**ECG Puzzler**

A regular feature of the *American Journal of Critical Care*, the **ECG Puzzler** addresses electrocardiogram (ECG) interpretation for clinical practice. To send an eLetter or to contribute to an online discussion about this article, visit [www.ajcconline.org](http://www.ajcconline.org) and click “Respond to This Article” on either the full-text or PDF view of the article. We welcome letters regarding this feature.

---

**Evolving Myocardial Infarction**

By Michele M. Pelter, RN, PhD, and Mary G. Carey, RN, PhD

**Scenario:** This electrocardiogram (ECG) was obtained from a 66-year-old male patient being admitted to the coronary care unit (CCU) as a “direct admit.” The patient had gone to an urgent care center 1 hour earlier with complaints of weakness and shortness of breath. Based on the symptoms and ECG (similar to the one below), he was sent via ambulance to the CCU. Past medical history includes hypertension and hypercholesterolemia. The patient stated he has not been feeling well for about 3 weeks, and was especially “sick” this day. He decided to go to work but a coworker urged him to get medical help, and at the end of his shift he went to the urgent care center.

For every ECG, we recommend that readers systematically examine the following 9 features (check all that apply):

1. **Rate**
   - Normal (60–90 beats per minute)
   - Bradycardia (<60 beats per minute)
   - Tachycardia (>90 beats per minute)

2. **Rhythm**
   - Regular
   - Irregular
   - Irregular-regular

3. **P waves**
   - One P wave for every QRS complex
   - Fewer P waves than QRS complexes
   - More P waves than QRS complexes
   - Cannot determine

4. **PR interval**
   - Normal (≤0.20 seconds)
   - Short (<0.11 seconds)
   - Lengthened (>0.20 seconds)
   - Cannot determine

5. **QRS complex duration**
   - Normal (≤0.12 seconds)
   - Wide (>0.12 seconds)

6. **QRS complex direction lead V1**
   - Negative and ≤0.12 seconds (normal)
   - Negative and >0.12 seconds
   - Positive and >0.12 seconds
   - Cannot determine

7. **ST segments**
   - Normal
   - Elevated (≥2 mm)
   - Depression (≥2 mm)
   - Elevation/depression 2 contiguous (side by side) leads (≥1 mm)

8. **T wave**
   - Normal
   - Inverted

9. **QTc**
   - Normal
   - Lengthened (>0.47 seconds)

---

Michele M. Pelter is an assistant professor at the Orvis School of Nursing, University of Nevada, Reno. Mary G. Carey is an associate professor at the School of Nursing, State University of New York at Buffalo.

©2010 American Association of Critical-Care Nurses, doi: 10.4037/ajcc2010234
Interpretation
Acute inferior myocardial infarction (MI) with posterior wall involvement, nonspecific intraventricular conduction delay that may be related to ischemia or incomplete right bundle branch block, and accelerated junctional rhythm.

Rationale
Acute MI in the inferior part of the heart is identified by ST segment elevation in the inferior leads II, III, and aVF. The ST segment elevation in lead II is less than 1 millimeter, but its shape is abnormal and suggests acute ischemia. Importantly, because this patient delayed seeking treatment, it is likely these changes represent evolutionary ST segment changes of an MI and indicate necrosis has occurred. This is further supported by the Q waves seen in these 3 leads. Q waves greater than 30 milliseconds in leads II and aVF indicated “old” MI in the posterior wall. Criteria for this diagnosis is an R > 40 milliseconds in V1 and > 50 milliseconds in V2. Accelerated junctional rhythm is present and P waves can be appreciated in the T waves in leads V2 to V4.

Nursing Actions
This patient’s condition and ECG indicate an acute MI. He likely exceeded the time frame for reperfusion with primary percutaneous coronary intervention or thrombolytics because the time from symptom onset to presentation should be less than 90 minutes. Immediate interventions include bedside ECG monitoring, intravenous access, oxygen, nitrates, analgesia for chest pain, aspirin, serum biomarker, and a beta blocker. Be prepared for lethal cardiac arrhythmias given the ischemic conditions and the lack of sinus rhythm.