

QUIZ

The EKG Quiz: “Sensing Issues!”**Khalid Abozguia, Fathi Idris Ali**Lancashire Cardiac Centre, Blackpool Victoria Hospital, Blackpool, England
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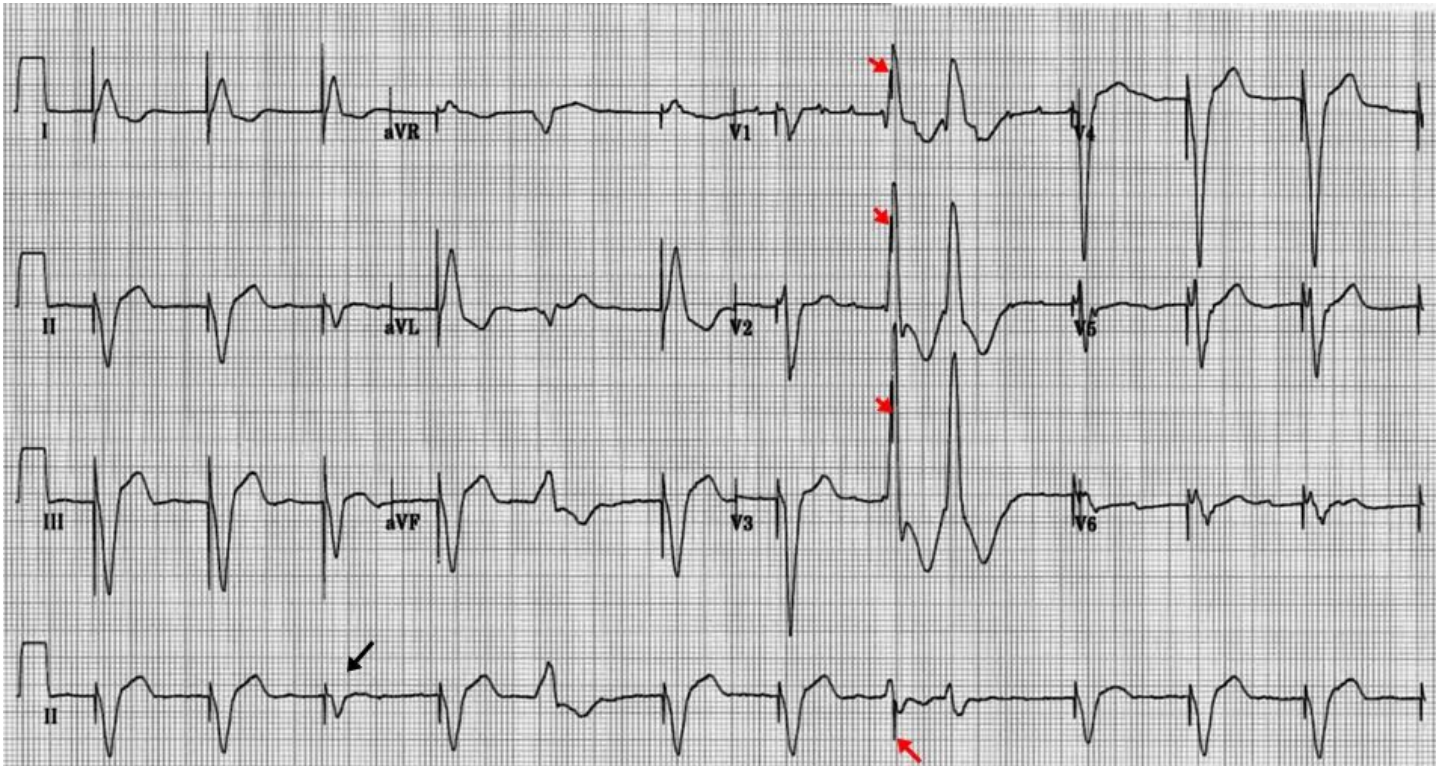
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History

This EKG (Figure 1) was done on a 74-year-old man with a pacemaker (PM). The telemetry technician brought it to you and she asked you two questions. Please look at the EKG and answer the two questions given below.

**Figure 1.** The abnormal EKG.**Questions:**

1. Was there an intermittent sensing issue with pacemaker where the PM spikes fell on QRS complexes (red arrow)?

2. Why did the third paced beat (black arrow) look different than the rest of the paced beats?

Please consider these two questions before proceeding further.

