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## Case Report

## Catheter ablation for Wolff–Parkinson–White syndrome with coronary sinus diverticulum in a 15-year-old boy

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## ABSTRACT

The left posterior and posteroseptal accessory pathways often have an epicardial accessory and are associated with coronary vein anomalies, such as diverticulum, fusiform, or bulbous enlargement. We report the case of a 15-year-old boy who suffered from palpitation due to Wolff–Parkinson–White syndrome with coronary sinus diverticulum. An electrophysiology study revealed a left posterior accessory pathway and orthodromic atrioventricular reciprocating tachycardia. After the transseptal puncture, we performed mapping around the mitral annulus during sinus rhythm. We could not detect typical atrioventricular fusion accompanied with accessory pathway potential and failed to ablate around the mitral annulus. We revealed typical accessory pathway potential in a coronary vein and successfully ablated. After ablation, a right atrium angiography showed a successful ablation site was just at the neck of coronary sinus diverticulum. It is important for a successful and safe ablation to evaluate coronary vein anomalies in patients with left posterior and posteroseptal accessory pathways. <Learning objective: In pediatric patients, Wolff–Parkinson–White syndrome with the posteroseptal accessory pathway with coronary sinus diverticulum is rare. It is important to predict the left posterior and posteroseptal accessory pathways from the polarity of the delta wave; ablation for pediatric patients seems to be more effective and safe in confirming coronary sinus diverticulum by echocardiogram before electrophysiology study and performing coronary vein angiography before mapping of the accessory pathway.>

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## Introduction

Coronary vein anomalies, such as diverticulum, fusiform, or bulbous enlargement of small veins have been associated with posteroseptal and left posterior accessory pathways [1–4]. These accessory pathways can be recorded with accessory pathway potential in the middle cardiac vein and neck of coronary sinus diverticulum [1,3,5–7]. We report the case of a 15-year-old boy who suffered from palpitation due to Wolff–Parkinson–White (WPW) syndrome with coronary sinus diverticulum and underwent successful radiofrequency catheter ablation (RFCA) in the neck of coronary sinus diverticulum.

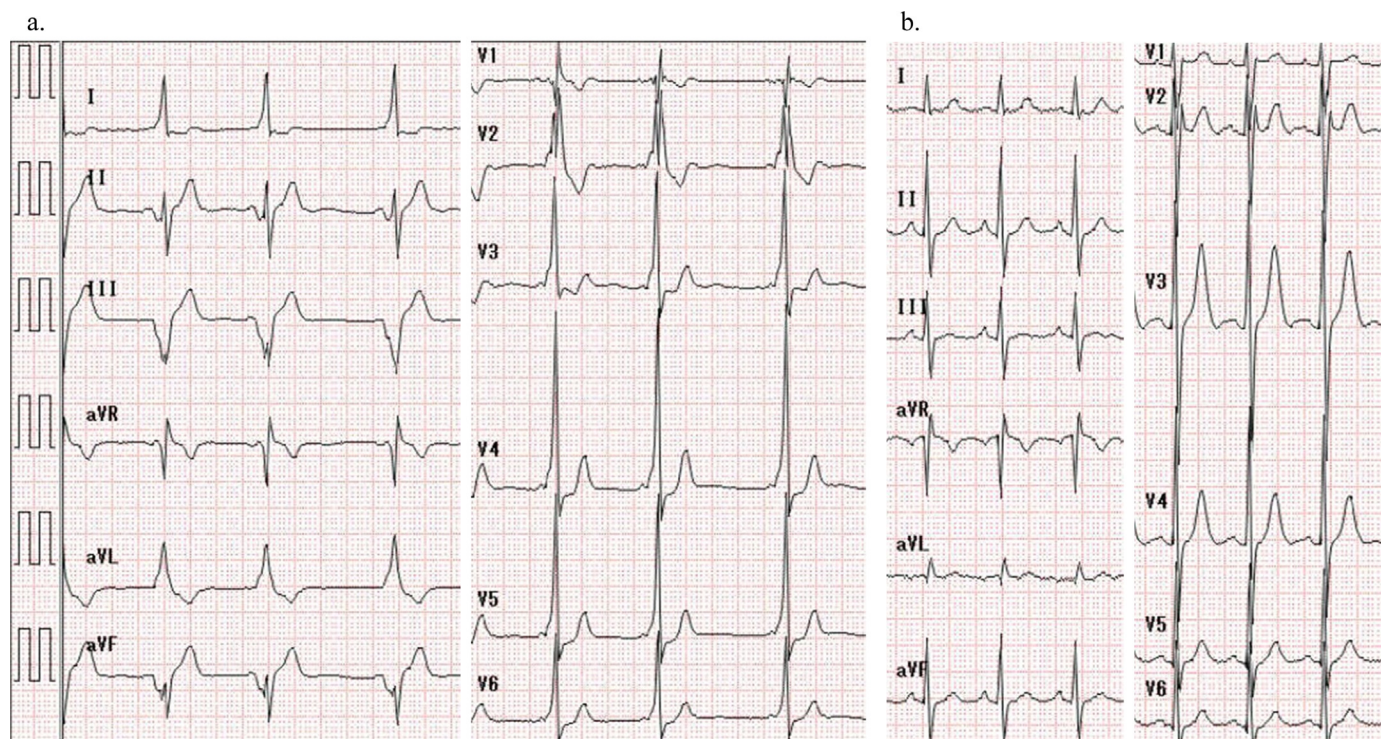
## Case report

A 15-year-old boy was regularly followed at our hospital for the WPW syndrome. He was found to have a delta wave on the surface

