ECG Challenge: A 73-year-old man with a history of paroxysmal atrial fibrillation being treated with a β-blocker and digoxin presents to the emergency room after 2 days of nausea, vomiting, and abdominal pain. He is placed on telemetry because of a slightly irregular heart rate. It is thought that he has a viral gastroenteritis. Noted on telemetry are several pauses in the rhythm; hence, a 12-lead ECG is obtained.

The rhythm is regular at a rate of 60 bpm, but 2 long RR intervals (of an equivalent duration) are noted with a ventricular rate of 40 bpm (↔). The QRS complex duration is normal (0.08 second), and the QRS complex has a normal morphology. The axis is leftward between −30° and −90° (positive QRS complex in lead I and negative QRS complex in leads II and aVF with an rS morphology). There are two etiologies for an extreme left axis. The first is a chronic inferior wall myocardial infarction in which there is an initial deep Q wave in leads II and aVF; hence the QRS complex has a Qr morphology in these leads. The second is a left anterior fascicular block in which the initial forces are normal; the QRS complex has an rS morphology in leads II and aVF. This is a left anterior fascicular block. The QT/QTc intervals are normal (440/440 milliseconds). There is a P wave before all of the QRS complexes (+) except for the sixth complex (^). The P wave is positive in leads I, II, aVF, and V₄ through V₆. Hence, there is a normal sinus rhythm. The PR interval is...
constant (0.48 second) except for the PR interval associated with the seventh QRS complex (↑), which is shorter (0.32 second). Noted after the fifth QRS complex (↓) is an on-time but nonconducted P wave (*). This is followed by a QRS complex after a long pause. The QRS complex has the same morphology as all of the other QRS complexes, but it is not preceded by a P wave; there is a positive waveform at the end of the QRS complex (▼) that is the on-time P wave based on the sinus PP interval (⏘). Hence, there is complete atrioventricular block with an escape junctional complex. There is a P wave (▲) before the seventh QRS complex (↑) with a PR interval that is shorter (0.32 second) than the baseline PR interval (0.48 second). The QRS complex is the same as all of the others. This suggests that this P wave is nonconducted and that the QRS complex is also a junctional escape complex. It has the same RR interval (↔) as the other junctional complex. The presence of escape junctional complexes means that the complete atrioventricular block is the result of an atrioventricular nodal conduction abnormality, which may be attributable to the combined use of a β-blocker and digoxin, both of which impair atrioventricular nodal conduction. Noted is that the junctional QRS complexes have a slightly different amplitude than the sinus QRS complexes. This is often seen with junctional complexes. An explanation for this is that the junctional complex, originating from a focus in the AV junction, enters the bundle of His at a different location compared to a sinus complexes in which the impulse travels through the AV node to enter the bundle of His. As the bundle of His is a series of tracks, the junctional complex is conducted to the ventricle through a slightly different His-Purkinje track. Thus it will have a slightly different amplitude and may also have a slightly different axis compared to a sinus complex.
ECG Response: October 15, 2013

Circulation. 2013;128:1795-1796
doi: 10.1161/CIRCULATIONAHA.113.006223

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/128/16/1795