



Faster and Faster

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Vignette

A 36-year-old woman presents to the emergency department complaining of chest pain, dizziness, and palpitations for the last hour. On examination, her heart rate is irregular (160 beats per minute [bpm] to 180 bpm), and her blood pressure is 95/60 mmHg. Her electrocardiogram (ECG) is shown in Figure 1.

Questions

1. What is her cardiac rhythm?
2. What other electrocardiographic abnormality is shown, and what is its clinical significance?

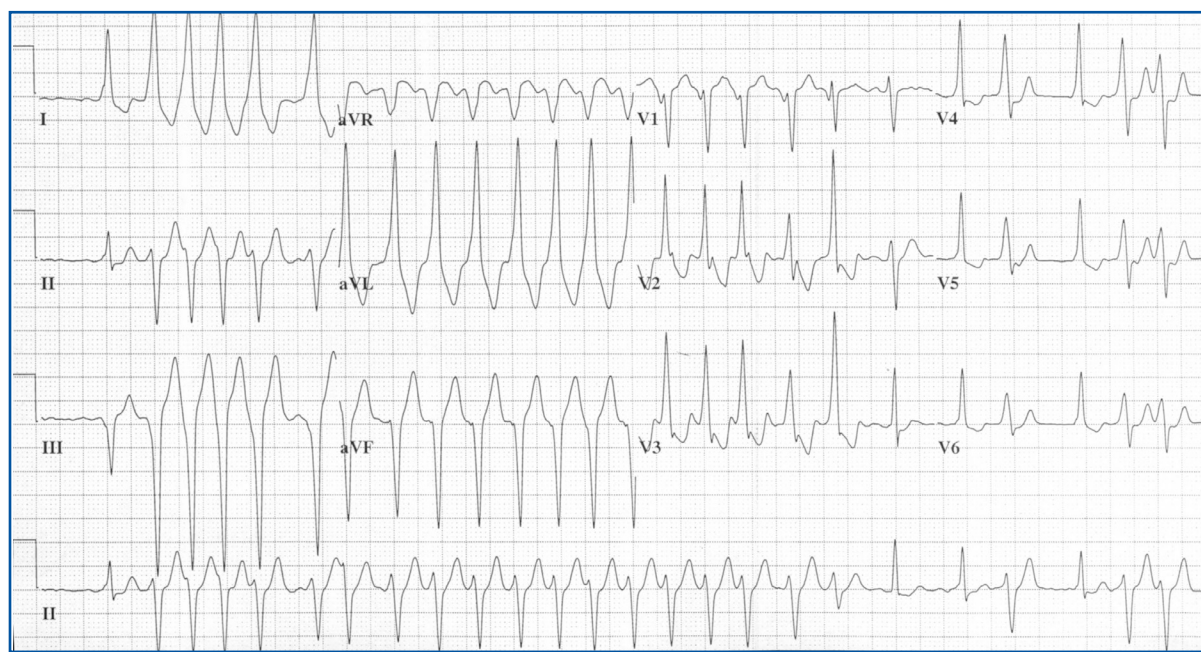


Figure 1. ECG.

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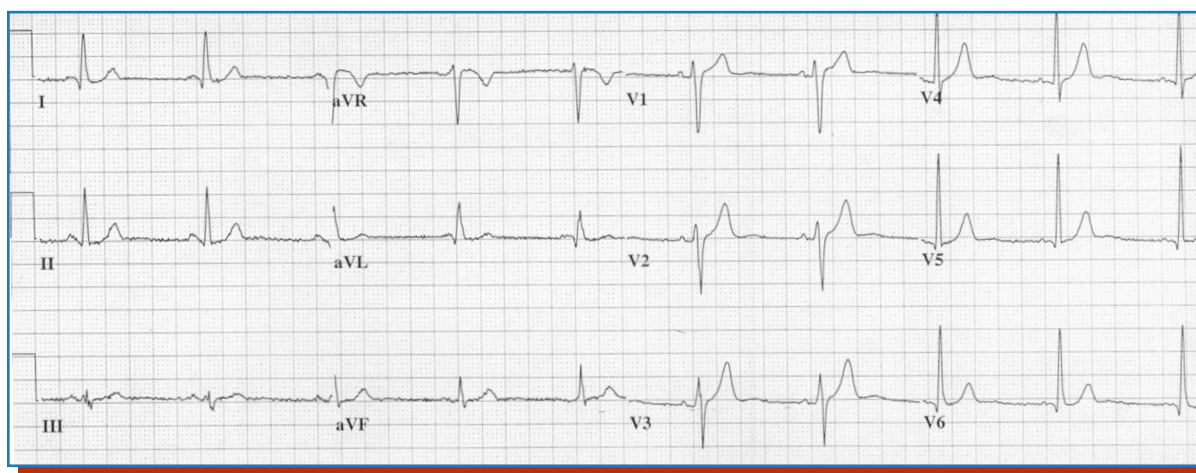


Figure 2. ECG showing the hint of a delta wave in leads V_2 and V_3 .

Answers

1. The initial ECG shows an irregular tachycardia with ventricular rates which, at times, are close to 200 bpm. Some QRS complexes are wide and show an atypical left bundle branch block (LBBB) pattern. Others show a near normal duration and configuration. One possibility to consider is sinus rhythm with repetitive runs of non-sustained ventricular tachycardia. However, there is no clear evidence of sinus P waves, and the bursts of wide-complex tachycardia are quite irregular, which would be unusual for ventricular tachycardia. Perhaps this is simply atrial fibrillation (AF), but why the intermittent atypical LBBB QRS configuration?

2. At very rapid rates, AF may cause a functional bundle branch block (rate-dependent aberration) because the interval between QRS complexes is shorter than the refractory period of one or other bundle branch (more commonly the right, although rate-dependent LBBB may also be seen). However, we do not see a typical LBBB pattern in this case, and there is also some variation in the QRS duration from beat

to beat. This should suggest the possibility of ventricular pre-excitation (Wolff-Parkinson-White syndrome) with intermittent rapid antegrade conduction down an accessory pathway. A clue to the diagnosis in this patient is the presence of two beats towards the end of the recording (third- and fifth-last beats in V_4 to V_6), which show delta waves consistent with partial pre-excitation. The wide QRS complexes are fully pre-excited, hence the morphology suggestive of ventricular tachycardia. Failure to make the correct diagnosis in this patient may lead to potentially dangerous therapy.

Her accessory pathway appears capable of rapid conduction. Administration of the usual atrioventricular node blocking drugs may “shift the balance” of conduction towards the accessory pathway, and precipitate extremely rapid ventricular rates or ventricular fibrillation.

Direct current cardioversion, which was performed here, is usually the safest and most effective treatment. Following cardioversion and restoration of sinus rhythm, the only clue to the diagnosis was the presence of a slightly short PR interval, and the hint of a delta wave in leads V_2 and V_3 (Figure 2). \square