electrocardiogram of a school-based electrocardiogram screening by the first grade of elementary school. Twelve-lead electrocardiogram showed ventricular pre-excitation with an isoelectric delta wave in lead V1 and negative delta wave in leads II, III, aVF (Fig. 1). He had no symptoms and outpatient sessions followed regularly. He had felt the sudden beginning and sudden terminating of palpitations, which lasted for several minutes for 3 months previously. But he had no symptoms of faintness or syncope during the palpitations. Chest X-ray and echocardiogram detected no abnormalities. Holter electrocardiogram showed the maximum heart rate was up to 188 bpm but it was a sinus tachycardia. The treadmill-exercise-test showed that the maximal heart rate reached 204 bpm, but the delta rhythm did not disappear, as well as paroxysmal supraventricular tachycardia (PSVT) and atrial fibrillation (AF) were not induced. We judged that his recurrent palpitations were caused by PSVT and we performed an electrophysiological study (EPS) and RFCA under transvenous anesthesia. A 5F sheath was inserted into the left basilic vein, and a 5F electrode was arranged in the CS. An 8F and a 5F sheath were inserted into the right femoral vein, and 2F electrode catheters (EP star 2F Multi, Japan Lifeline, Tokyo, Japan) were arranged in the

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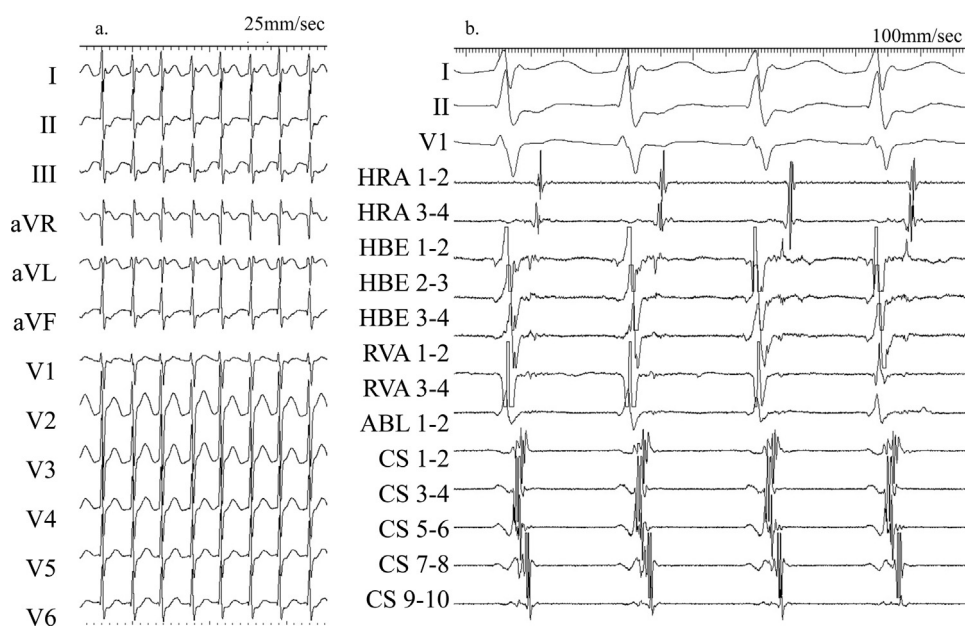
E-mail address: [peditrics\\_car@yahoo.co.jp](mailto:peditrics_car@yahoo.co.jp) (S. Fujita).



**Fig. 1.** Twelve-lead electrocardiogram (ECG) before and after radiofrequency catheter ablation. (a) ECG showing V1 isoelectric and II, III, aVF negative delta wave, especially III, aVF showed steep negative delta wave. (b) Normal PQ interval and no delta wave.

high right atrium, the His bundle, and the right ventricular apex. During ventricular pacing, the earliest atrial activation was at CS proximal (CS5-6) (Fig. 2c) and decremental property was not demonstrated. Narrow QRS tachycardia induced by atrial stimulation was demonstrated to advance in the atrial electrogram due to single ventricular stimulation during the His bundle refractory

period. An atrial program stimulation revealed the antegrade accessory pathway effective refractory period (ERP) were <600–220 ms, <450–200 ms, respectively. It was diagnosed as an orthodromic atrioventricular reciprocating tachycardia (AVRT) by the left posterior accessory pathway. After performing a transeptal puncture using intracardiac echocardiogram and



**Fig. 2.** Successful ablation site, 12-lead electrocardiogram (ECG) and intracardiac ECG of induced supraventricular tachycardia (SVT). (a) 12-lead ECG of induced SVT (b) Intracardiac ECG of induced SVT showed retrograde earliest atrial activation site at CS5-6. (c) Intracardiac electrogram showed typical AV fusion accompanied with accessory pathway potential at ABL. (d) Delta wave was interrupted for 2.4 s with a radiofrequency pulse (RF on). (e) Right and left anterior oblique right atrium angiography. Arrow denotes the coronary sinus diverticulum. The position of ablation catheter is at the site of successful ablation. ABL, ablation catheter; CS, CS electrode; His, His bundle electrode; RVA, RVA electrode.

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