Case Report

Pseudo-Preexcitation Mimics Right Antero-Septal Accessory Pathway in Hypertrophic Cardiomyopathy

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Hypertrophic cardiomyopathy (HCM) is not uncommon in clinical practices. Various electrocardiographic abnormalities have been noted in patients with HCM, such as anterolateral and inferior pseudo Q waves or apical giant inverted T wave. Patterns of ventricular preexcitation including the Wolff-Parkinson-White have been reported in patients with HCM, especially in certain congenital glycogen storage diseases. Here, we describe a male HCM patient whose twelve-lead electrocardiogram showed short PR interval and wide QRS suggesting ventricular preexcitation. However, after detailed electrophysiological study, pseudo ventricular preexcitation with normal atrioventricular nodal conduction was diagnosed.

Key words: hypertrophic cardiomyopathy, ventricular preexcitation, Wolff-Parkinson-White, atrioventricular nodal conduction

Case Report

A 51-year-old male came to our emergency room due to palpitations. The electrocardiogram (ECG) during palpitation revealed atrial fibrillation with wide QRS complexes. After termination of the atrial fibrillation, ECG revealed normal sinus rhythm with short PR interval and wide QRS complexes which suggested ventricular preexcitation (Fig. 1). After analysis of the polarity of delta waves, a right anteroseptal accessory pathway was suspected using previous accessory pathway localization algorithm.[1]

Transthoracic echocardiography revealed concentric left ventricular hypertrophy with preserved left ventricular systolic function (Fig. 2). After informed consent was obtained, the patient received an electrophysiological study in a postabsorptive, nonsedated state. All antiarrhythmic drugs were discontinued for at

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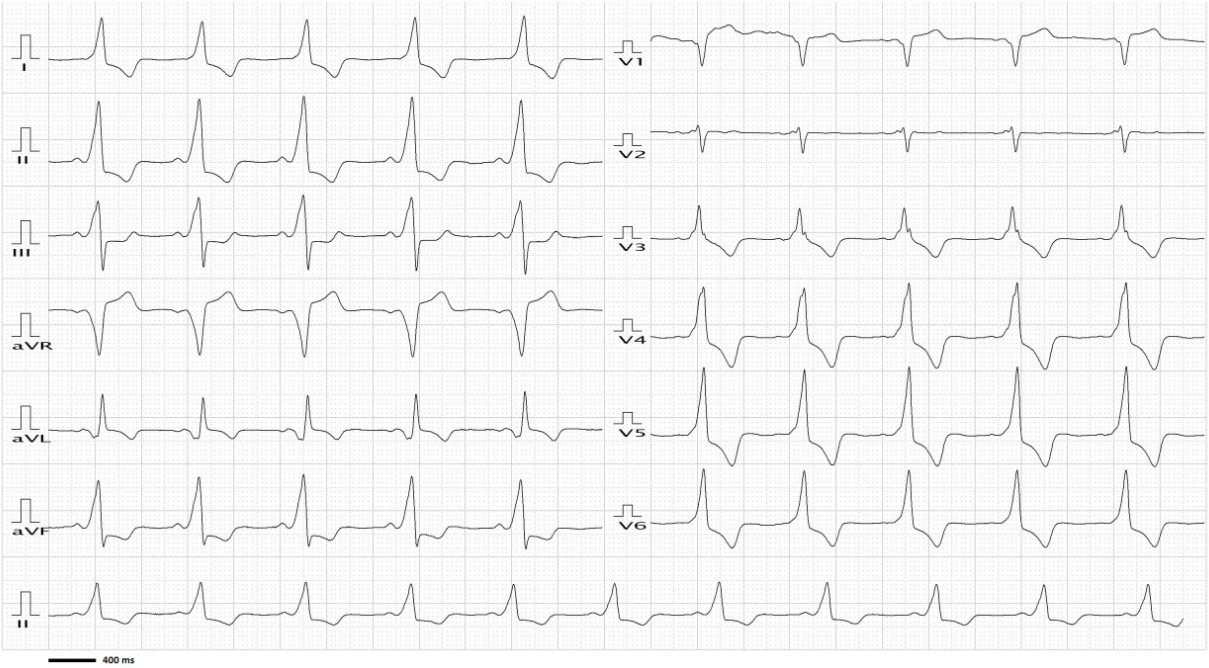

Fig. 1 Twelve-lead electrocardiogram in sinus rhythm revealed wide QRS with suspected ventricular preexcitation of right anterior septal atrioventricular accessory pathway.

