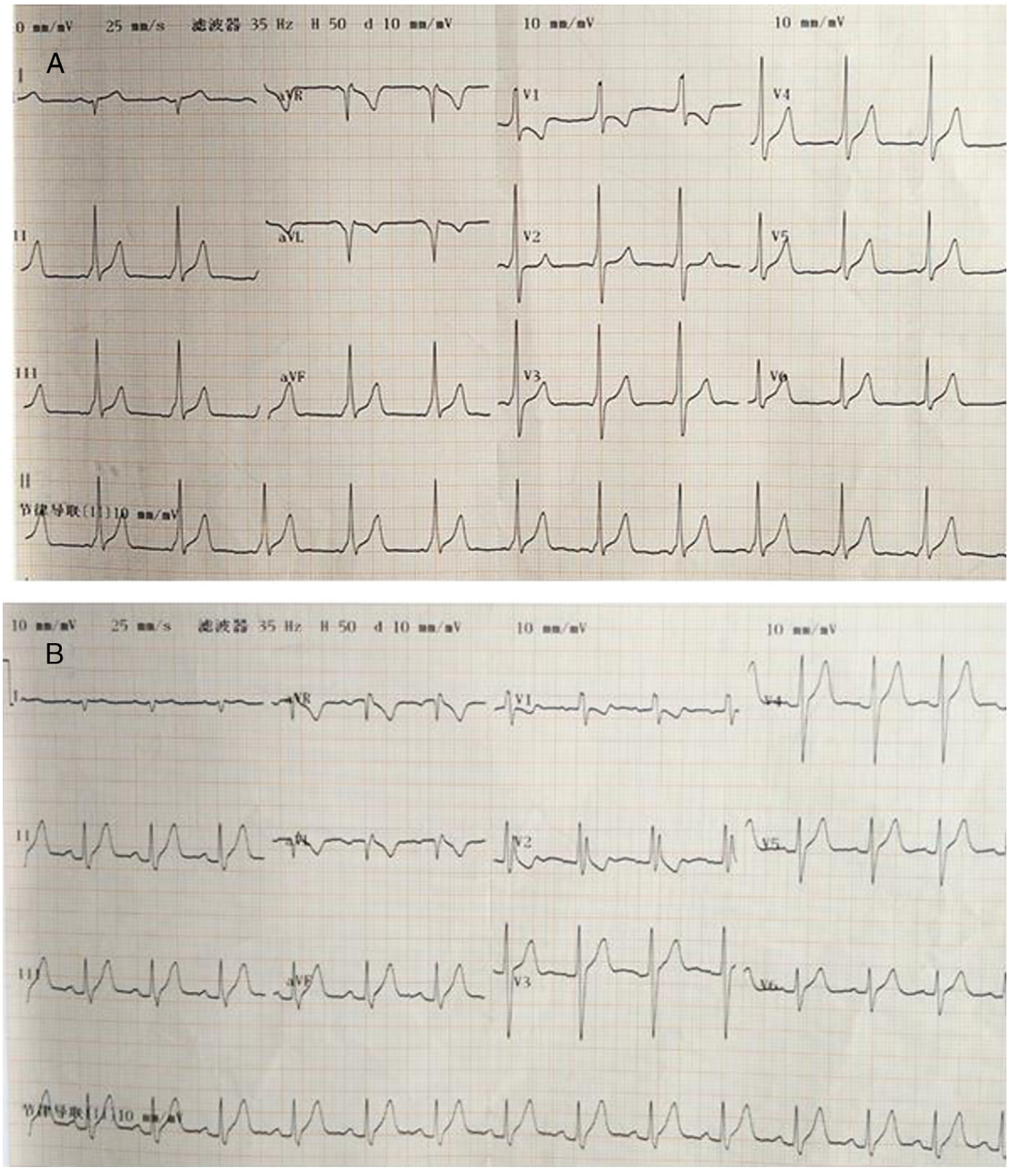

Figure 1 **A**: Wolff-Parkinson-White syndrome prior to ablation; **B**: Disappearance of preexcitation on postprocedural electrocardiogram.