Rapid Recovery from Congestive Heart Failure Following Successful Radiofrequency Catheter Ablation in a Patient with Late Onset of Wolff-Parkinson-White Syndrome

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Abstract

A 56-year-old man was admitted because of palpitations and dyspnea. A 12-lead electrocardiogram showed irregular wide QRS complex tachycardia with a slur at the initial portion of the QRS complex. He had preexisting long-standing persistent atrial fibrillation, but early excitation syndrome had never been noted. Chest X-ray showed heart enlargement and pulmonary congestion. He was diagnosed with late onset of Wolff-Parkinson-White syndrome, and congestive heart failure was probably caused by rapid ventricular response of atrial fibrillation through the accessory pathway. Emergency catheter ablation for the accessory pathway was undertaken, and heart failure was dramatically improved.

Key words: WPW syndrome, atrial fibrillation, congestive heart failure, catheter ablation


Introduction

Wolff-Parkinson-White syndrome (WPW) is a syndrome of pre-excitation of the ventricles via an accessory pathway. Patients with atrial fibrillation (AF) and rapid ventricular response are often treated with sodium channel blocker to stabilize their heart rate. However, a prolonged tachycardia can lead to congestive heart failure following decreased ventricular diastolic filling time and decreased cardiac output. In such cases, sodium channel blocker should be avoided because it may worsen heart failure. We encountered a case of long-standing persistent AF presenting late onset WPW syndrome and heart failure.

Case Report

A 56-year-old man was admitted because of palpitations and dyspnea. He had been seen at an out-patient clinic regularly for long-standing persistent AF, and taking beta-blocker (bisoprolol 2.5 mg) and warfarin potassium for 5 years. Early excitation syndrome had never been noted. A 12-lead electrocardiogram (ECG) showed irregular wide QRS complex tachycardia with a slur at the initial portion of the QRS complex (QRS duration; 136 msec, mean heart rate; 140 beats per minute, Fig. 1B), which was not recognized on previous ECG (Fig. 1A). His blood pressure was 80/58 mmHg and chest X-ray showed heart enlargement and pulmonary congestion (Fig. 2A). Routine laboratory analyses were relatively normal except for prolonged prothrombin time and brain natriuretic peptide (BNP) which was increased at 391.2 pg/mL. Serum electrolytes values were within normal limits. Two-dimensional echocardiogram revealed a decrease of the left ventricular systolic function (ejection fraction 35%) and left ventricular dilatation. Based on these findings, he was diagnosed with late onset of Wolff-Parkinson-White Syndrome, and congestive heart failure was likely caused by rapid ventricular response of AF through the accessory pathway.

Antiarrhythmic agents could not be used since heart failure might be deteriorated by their negative inotropic effects. Elimination of wide QRS tachycardia was thought to be impossible to restore sinus rhythm because of longstanding AF. Therefore, we decided to perform catheter ablation to eliminate wide QRS tachycardia.

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After written informed consent was obtained, an electrophysiologic study was performed. With fluoroscopic guidance, a quadripolar catheter was inserted into RV or LV. When wide QRS tachycardia appeared, the onset of QRS preceded the ventricular potentials both of RV and LV, excluding ventricular tachycardia as a cause of wide QRS tachycardia. Next, a decapolar catheter was advanced into the CS from the left internal jugular vein, and a quadripolar catheter was advanced into His bundle area from the right femoral vein. It was found that the earliest ventricular activation site of wide QRS beat was located at CS 3-4 in the second distal pair of CS catheters (Fig. 3), indicating that an atrioventricular accessory pathway (AP) existed at the left lateral area. A deflectable 7F 4-mm tip ablation catheter was inserted retrogradely into the left ventricle from the right femoral artery and placed at subvalvular lateral mitral annulus indicated by CS 3-4 electrodes. Ablation was performed at a site where a Kent potential, characterized as a rapid deflection preceding ventricular activation, was observed (Fig. 4). Radiofrequency energy was delivered for 60 seconds at a temperature of 60°C. Although an apparently optimal unipolar recording (QS pattern) was not obtained, wide QRS tachycardia was terminated by radio-frequency delivery 2 seconds later and a lower heart rate AF without AP conduction was revealed (Fig. 5). Pulmonary congestion and cardiomegaly improved dramatically the following day after RFCA (Fig. 2B). The patient could be discharged and seen as an outpatient for follow-up without recurrence of wide QRS tachycardia and heart failure. Left ventricular ejection fraction increased to 54%, and plasma BNP concentrations decreased to 72.1 pg/mL at the 6-month follow-up.
Discussion