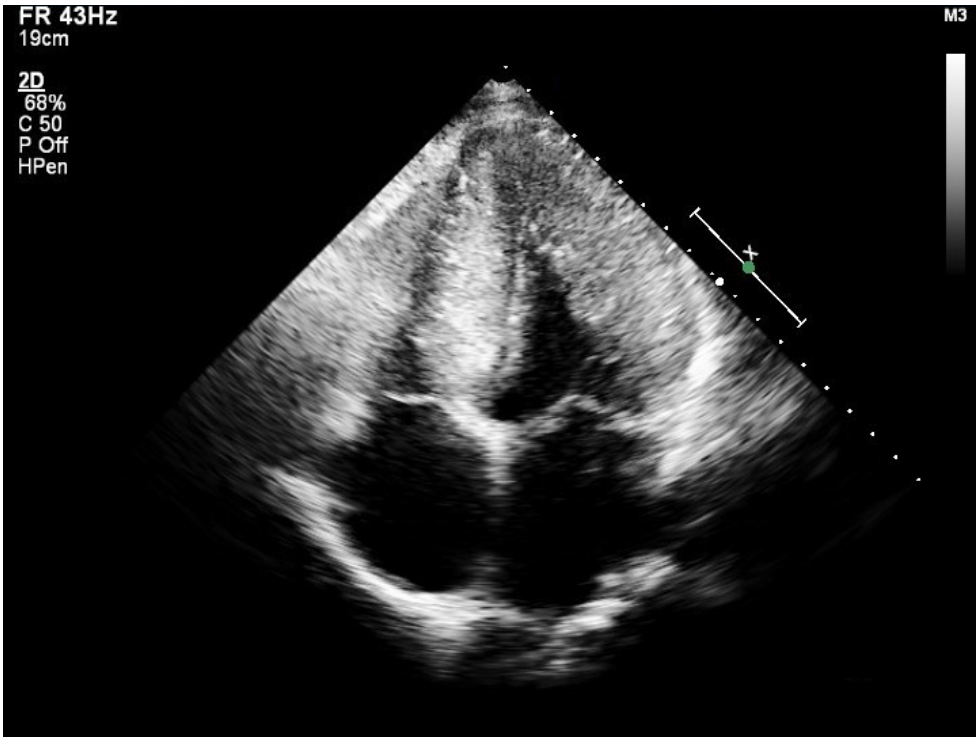

Fig. 2 A transthoracic echocardiography apical four chamber view revealed concentric thickening of left ventricular myocardium with persevered left ventricular ejection function.

least five half-lives before the electrophysiological study. Three multipolar electrode catheters were positioned in the high right atrium, His-bundle area and right ventricle respectively, via the right femoral vein. One decapolar electrode catheter was introduced from the right internal jugular vein and placed in the coronary sinus to record the electrical activity around the posteroseptal area and coronary sinus. Intracardiac bipolar electrograms and 12-lead ECG were displayed and recorded by a computer recording system (Bard LabSystem PRO EP Recording System version; Bard, Electrophysiology Division, Lowell, MA, USA.) for further analysis. A programmed electrical stimulator (DTU-210, bloom Associated, Reading, PA, USA) was used to deliver electrical impulses of 2.0-ms duration at approximately twice the diastolic threshold.

During electrophysiology study (Fig. 3A), intracardial recordings at baseline revealed a normal atrial-His (AH) interval (87 msec) and His-ventricular (HV) interval (36 msec). Ventricular programmed stimulation revealed a concentric and decremental ventriculoatrial (VA) retrograde conduction pattern which the earliest atrial activation was identified in His bundle area. VA retrograde conduction through atrioventricular node was suggested. Incremental atrial rapid pacing did not change the ECG QRS morphology and intracardial HV interval. During atrial extrastimulus pacing, the A2H2 interval exhibited decremental conduction with a fixed HV interval (Fig. 3B).

Right antero-septal accessory pathway was then mapped by 4 mm tip ablation catheter. The shortest atrial-ventricular (AV) signal was mapped in the para Hisian area and the catheter radiofrequency ablation was performed during sinus rhythm. AH interval prolongation with fixed HV interval and junctional rhythm were noted after ablation energy delivering (Fig. 3C). The ablation was then stopped immediately. During the junctional rhythm, the surface ECG showed a wide QRS pattern which was identical to the wide QRS in sinus rhythm. As a result, fasciculoventricular accessory pathway or hypertrophic cardiomyopathy (HCM)-related pseudo-ventricular preexcitation were suspected. Because both fasciculoventricular accessory pathway and HCM-related pseudo preexcitation were not the targets of ablation, the procedure was stopped.

The final electrophysiological diagnosis of the patient is HCM-related pseudo-ventricular preexcitation.

The patient was discharged on the next day with oral amiodarone administration for atrial fibrillation control.

