

IMAGING VIGNETTE

INTERMEDIATE

ECG CHALLENGE

Wide Complex Tachycardia and Cardiac Arrest During Endoscopy



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ABSTRACT

A 59-year-old man presented for implantable cardioverter-defibrillator placement after a wide QRS complex tachycardia cardiac arrest at an outside hospital. In this case report, we discuss the differential diagnosis of this patient's tachyarrhythmia and the electrophysiological studies that established the diagnosis and guided management. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2022;4:211-213) © 2022 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/>).

CASE

A 59-year-old man with no history of cardiac disease and a previous history of deep vein thrombosis who was receiving anticoagulant therapy presented with melena and underwent endoscopy. During the procedure, he experienced a cardiac arrest with reported wide complex tachycardia (WCT). Cardiopulmonary resuscitation was initiated, and a return of spontaneous circulation was achieved after a single defibrillation. He was transferred to a tertiary care center for implantable cardioverter-defibrillator (ICD) placement.

On admission, his heart rate was 105 beats/min, and his blood pressure 116/68 mm Hg. He had negative results of serial troponin testing and did not report chest pain. His echocardiogram showed mild left ventricular hypertrophy and normal regional and global systolic function. The onset of the WCT was captured on telemetry ([Supplemental Figure 1](#)), as was a subsequent episode of WCT ([Figure 1](#)). A 12-lead electrocardiogram was obtained during administration of adenosine in sinus rhythm ([Supplemental Figure 2](#)).

What is the diagnosis of the wide QRS complex tachycardia observed on telemetry?

- A. Supraventricular tachycardia (SVT) with aberrancy
- B. Ventricular tachycardia (VT)
- C. Antidromic atrioventricular (AV) reciprocating tachycardia (AVRT)
- D. Atrial tachycardia with pre-excitation

The correct answer is D.

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

Manuscript received December 22, 2021; accepted January 3, 2022.

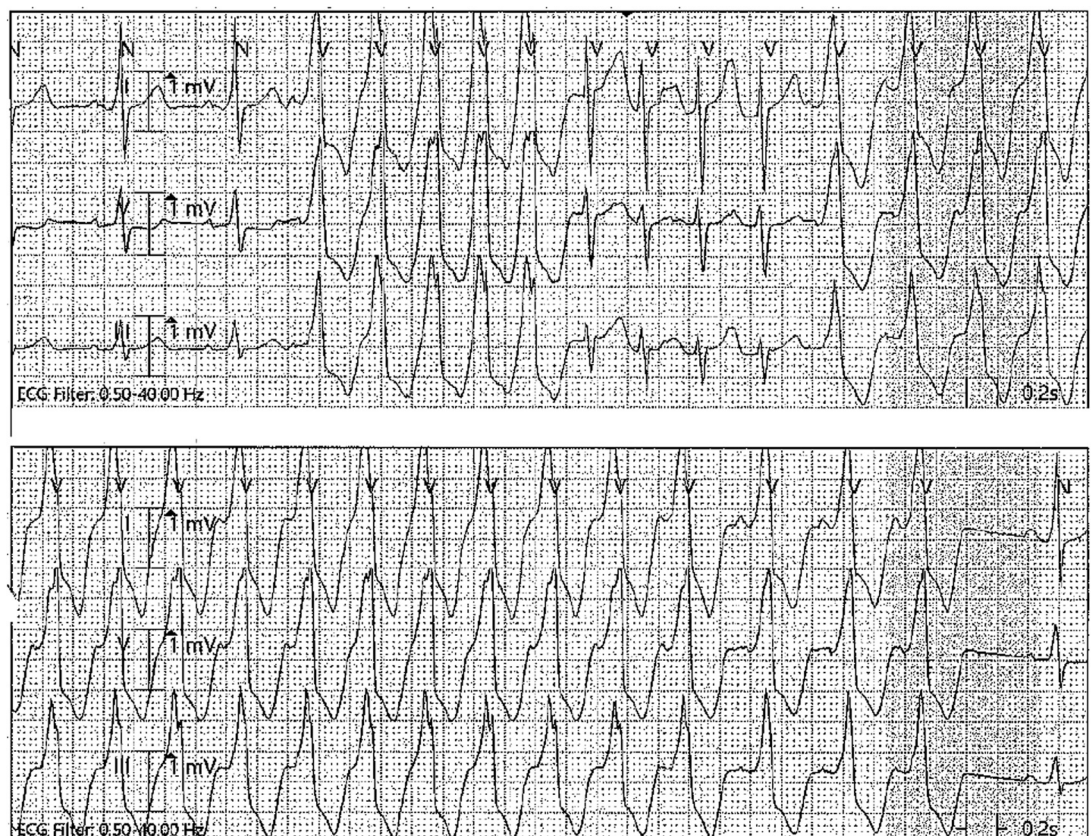
DISCUSSION

The telemetry strip of the initial onset of WCT (Supplemental Figure 1) shows 8 beats of normal sinus rhythm, followed by a premature atrial depolarization that conducts with a short PR interval and a wide QRS complex that initiates the WCT. The telemetry strip of the subsequent WCT (Figure 1) starts with 2 beats of normal sinus rhythm. An atrial premature depolarization that conducts with a short PR interval and a wider QRS complex then initiates 5 beats of an accelerating WCT, followed by 4 narrow-complex beats with a QRS configuration that is different from and narrower than the first 2 sinus beats. Subsequently, there are 18 beats of WCT with discernible P waves.

The differential diagnosis of monomorphic, regular WCT includes VT (answer choice B), SVT with aberrancy (answer choice A), and SVT with pre-excitation (answer choice D). There are several published algorithms for distinguishing between SVT with aberrancy and VT.^{1,2} Features suggestive of VT include AV dissociation, a slow initial deflection of the QRS complex, absence of typical QRS complex features of right or left bundle branch block, or an axis of ventricular depolarization inconsistent with use of the normal conduction system.^{1,2} The algorithms, however, cannot reliably be used to differentiate SVT with pre-excitation from VT.

The telemetry strips show multiple features that raised suspicion of atrial tachycardia with pre-excitation. First, the tachycardia initiates with an atrial premature complex, thus making SVT more likely than VT. Second, the variability in PR interval and QRS complex configuration suggests variable pre-excitation, or variable conduction through the bypass tract and the normal conduction system. In contrast, in antidromic AVRT

FIGURE 1 Telemetry Recording of a Subsequent Wide Complex Tachycardia



ECG = electrocardiogram.

(answer choice C), the PR interval and QRS complex configuration would be expected to be constant as a result of anterograde conduction through the bypass tract with retrograde conduction through the AV node.

The presence of an accessory pathway can be confirmed by delaying conduction over the AV node by using vagal maneuvers, beta-blockers, calcium-channel blockers, or adenosine. A continuous 12-lead electrocardiogram recorded during adenosine administration (Supplemental Figure 2) showed a progressive increase of the delta waves with widening of the QRS complex as the AV block increased. Positive delta waves across the precordial and inferior leads, together with negative delta waves in lead aVL, suggested a left lateral accessory pathway. The patient underwent an electrophysiology study to map the pathway, which was successfully eliminated with radiofrequency ablation (Supplemental Figure 3). He ultimately did not require ICD placement.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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APPENDIX For supplemental figures, please see the online version of this paper.

KEY WORDS ablation, supraventricular tachycardia, ventricular tachycardia