

IMAGING VIGNETTE: ECG CHALLENGE

Unusual Permanent Form of Junctional Reciprocating Tachycardia Associated With an Accessory Pathway With Bidirectional Conduction



Hiroshi Miyama, MD,^a Seiji Takatsuki, PhD,^a Takehiro Kimura, PhD,^a Hideo Mitamura, PhD,^b Satoshi Ogawa, PhD^c

ABSTRACT

We describe an unusual case of permanent form of junctional reciprocating tachycardia in a patient with manifest Wolff-Parkinson-White syndrome. The electrophysiological study revealed an accessory pathway responsible for the tachycardia, revealing fast and nondecremental anterograde conduction and slow and decremental retrograde conduction that was successfully ablated from the middle cardiac vein. **(Level of Difficulty: Advanced.)**

(J Am Coll Cardiol Case Rep 2020;2:245-6) © 2020 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

A 66-year-old man with an incessant form of tachycardia was referred to our hospital. He was found to have manifest Wolff-Parkinson-White syndrome at 50 years of age. Twelve-lead electrocardiography showed long-RP, narrow-QRS tachycardia, with a discretely negative P wave in the inferior leads (Figure 1A). The tachycardia was terminated with administration of adenosine triphosphate but recurred after a few beats of sinus rhythm without any extrasystoles (Figure 1C).

An electrophysiological study was performed. An extrastimulus delivered from the posteroseptal right ventricle when the His bundle was refractory advanced the tachycardia reproducibly, suggesting an accessory pathway (AP) as a retrograde conduit. An atrial activation map was constructed, which revealed the middle cardiac vein (MCV) as the earliest activation site. While manipulating the ablation catheter in the MCV, the tachycardia terminated inadvertently (Figure 1D). In Figure 1D, tiny AP potentials (arrows) just before the A wave were recorded in the MCV. The tachycardia was terminated by the retrograde conduction block after recording the AP potential. Then sinus rhythm resumed, and the delta wave began to appear intermittently (Figure 1B). When the delta wave was present, the AP potential was recorded between the A wave and the V-wave in the MCV. In contrast, when the delta wave disappeared, the AP potential was recorded 146 ms after the V-wave (Figure 1E). The retrograde conduction of the AP revealed a decremental property, while the anterograde conduction of the AP showed no decremental property.

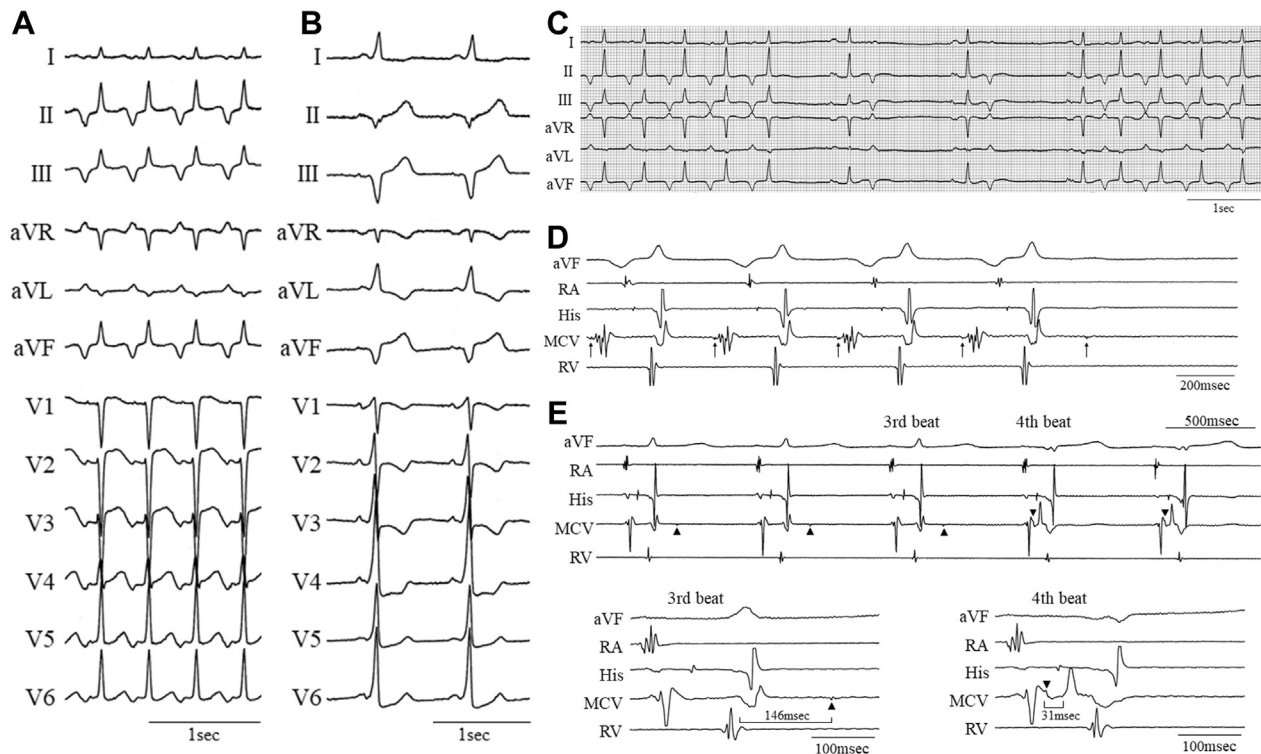
Radiofrequency ablation was performed in the MCV during sinus rhythm, which eliminated the delta wave and the retrograde AP conduction. Both the anterograde and retrograde AP conduction did not recur, and the tachycardia was never inducible.