The unique findings of this case were as follows:

1. A late-onset manifestation of accessory pathway in a patient with long-standing persistent AF.
2. Congestive heart failure was thought to be caused by rapid ventricular response of AF through the accessory pathway.
3. Heart failure was dramatically improved soon after catheter ablation for the accessory pathway.

WPW syndrome is characterized by pre-excitation of the ventricles of the heart due to an accessory pathway conduction. The accessory pathway is congenital but some cases of WPW syndrome are inherited. However, there have been few reports on late onset manifestation of WPW syndrome. In addition, long-standing persistent AF is reported to be rare in WPW syndrome. In the present case, we encountered a late-onset manifestation of an accessory pathway in a patient with long-standing persistent AF. Takemoto et al reported a similar case of late onset WPW syndrome in a patient with long-standing persistent AF. They suggested that the presumed mechanism of late onset WPW syndrome is the decrease in the capability of conduction via the atrioventricular (AV) node which may progress with age, leading to pre-excitation of the ventricles through the anterograde conduction over the accessory pathway. Fan et al reported that effective refractory periods of the AV node were significantly greater in the elderly WPW syndrome patients than in the younger group, suggesting that the capability of AV node conduction is decreased with age. As another mechanism, the altering property of the accessory pathway may result in the late-onset WPW syndrome.

In the present case, congestive heart failure developed after the manifestation of WPW syndrome. The presumed mechanism of congestive heart failure is rapid ventricular response of AF through the accessory pathway resulting in insufficient cardiac output.

The unique and rare aspect of the present case is that the patient markedly improved soon after emergency catheter
ablation for the accessory pathway. In general, class I anti-arrhythmic drugs are often used for treatment of rapid ventricular response of atrial fibrillation through an accessory pathway. However, they are not adequate for use in patients with heart failure, even as emergency treatment, since they sometimes suppress cardiac function caused by their negative inotropic effects, deteriorating heart failure. Thus, we performed emergency catheter ablation as a treatment option. Heart failure was dramatically improved soon after catheter ablation for the accessory pathway, because ventricular response was controlled (via AV node). In this case, catheter ablation was undertaken during AF. Hindricks et al reported successful localization and radiofrequency catheter ablation of the left accessory pathway in patients with sustained AF and rapid anterograde conduction over the accessory pathway during the ablation procedure (4). They suggested that the presence of accessory pathway potential and early ventricular activation time in relation to the onset of QRS complex is important for ablation success. In the present case, at the successful site, the earliest ventricular activation demonstrated by CS catheter was obtained, and a rapid deflection preceding the onset of ventricular activation, indicating the accessory pathway potential, was observed. Kose et al showed successful radiofrequency catheter ablation of accessory pathways during pre-excited AF (5). They showed that acute success and recurrence rates and long-term follow-up results are similar to those of pathways ablated during sinus rhythm. Also in the present case, neither recurrence of conduction through the accessory pathway nor heart failure had been observed during 3 years of follow-up.

**Conclusion**

We encountered a case of late onset of WPW syndrome presenting rapid AF and congestive heart failure. Emergency catheter ablation was effective for the management of heart failure.

The authors state that they have no Conflict of Interest (COI).

**References**