Full disclosure: Unraveling the mystery of a wide complex tachycardia

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Wide complex tachycardia is not uncommon in patients with underlying structural heart disease and reduced ejection fraction. It is important to make the correct diagnosis as it carries prognostic and clinical implications. We present a case of a challenging wide complex rhythm detected on remote telemetry monitoring. This case outlines the differential diagnosis of a wide complex tachycardia and the clues to making a diagnosis of artifact. It highlights the importance of correct diagnosis as an incorrect diagnosis may lead to inappropriate treatments and unnecessary investigations.

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Introduction

Wide complex tachycardia (WCT) is not uncommon in patients with underlying structural heart disease and reduced ejection fraction. It is important to make the correct diagnosis as it carries clinical and prognostic implications. We present a case of a challenging wide complex rhythm detected on remote telemetry monitoring.

Case report

A 66-year-old male patient underwent thoracic endovascular aortic repair for a type B dissection. His postoperative course was complicated by delayed spinal cord ischemia. Past medical history was significant for myocardial infarction with the culprit artery a 90% proximal left anterior descending lesion treated with a drug eluting stent. Subsequent transthoracic echocardiogram documented a mild ischemic cardiomyopathy with a left ventricular ejection fraction of 40% with akinesis of the anterior wall, septum and apex. Medications prior to hospital admission included metoprolol and ramipril both of which were discontinued to maintain systolic blood pressure above 100 mmHg to optimize spinal cord perfusion.

On postoperative Day 28, while on telemetry in the cardiac inpatient unit, an episode of WCT
was detected on telemetry (Fig. 1). The patient was asymptomatic and hemodynamically stable during this episode. The team looking after the patient made a presumptive diagnosis of ventricular tachycardia and intravenous amiodarone was initiated followed by oral metoprolol. The electrophysiology service was subsequently consulted to assist with rhythm diagnosis and management.

Discussion

The telemetry recording revealed a WCT with a ventricular rate of 240 beats/min. There was a premature ventricular complex prior to the onset of a wide, fairly regular rhythm that terminates spontaneously followed by a normal QRS. The episode duration was 30 seconds. A closer analysis of the rhythm strips, particularly the onset and offset of the rhythm, suggested the presence of a narrow QRS marching through at a rate of 70–75 beats/min. We were suspicious that the rhythm may have been the result of artifact.

Upon reviewing the full disclosure screen, which records seven leads, there was clearly a regular narrow QRS in lead I during the episode of apparent wide complex tachycardia (Fig. 2). The rhythm was diagnosed as artifact and amiodarone was discontinued.

The differential diagnosis of WCT includes ventricular tachycardia, supraventricular tachycardia (SVT) with pre-existing bundle branch block or intraventricular conduction delay, SVT with aberrant conduction, SVT with pre-excitation, paced rhythm, and artifact.

In a study by Knight et al. [1], 766 physicians were asked to review a two-lead rhythm strip documenting artifact mimicking ventricular tachycardia. The rhythm strip was not recognized as artifact by 52 of 55 internists (94%), 128 of 221 cardiologists (58%), and 186 of 490 electrophysiologists (38%).

The correct diagnosis of WCT is essential since it has significant management and prognostic implications. Artifact mistaken for ventricular tachycardia may result in unnecessary treatment, as was
Figure 2. (A) Seven-lead rhythm strip showed artifact with normal sinus rhythm in lead I and the native QRS complex marching through in the remaining leads (arrowhead). (B) Seven-lead rhythm strip showed termination of rhythm.
evident in our case, and in some cases unnecessary invasive procedures may occur. There are clues to suggest artifact including bizarre initiation and termination, the native QRS complex visible within the WCT sequence and lack of atrioventricular dissociation. Also, the patient is likely to be asymptomatic with no hemodynamic instability.

Causes of artifact can be divided into two general categories: patient factors and external factors. Patient factors include tremors, shivering, brushing teeth, or combing hair. External factors include electrocautery, deep brain stimulator, or loose lead connections. Asking the patient what they were doing at the time of the event may help elucidate the diagnosis. In this case, it appears that the likely cause was a loose telemetry lead, although we were unable to confirm this.

Conclusion
Artifact can mimic ventricular tachycardia and should be considered in the differential diagnosis of WCT. Misdiagnosis is more likely with fewer monitoring leads and may result in unnecessary invasive procedures or treatment.

Author contributions
All authors contributed to case design, data collections, literature review, writing up the case and approval of the final draft.

Reference
[1] Knight BP, Pelosi F, Michaud GF, Strickberger SA, Morady F, et al.. Physician interpretation of electrocardiographic artifact that mimics ventricular tachycardia. Am J Med 2001;110:335–8.