

Deep T wave inversions in a young patient with chest pain

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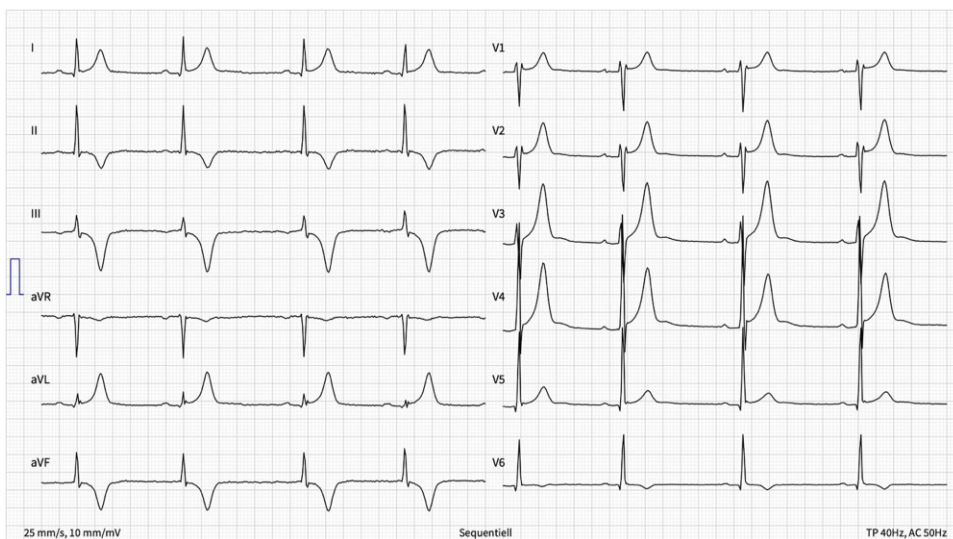
Clinical vignette

A 20-year-old athletic man presented to the emergency department (ED) with acute chest pain. According to the patient, a cardiac procedure was performed the day before admission. However, the patient does not speak English and is not able to provide further details. The high-sensitive cardiac troponin T value at presentation was 167 ng/mL. The initial electrocardiogram (ECG) at admission is shown in the Figure.

Question 1

Which of the following findings on the 12-lead ECG is abnormal for a young patient?

- A. Sinus bradycardia
- B. Minor right bundle branch block (RBBB)
- C. Negative T waves in the lateral and inferior leads
- D. The tall T waves and U waves in V3 and V4
- E. The Q waves in V5, V6, and aVL



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The correct answer is C.

The ECG shows sinus rhythm with a heart rate of 48 bpm and a QRS complex axis of 40 degrees. Besides the incomplete RBBB, no other P wave- or QRS-abnormalities are seen. Marked T wave inversion (TWI) in the inferior leads and asymmetrical T waves with mild non-significant ST elevation are present in precordial leads.

Young patients often show sinus bradycardia, tall T waves in the precordial leads, and small Q waves on the lateral leads, marking the depolarization of the septum. However, T wave negativity in the inferior and lateral leads is even in a young patient abnormal.¹

Question 2

Which of the following situations can cause a minor RBBB on the 12-lead ECG?

- High positioning of V1 and V2 on the anterior chest
- Arrhythmogenic right ventricular cardiomyopathy
- Brugada syndrome
- Hypothermia
- Atrioventricular nodal reentry tachycardia (AVNRT)

The correct answer is A.

The minor RBBB morphology is most often a normal variant. Moreover, a high positioning of the V1 and V2 can lead to an RBBB morphology in these leads. The rest of the answers cause a pseudo-RBBB morphology, the epsilon wave in the case of ARVC, the J wave in the case of Brugada Syndrome and hypothermia, and the retrograde P wave in the case of AVNRT being confounded with the second R wave.²

Question 3

What is the final diagnosis?

- Sinus bradycardia with signs of ischemia affecting the posteroinferior wall
- Sinus bradycardia with signs of pericarditis
- Sinus bradycardia with memory T waves
- Sinus bradycardia with non-specific ST-T Changes
- Sinus bradycardia and further diagnosis is impossible without a second ECG tracing

The correct answer is C.

Discussion

TWI is common in post-ablation patients who had abnormal ventricular activation for a long period of time.^{3,4} In our case, the patient underwent ablation of a postero-septal accessory pathway (AP) the day before the presentation (see [Supplementary material online, Figure S2](#)). Postero-septal APs are, more than any other kind of AP,⁴ known to create lasting 'memory T waves' after the ablation procedure.

Of note, the cardiac troponins are often elevated after invasive cardiac procedures of any kind, complicating the diagnosis of myocardial infarction in these patients. However, in this case, a negative asymmetric T wave, in a young patient with no risk factors, is not suggestive of ischemia.

In the subacute stage of pericarditis, diffuse T wave inversion is common. In this case, however, the T wave inversion is localized.⁵

Supplementary material

[Supplementary material](#) is available at *European Heart Journal – Case Reports* online.

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