

Pacing on the T Wave: What Is the Cause?

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We present the case of a 50-year-old man who had a dual-chamber pacemaker that was implanted because of symptomatic bradycardia. The pacemaker was programmed in a DDD mode, with a lower rate of 70 beats/min; upper rate, 120 beats/min; paced atrioventricular (AV) delay, 180 ms; sensed AV delay, 150 ms; and V-blanking period, 200 ms.

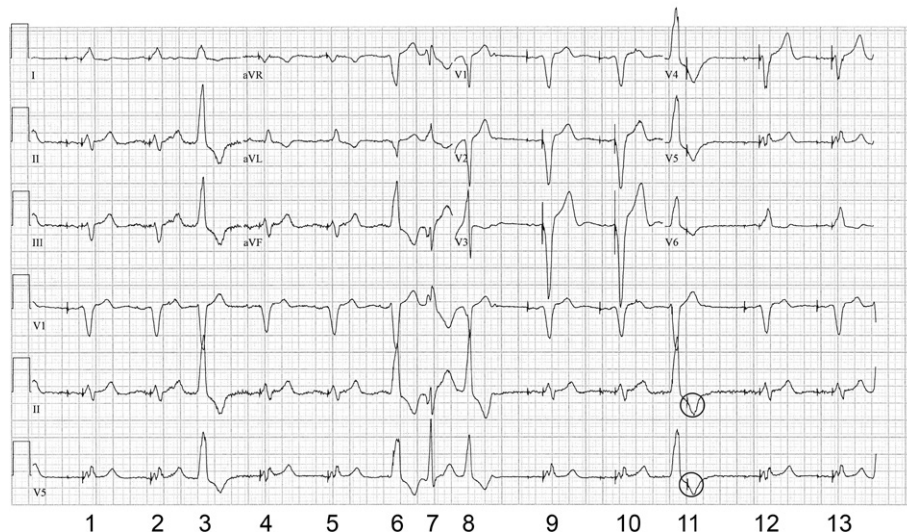


Fig. 1

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How would you explain the pacing stimulus observed on the T wave in the 11th complex (Fig. 1)?

- A) Ventricular undersensing with inappropriate ventricular pacing
- B) Ventricular tracking of a retrograde P wave from the premature ventricular contraction
- C) Ventricular event during the atrial blanking period with subsequent V-pacing
- D) T-wave oversensing
- E) Artifact on the electrocardiogram (ECG)—not a real pacing stimulus

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.

FOCUS ON ECGs: ANSWER #1

Answer

C) Ventricular event during the atrial blanking period with subsequent V-pacing

In Figure 1 (previous page), the ECG shows intermittent AV sequential electronic pacing (complexes 4–5 are sinus followed by electronic ventricular pacing), with premature ventricular contractions (PVCs) in the 3rd, 6th, 7th, and 8th complexes. In Figure 2, the short arrows designate the atrial-ventricular interval (A-V), which is a period that may elapse after an atrial activity before the ventricle must be paced. The long, horizontal arrows show the interval between atrial pacing.



Fig. 2

The index PVC, the 11th beat, is a pseudo-pseudofusion beat.

If an atrial pacing output occurs in the presence of an already depolarized myocardium by an intrinsic premature beat (in this case, the PVC), the pacer output cannot contribute to the myocardial depolarization, and, therefore, the QRS is formed entirely by the intrinsic PVC beat. Furthermore, notice that the index PVC falls in the post-ventricular atrial blanking period (P-VAB); therefore, the pacemaker was not inhibited.

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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.

ERRATUM

Pacing on the T Wave: PAVB, Not PVAB

To the Editor:

In the "Focus on ECGs" section of the February 2016 issue, Gahremanpour and colleagues described an interesting case of pacing on the T wave.¹ We completely agree that it was not a sensing issue with the pacemaker and that answer "C" was appropriate. However, in the answer section, the authors described the premature ventricular contraction (PVC) as falling in the post-ventricular atrial blanking period (PVAB). The PVAB is the interval after a sensed or paced ventricular event, during which any atrial activity is not seen by the pacemaker.^{2,3} In the authors' presented case, there was an atrial pacing stimulus right at the time of the PVC. Therefore, the PVC fell in the post-atrial ventricular blanking period (PAVB) and not in the PVAB.³

The PAVB is the interval after an atrial pacing stimulus during which the ventricular event is not seen by the ventricular channel of the pacemaker.⁴ In this case, the pacemaker was not inhibited, and there was subsequent ventricular pacing on the T wave. In that the myocardium was in the refractory period because of the PVC, the V-pacing on the T wave led to physiologic failure to capture, and there was no QRS complex following that V-pacing stimulus.

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