Successful catheter ablation to accessory atrioventricular pathway as cardiac resynchronization therapy in a patient with dilated cardiomyopathy

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A 55-year-old man was admitted to our hospital for further examination of the abnormalities of chest X-ray and electrocardiogram. He was diagnosed with type B Wolff–Parkinson–White syndrome concomitant with dilated cardiomyopathy. Despite the medical therapy using enalapril and carvedilol for 20 months, his cardiac performance and brain natriuretic peptide (BNP) were not so improved. Because asynchronous septal motion caused by pre-excitation through a right-sided accessory pathway (AP) might deteriorate his cardiac performance, catheter ablation to the AP was performed. Successful procedure after 17 months improved left ventricular (LV) contraction, reduced LV volume, and decreased mitral regurgitation and BNP.

Figure 1 Surface electrocardiograms. (A) Before catheter ablation; QRS duration is 178 ms and the delta wave is seen. (B) After catheter ablation, QRS duration is shortened to 108 ms and the delta wave disappeared.
Introduction
Cardiac resynchronization therapy (CRT) has currently proposed for the treatment of patients with drug-refractory heart failure and intraventricular conduction delay. It is well known that the majority of CRT recipients present with complete left bundle branch block (CLBBB). On the other hand, patients with manifest Wolff–Parkinson–White (WPW) syndrome have asynchronous ventricular wall motion because of abnormal impulse propagation through an accessory pathway (AP) to the ventricle. This abnormality is especially apparent in cases of right-sided AP as well as in patients who have CLBBB. We describe an interesting case of dilated cardiomyopathy (DCM) with asynchronous septal motion due to type B WPW syndrome.

Case report
A 55-year-old man was referred to our hospital for examination of his cardiac function. During medical checkup by his company, he was pointed out the delta wave on electrocardiogram (ECG) and cardiac enlargement on chest X-ray. However, he had never experienced a palpitation attack and his status was in New York Heart Association functional class I. The chest X-ray revealed a cardiothoracic ratio of 56%, and a surface ECG showed type B WPW syndrome with localization of the AP in the right antero-lateral area (Figure 1A). Initial transthoracic echocardiography revealed left ventricular (LV) dilatation, reduced systolic function, and moderate mitral regurgitation (MR) grade 3/4 (Figure 2). The plasma level of brain natriuretic peptide (BNP) was 110 pg/mL (normal range in Japanese is <18.4 pg/mL) (Figure 2). Coronary arteriography did not show any significant stenosis and right cardiac catheterization revealed no pulmonary hypertension. From the right ventricular endomyocardial biopsy, he was diagnosed with DCM. The patient was administered enalapril (5 mg/day) and carvedilol, which was increased gradually up to 20 mg/day. After 20 months of medical therapy, nevertheless, his cardiac performance and plasma BNP did not improved. After informed consent was obtained, an electrophysiological study and a radiofrequency catheter ablation (RFCA) were performed using the standard technique. The AP was successfully ablated and the delta wave disappeared (Figure 1B). We evaluated the LV intraventricular conduction delay using tissue Doppler imaging (TDI) by commercially available ultrasound system (Aloka SSD-6500SV, Tokyo, Japan) before and after RFCA. The time difference with electromechanical delay was markedly shortened from 139.62 to 0 ms (Figure 3). Seventeen months after successful ablation, LV dilatation and systolic function were improved and MR and plasma BNP were markedly decreased (Figure 2).

Discussion
We described a type B WPW patient concomitant with DCM. To our knowledge, this is the first report of cardiac resynchronization by RFCA to right-sided AP for the patient who was diagnosed with DCM with severely reduced cardiac function. Although beta-blockers increase survival rates as well as improve cardiac function of patients with chronic heart failure, some patients are non-responder for them and their prognosis is consequently poor. In most of the patients with WPW syndrome, an asynchronous septal motion would not cause any symptoms because global cardiac function is preserved almost normal. However, this asynchronous ventricular motion is unfavourable to the patients with severely reduced LV function. Cardiac resynchronization therapy reduces the degree of LV dyssynchrony. This effect is accompanied by an increase in the LV contraction and a decrease in the LV end-diastolic dimension and the magnitude of MR. Although RFCA of atrioventricular AP is established as a curative therapy of atrioventricular reciprocating tachycardia in patients with WPW syndrome, this procedure would not necessary in cases without any past palpitation attacks. However, for this particular patient, RFCA to right-sided AP must have been exceedingly useful as it could cancel the dysynchronous ventricular contraction. Recent advances in echocardiographic technology, especially TDI, have enabled to evaluate ventricular synchrony and regional myocardial function. Bax et al. reported that the patients with LV dyssynchrony more than 65 ms respond to CRT and have an excellent prognosis after this procedure. In this case, LV dyssynchrony was markedly improved with RFCA. Consequently, his cardiac performance was improved and MR and plasma BNP were decreased. In conclusion, RFCA to a right-sided AP may be the first therapeutic choice for the patients concomitant with DCM, even without any experience of tachycardia attack.
References


Figure 3 Change in the intraventricular conduction delay by tissue Doppler imaging in the left ventricle before and after catheter ablation. The region of interest was located at the base of the septum (yellow closed circle) and lateral wall (pink closed circle) of the left ventricle in the apical four-chamber view. And the time from the onset of the QRS to the peak myocardial systolic velocity (arrows), which was defined as the maximum velocity during systole, was measured. The time difference (T-dif) in the electromechanical delay between the septum and lateral wall was defined as intraventricular conduction delay. T-dif was markedly shortened from 139.62 to 0 ms after catheter ablation. LA, left atrium; LAT, left ventricular lateral wall; LV, left ventricle; RA, right atrium; RV, right ventricle; SEPT, septum; TDI, tissue Doppler imaging.