

Unfamiliar Footprints

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This ECG was recorded in a 64-year-old man as part of a routine preoperative evaluation prior to prostate surgery. The patient has no past cardiac history and is not taking any medication.

What is your analysis of his cardiac rhythm and conduction?



ECG upon presentation.

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This Month's ECG Diagnosis

The cardiac rhythm is irregular, but there appears to be a consistent pattern of group beating, with groups of three QRS complexes being followed by a pause. This pattern of group beating has been described as the “footprints of Wenckebach.”

The usual manifestation consists of small groups of beats (usually pairs or triplets) demonstrating progressive shortening of the cycle length, followed by a long cycle whose duration is less than twice the shortest cycle. These familiar footprints are the result of impaired conduction of atrial impulses to the ventricles, most commonly at the level of the atrioventricular (AV) node.

There are two unusual features in this patient. The first is that the P wave morphology is inconsistent with a sinus node origin, which would normally show upright P waves in leads I and II, and usually in a V_F as well. In

this case, the inverted P waves in the inferior leads indicate that the atria are being depolarized in an inferior to superior direction. This, coupled with the inverted P waves in V_5 and V_6 , suggests an ectopic atrial rhythm, most likely arising in the left atrium.

The other unusual feature is that the final R-R interval of the second group of QRS complexes is longer, not shorter, than the preceding one. This has been described as atypical Wenckebach periodicity and may reflect dynamic changes in autonomic tone affecting AV node refractoriness. An alternative explanation could be that the final beat is unrelated to the preceding P wave and represents a relatively early junctional escape beat following a 3:2 Wenckebach sequence. In the absence of a similar phenomenon during the other long cycles, this explanation is less likely. 