EKG PUZZLER

A regular feature of the American Journal of Critical Care, the EKG Puzzler addresses EKG interpretation for clinical practice. We welcome letters to the Editors regarding this feature.

Increased Automaticity of the AV Node

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Scenario: This lead II ECG rhythm strip was obtained in a 52-year-old male patient being treated in the neurological intensive care unit for subarachnoid hemorrhage. The patient was unconscious and therefore could not be asked whether he was experiencing symptoms. His vital signs were stable: His blood pressure was 125/70, heart rate was 80 beats per minute (bpm), and he was receiving mechanical ventilation at 20 breaths/minute.

For every ECG, we recommend you 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

3. P waves
   - One P wave for every QRS complex
   - Fewer P waves than QRS complexes
   - More P waves than QRS complexes

4. PR interval
   - Normal (≤0.20 seconds)
   - Short (<0.08 seconds)
   - Lengthened (>0.20 seconds)

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 (left bundle branch block)
   - Not applicable

7. ST segments
   - Normal
   - Elevated (≥2 mm)
   - Depressed (≥2 mm)

8. T Wave
   - Normal
   - Inverted

9. QTc
   - Normal
   - Lengthened (>0.47 seconds)
**Interpretation:** Accelerated junctional rhythm for the first 4 beats, with transition to sinus rhythm at 70 bpm.

**Rationale**
There are 2 important characteristics that help diagnose the rhythm presented in this example. In the first 4 beats of the rhythm strip, (1) there are retrograde P waves and (2) the PR interval is shortened (.10 sec). The presence of a retrograde P wave in lead II indicates that the pacemaker impulse was generated below the SA node, in this case the AV node, and then conducted retrogradely (backward) throughout the atria. The position of the P wave in relation to the QRS complex indicates which chamber was depolarized first. In this example, the P wave appears before the QRS complex, resulting in a short PR interval and indicates that the atria were depolarized before the ventricles. If the P wave occurs immediately after the QRS complex, then the atria were depolarized after the ventricles; if the P wave was buried in the QRS complex, then the atria and ventricles were depolarized simultaneously. The QRS complex will be narrow as long as the intraventricular conduction is undisturbed. Accelerated junctional rhythms are abnormal and indicate increased automaticity of the AV node. The etiology of this rhythm includes digitalis toxicity, inferior wall myocardial infarction, following cardiac surgery as well as idiopathic causes.

**Nursing Actions**
Determine the underlying cause and correct if possible. Given the patient’s subarachnoid hemorrhage, the cause of the AV node’s increased automaticity is most likely idiopathic. Because the patient’s vital signs are stable, no immediate action is necessary; therefore, continue to monitor the patient for any acute changes.

**ANSWERS**

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