Discussion

More than 90% of HCM patients have abnormal ECG.[2] Most frequent ECG abnormalities include left atrial enlargement, q waves, diminished R waves in lateral precordial leads, increased voltages with ST-T changes and marked T wave inversion in the lateral precordial leads.[3] Patterns of ventricular preexcitation, including the typical Wolff-Parkinson-White (WPW) syndrome , have also been reported.[4] From previous studies, the most common accessory pathway in HCM is the fasciculoventricular pathway.[5,6] However, "pseudo-ventricular preexcitation" without real atrial-ventricular accessory pathway has also been identified in certain HCM patients, especially in congenital glycogen storage disorders, such as the Danon syndrome.[7,8]

To differentiate the pseudo-ventricular preexcitation from fasciculoventricular accessory pathway, we must understand its basic characteristics. The characteristics of the fasciculoventricular pathway in electrophysiology study could be summarized as (1) a short HV interval; (2) a prolongation of AH interval with fixed HV interval during atrial decremental pacing and extrastimulus pacing; (3) reproducibility of preexcitation pattern with His-bundle pacing or junctional rhythms and

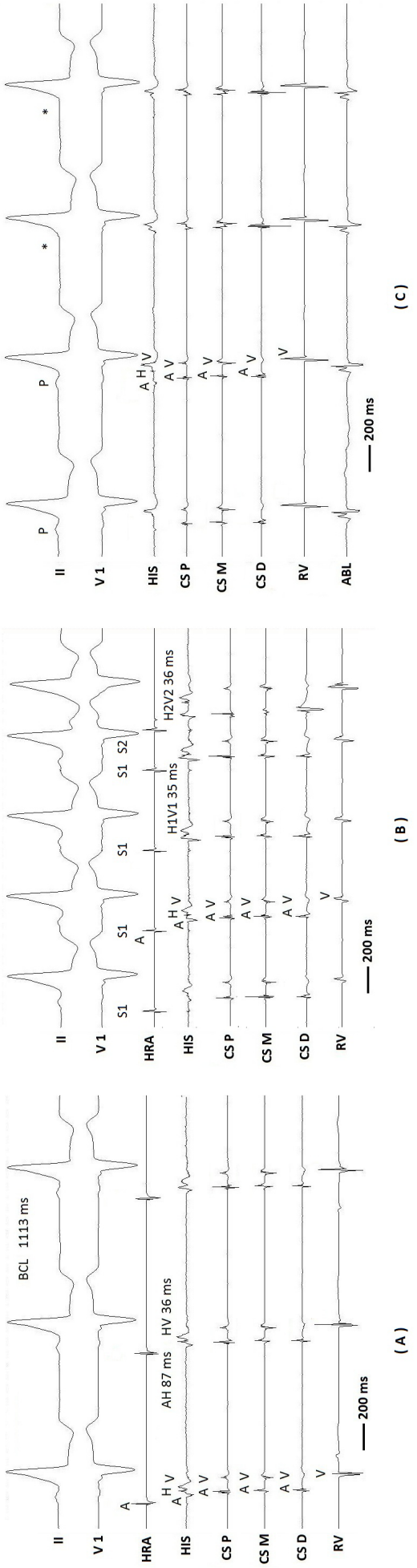

Fig. 3 (A) Baseline intracardiac electrocardiograms revealed a normal AH (87 msec) and HV (36 msec) interval. (B) During atrial extrastimulus pacing (S1/S2 600 msec /300 msec), the A2H2 interval exhibited decremental conduction with a fixed HV interval. (C) Junctional rhythm with identical wide QRS noted during ablation. No P waves was noted in the last two junctional beats with "" marked. A: Atrial potential, H: His bundle potential, V: ventricular potential, HRA: high right atrium electrogram, HIS: His bundle electrogram, RV: right ventricular apex electrogram, CS P: proximal pairs of the coronary sinus electrogram, CS M: middle pairs of the coronary sinus electrogram, CS D: distal pairs of the coronary sinus electrogram, ABL: ablation catheter electrogram, BCL: basic cycle length, AH: Atria-His interval, HV: His-ventricular interval.*

(4) absence of preexcitation with adenosine-induced AV block.[6,9,10]

To target the accessory pathway, the shortest AV signal and earliest V activation signal was mapped. In our case, the first impression of the accessory pathway location was localized at right anterior septal area. Ablation at the shortest AV signal in the para Hisian area caused wide QRS junctional rhythm which was identical to the QRS in normal sinus rhythm (Fig. 3C). Fasciculoventricular pathway was suspected and the ablation procedure was stopped. However, a normal HV interval (35 msec) was noted in our patient and this opposes the possibility of the fascicular accessory pathway. As a result our final diagnosis of this patient was HCM with pseudo ventricular preexcitation pattern.

In previous studies of the familial pseudo-WPW syndrome with glycogen storage cardiomyopathy, the most frequent ECG presentation of the patients is right bundle branch block pattern.[7,8] However, the ECG in our case was left bundle branch block pattern similar to the real fasciculoventricular pathway ECG presentation in other HCM studies.[4,5,6]

In conclusion, we present a unique case of HCM with pseudo-WPW which mimicked right anterior septal fasciculoventricular accessory pathway. Precious and detailed electrophysiology study and echocardiography should be done before any ablation; especially when the ECG represents a suspect ventricular preexcitation and lateral precordial leads consistent to left ventricular hypertrophy are noted, with increase of voltages and marked T wave inversion.

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