Focus on ECGs: Case #7

Electrocardiogram Interpretation

in a Man with Alcohol Withdrawal and Hypothermia

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A 60-year-old man with paroxysmal atrial fibrillation, hypertension, seizure disorder, and alcohol abuse was unresponsive on presentation at the hospital. Laboratory tests revealed hypokalemia (2.5 mg/dL), hypomagnesemia (1.3 mg/dL), and no elevation in cardiac biomarkers. The patient's admission electrocardiogram (ECG) showed an undetermined rhythm, with further interpretation limited by motion artifact. He was admitted with a diagnosis of alcohol withdrawal and hypothermia. During his hospital stay, he was monitored on telemetry for cardiac manifestations of electrolyte abnormalities. The covering physician was urgently called for suspicious telemetry events that prompted the completion of the following ECG (Fig. 1).

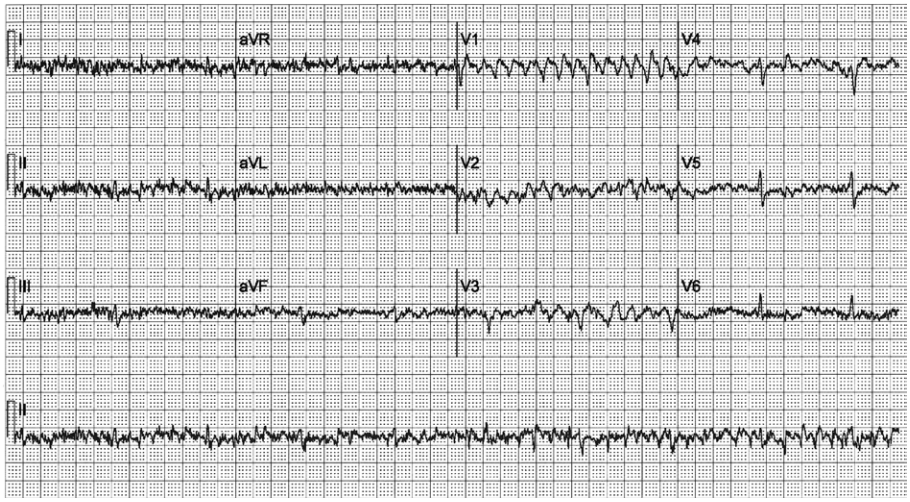

Fig. 1

What is the most appropriate next step in treating this patient?

A) Perform prompt, unsynchronized electrical defibrillation.
B) Initiate pharmacologic therapy with intravenous magnesium sulfate followed by isoproterenol infusion, if necessary.
C) Perform a full physical examination.
D) Withdraw any provocative agents.
E) Start temporary transvenous overdrive pacing (atrial or ventricular).

See next page for the answer, as well as a link to the Focus on ECGs *blog, where you can participate in a moderated discussion.*

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Answer

C) **Perform a full physical examination.**

The patient's ECG patterns (Fig. 1) can be confused with those of torsades de pointes, a form of polymorphic ventricular tachycardia. The characteristics of torsades de pointes include a heart rate of 150 to 300 beats/min, irregular RR intervals, a prolonged QT interval in the last sinus beat, progressive twisting of the QRS complex that leads to a complete 180° twist in 10 to 12 beats, and a sinusoidal change in amplitude of the QRS complexes in each cycle.[1]

Although the patient's ECG resembles torsades de pointes, further inspection suggests otherwise. The twisted QRS complexes are discernible in leads V_3, V_4, and V_5 (Fig. 2).

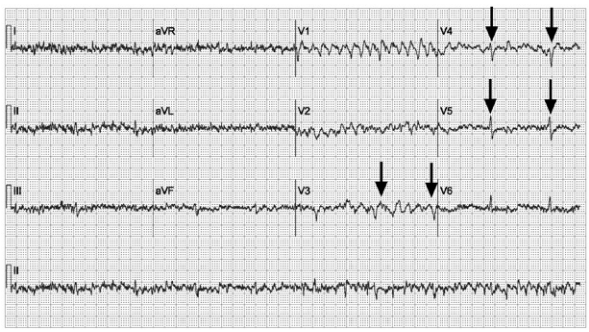

Fig. 2

In the patient's telemetry strip (Fig. 3), the oscillating axis that suggests torsades de pointes is again seen. However, it shows a regular rhythmic rate of 70 beats/min with narrow QRS complexes—characteristics not associated with torsades de pointes.

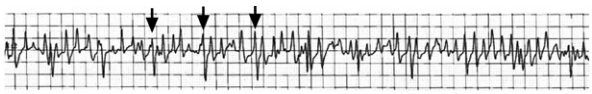

Fig. 3

In this case, a motion artifact in the presence of alcohol withdrawal resulted in a rhythm strip and an ECG pattern that can be confused with torsades de pointes, not an unreasonable presumption in this patient with electrolyte abnormalities and hypothermia. Whereas all 5 answer choices might be appropriate in the treatment of torsades de pointes, the most appropriate next step would be to perform a physical examination, including auscultation and palpation of the patient's pulse to help ascertain the presence of an arrhythmia.[2]

Torsades de pointes and other ventricular arrhythmias are often associated with hemodynamic instability that manifests itself as hypotension, syncope, dyspnea, or chest pain.[3] The absence of these signs should alert the clinician to the possibility of an alternative explanation for bizarre ECG abnormalities, including tremor-induced artifact.[4]

References

1. Khan IA. Long QT syndrome: diagnosis and management. Am Heart J 2002;143(1):7-14.
2. Smith RM. Electrocardiographic artifact. N Engl J Med 2000;342(8):591-2.
3. Mirijello A, Fuorlo M, Addolorato G, Landolfi R. 'Doctor, treat your patient, not your monitor!' Tremor-induced ECG artefacts mimicking Torsades de pointes. BMJ Case Rep 2014;2014. Available from: http://casereports.bmj.com/content/2014/bcr-2014-204735.long
4. Srikureja W, Darbar D, Reeder GS. Tremor-induced ECG artifact mimicking ventricular tachycardia. Circulation 2000; 102(11):1337-8.

To participate in a moderated discussion of this case, go to THIJournal.blogspot.com. Two weeks from the original posting date, the discussion will close, but the comments will remain online for reference.