Focus on ECGs: Case #3

Heart Block in a Pacemaker: Does This Mean Trouble?

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We present a finding in a 61-year-old woman whose St. Jude Medical dual-chamber permanent pacemaker had been implanted to treat symptomatic bradycardia. The pacemaker, programmed in DDD mode, had a lower rate limit of 60 beats/min and an upper limit of 120 beats/min, a paced atrioventricular (AV) delay period of 250 ms, and a sensed AV delay period of 225 ms.

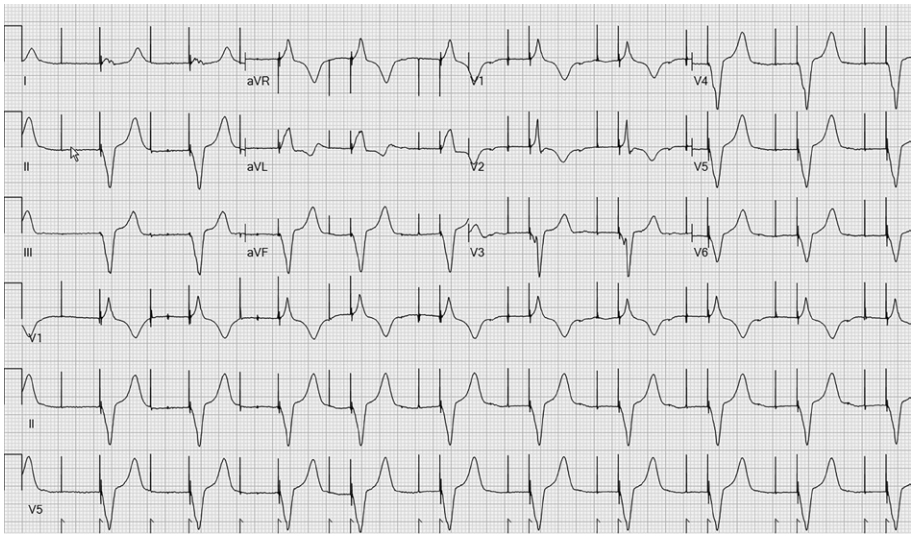

Fig. 1

What happened during the first 3 complexes (Fig. 1)?

A) Ventricular oversensing with inappropriate inhibition of ventricular pacing.
B) Pacemaker-mediated AV delay attempting to allow intrinsic ventricular activity.
C) Failure of ventricular capture with a ventricular escape rhythm.
D) Pseudofusion of an attempted ventricular pacing event with a coincidental delayed ventricular complex.

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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Focus on ECGs: Answer #3

Answer

***B)* Pacemaker-mediated AV delay attempting to allow intrinsic ventricular activity.**

Some St. Jude Medical devices have an optional programming mode called Ventricular Intrinsic Preference (VIP™) Technology. This incidental finding on the electrocardiogram is a normal result of a functioning program.

The MOde Selection Trial (MOST) investigators identified an increased rate of heart-failure–related hospitalizations in patients with a right ventricular (RV) pacing burden >40%.[1,2] Olshansky and colleagues later investigated the effect of DDDR mode with a programmed AV delay algorithm to reduce back-up pacing.[3] The AV delay algorithm decreased the RV-pacing percentage and thereby negated the increased risk of heart-failure hospitalizations.

The VIP mode operates by means of a programmed algorithm that enables a device to extend its AV delay period and monitor for intrinsic ventricular activity during a search interval. If the device senses such activity, it activates the VIP mode and temporarily extends the AV delay period for the next cycle. By extending the AV delay, intrinsic conduction is more likely and the RV pacing burden is reduced. However, if the device is required to pace despite its extended AV period, the VIP mode deactivates and the AV delay period returns to normal.

Figure 2 shows the device in VIP mode with an AV delay that has been temporarily extended by 190 ms, to 415 ms. However, it must pace at this extended AV interval for 3 consecutive beats. This signals the deactivation of VIP mode, and the device returns to its previously programmed AV delay interval of 225 ms.

Fig. 2

This type of programming is beneficial for patients who have intermittent AV block and those who have a slightly prolonged first-degree block. It should be avoided in patients who have complete heart block, a markedly prolonged first-degree block, or indications for cardiac resynchronization therapy.

References

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3. Olshansky B, Day JD, Moore S, Gering L, Rosenbaum M, McGuire M, et al. Is dual-chamber programming inferior to single-chamber programming in an implantable cardioverter-defibrillator? Results of the INTRINSIC RV (Inhibition of Unnecessary RV Pacing with AVSH in ICDs) study. Circulation 2007;115(1):9-16.

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.