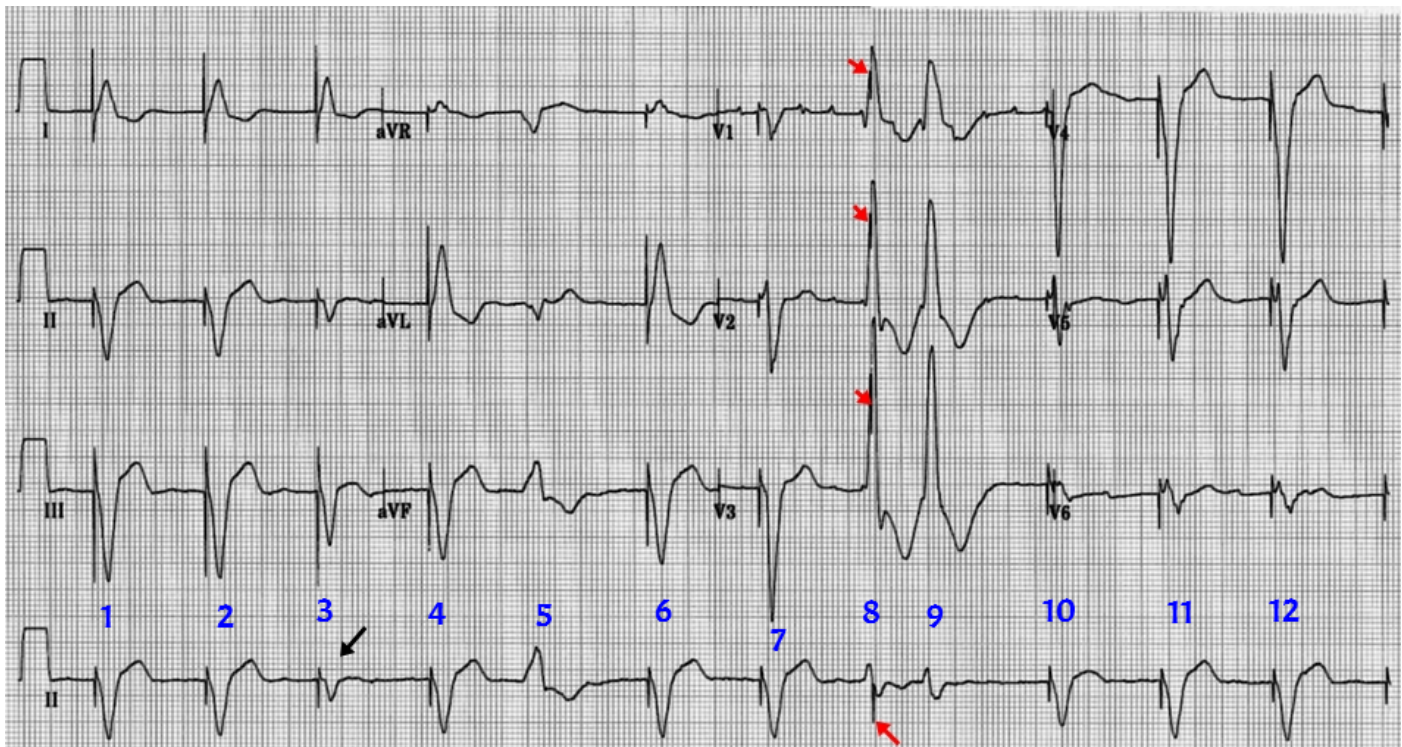


Figure 2. The EKG illustrated.

Discussion:

The native rhythm is probably atrial fibrillation/flutter with atrial activities best seen in lead V1 (Figure 2).

All beats are paced with the exception of three beats (#5, #8 and #9). Without more tracings it is hard to know the exact nature of these three beats. Both beats #8 and #9 have RBBB morphology (see lead V1); so they are either supraventricular beats with RBBB/aberration, or left-sided PVCs. In either case, in these two beats the LV is activated before the RV.

Beat # 8 is the one in question with the possible sensing malfunction of the PM. The timing of that beats is very close to the expected pacing spike. The apparent failure to sense is likely due to the fact that the PM lead, which is located in the RV, did not sense this beat which just originated in the LV (see the above paragraph) and did not reach the RV yet by the time the PM fired its spike. The PM did not fully capture the RV as it fired almost simultaneously with that beat and hence the ventricle was refractory. On the other hand, beat # 9 occurred relatively earlier and much before the next spike is expected; hence was fully sensed by the PM and therefore the timing of the next spike (beat #10) was delivered based on that beat (note that the time from beat # 9 to the PM spike for beat # 10 is the same as that for PM spikes between any other two sequentially paced beats). So, the failure of the PM to sense beat # 8 was expected and physiologically explicable and does not necessarily reflect any sensing issue with the PM.

The next question is now easier to answer. Knowing that there are two sources for activating the ventricle, one of them is the PM (which activates the RV first) and the other is either a native supraventricular rhythm with RBBB or left sided PVC, we then can expect to see some intermittent fusions between these two sources.

Beat #3 (and beat #10 to some extent) is a fusion beats; therefore, it looks narrower.

The patient's pacemaker was checked, and it was found to have a normal function.