

# A “Phenomenal” ECG

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## Vignette

A 28-year-old male athlete is found to have an irregular pulse on routine physical examination. His cardiovascular examination is otherwise normal. An electrocardiogram (ECG) is obtained (Figure 1).

## Questions

1. What abnormalities of cardiac rhythm are shown?
2. What is the explanation for the QRS configuration of the complex that is fourth from last?



Figure 1. ECG.


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## Answers

1. The basic rhythm is sinus in origin. There is a gradual deceleration in heart rate for the first few beats of the recording, consistent with sinus arrhythmia. This is an expected finding in a young, athletic person. Midway through the recording, two extrasystoles are seen. Both are preceded by P waves which have a different morphology from the normal sinus P waves (best appreciated in the lead II rhythm strip at the bottom). They are atrial premature complexes and, while the first one is conducted with a QRS configuration nearly identical to the

sinus beats, the second one shows a right bundle branch block (RBBB) pattern. It is not a ventricular extrasystole because it has clearly been preceded by a premature, ectopic P wave.

2. This is an example of the Ashman phenomenon, originally described nearly 60 years ago in patients with atrial fibrillation (AF). Because the refractory periods of the bundle branches are directly proportional to the preceding RR interval, a relatively early beat following a longer RR interval may encroach upon the refractory period of one of the bundle branches and fail to conduct through it (aberrant ventricular conduction). RBBB aberration is the usual form because the refractory period of the right bundle branch is longer than that of the left bundle branch. In this example, the first atrial extrasystole conducts normally, but the post-extrasystolic pause and associated increase in RR interval prolong right bundle branch refractoriness. The second atrial extrasystole, whose timing in relationship to the preceding QRS complex is identical, finds the right bundle branch refractory and, thus, conducts with RBBB aberration. The Ashman phenomenon does not have clinical significance, but when it occurs in AF, a run of aberrantly conducted beats may simulate ventricular tachycardia. Therefore, it is important to distinguish between these two entities. [Dx](#)



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