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Focus on ECGs: Case #30

What Is the Mechanism of This Cardiac Rhythm?

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An 80-year-old man with syncope was admitted for evaluation. His clinical examination revealed nothing remarkable. He had no history of heart disease, his blood pressure and electrolyte levels were normal, and he was taking no medications known to cause bradyarrhythmia. Overnight telemetry revealed the electrocardiogram displayed below (Fig. 1).

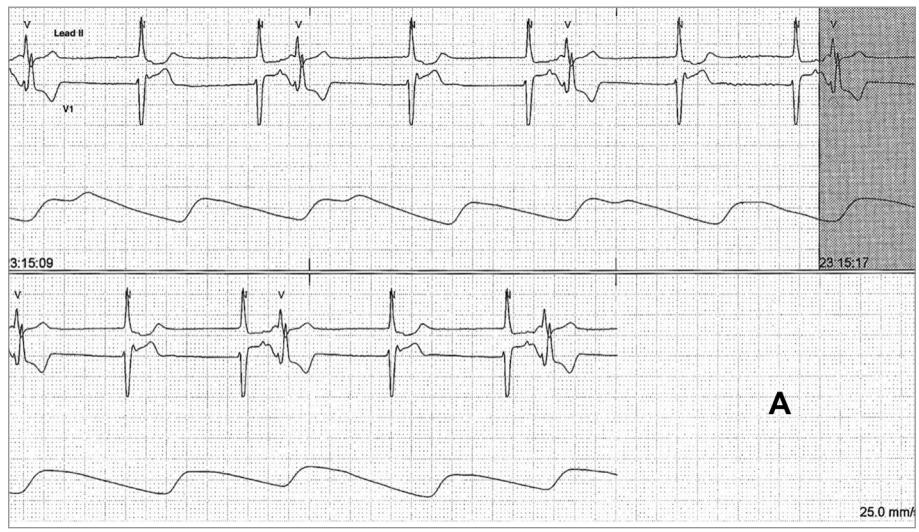

Fig. 1

The rhythm strip suggests which diagnosis?

A) Isorhythmic atrioventricular dissociation

B) Mobitz type I atrioventricular block

C) Premature ventricular contractions in trigeminy

D) Junctional escape and intermittently captured beats

E) Premature atrial complexes in trigeminy

See next page for the answer.

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FOCUS on ECGs: Answer #30

D) Junctional escape and intermittent capture beats

The telemetry strip displayed junctional rhythm, sinus capture after every second junctional rhythm, and right bundle branch block (RBBB) of the sinus-captured beat (Fig. 2). This rare phenomenon, wherein a sinus-captured beat occurs after 2 junctional escape beats, is termed escape-reentry-capture trigeminy.[1]

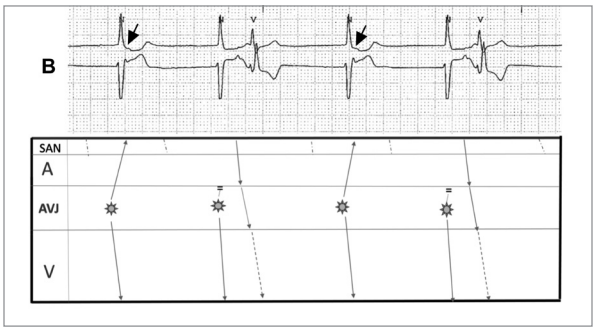

Fig. 2

In isorhythmic atrioventricular (AV) dissociation (Answer A), the atria and ventricles beat at the same rate but are dissociated from each other; here, however, the junctional beat with retrograde conduction to the atria rules out dissociation between competing rhythms. The lack of clear P waves preceding the QRS complexes and the absence of progressive PR prolongation makes Mobitz type I AV block (Answer B) unlikely. Premature ventricular contractions in trigeminy (Answer C) are unlikely because the wide complexes with RBBB morphology are preceded by a P wave, and the QRS pattern simulates a "typical" RBBB. The 2 junctional beats followed by P-wave capture makes premature atrial complexes in trigeminy (Answer E) unlikely.

Escape-reentry-capture occurs in the presence of sinus nodal dysfunction (sick sinus syndrome) when the sinus impulse rate is slower than the junctional escape rate. The inverted P wave in Figure 2 (arrows) suggests that the first junctional beat was conducted retrograde to the atria, that the next junctional beat was not, and that the subsequent sinus beat was conducted with an RBBB. This aberrancy may be explained by the "long-short" sequence that prolongs the effective refractory period of the right bundle. Consequently, the sinus rate was apparently slow enough to be captured in a trigeminal pattern. Note also that the junctional rhythm did not affect the sinus rate. The patient was given a permanent pacemaker. This case illustrates the escape-reentry-capture phenomenon in a trigeminal pattern caused by sinus nodal dysfunction.

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References

1. Chen WC, Zang ZR, Xu HL. "Escape-reentry-capture" trigeminy: a rare electrocardiographic sequence. Chest 1985;88(5):768-70.