From the ^aDivision of Cardiology, Department of Medicine, Keio University School of Medicine, Tokyo, Japan; ^bDivision of Cardiology, Tachikawa Hospital, Tokyo, Japan; and the ^cOgawa Satoshi Clinic, Tokyo, Japan. The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

Informed consent was obtained for this case.

Manuscript received July 21, 2019; revised manuscript received October 18, 2019, accepted December 9, 2019.

FIGURE 1 Electrocardiograms During the Electrophysiological Study



(A) Electrocardiograms during tachycardia. **(B)** Electrocardiograms during sinus rhythm. The delta wave was characteristically negative in the inferior leads, and the R/S ratio was <1 in lead V₁, indicating a subepicardial accessory pathway (AP). **(C)** Transient interruption of the tachycardia following adenosine triphosphate administration. **(D)** Termination of tachycardia while manipulating the catheter in the middle cardiac vein (MCV). **(E)** Electrograms showing intermittent anterograde AP conduction. The first 3 sinus beats show atrioventricular (AV) conduction only via the AV node and the fourth and fifth sinus beats via both the AP and the AV node. AP potentials are seen at different timings between the first 3 beats (**black triangles**) and the latter 2 beats (**inverted black triangles**). The lower tracings show a magnification of the third and fourth beats. RA = right atrium; RV = right ventricle.

There are no previous reports describing bidirectional conduction of an AP in the permanent form of junctional reciprocating tachycardia (PJRT) (1,2). We report a unique case of PJRT demonstrating combined conduction of slow, decremental retrograde conduction and fast, nondecremental anterograde conduction.

ADDRESS FOR CORRESPONDENCE: Dr. Seiji Takatsuki, Division of Cardiology, Department of Medicine, Keio University School of Medicine, 35 Shinanomachi, Shinjuku-ku, Tokyo 160-8582, Japan. E-mail: seiji.takatsuki@gmail.com.

REFERENCES

- Murdock CJ, Leitch JW, Teo WS, Sharma AD, Yee R, Klein GJ. Characteristics of accessory pathways exhibiting decremental conduction. *Am J Cardiol* 1991;67:506-10.
- Chen SA, Tai CT, Chiang CE, et al. Electrophysiologic characteristics, electropharmacologic responses and radiofrequency ablation in patients with decremental accessory pathway. *J Am Coll Cardiol* 1996;28:732-7.

KEY WORDS ablation, electrocardiogram, electrophysiology, supraventricular arrhythmias