Low Amplitude QRS

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Scenario: This 12-lead ECG reading was obtained from a 76-year-old African American woman who presented to the emergency department with shortness of breath, fatigue, and a cough for the past month. Prior medical history includes chronic obstructive pulmonary disease, hypertension, and cigarette smoking for more than 40 years.
Interpretation: Cannot evaluate limb leads because of misplacement of the right leg lead on upper extremity. Multifocal atrial rhythm with premature atrial complexes and with aberrant ventricular conduction.

Rationale

One striking feature of this 12-lead ECG reading is the extremely low QRS amplitude in lead II. This pattern indicates reversal of the right leg and right arm electrodes, producing a “far-field” signal. This pattern is observed because the ECG machine is recording the electrical potential between the right leg and left leg, rather than recording the potential between the right arm and left leg. Because of electrode misplacement, the limb leads cannot be used in the interpretation. However, the precordial leads still may be helpful for some diagnoses. For example, the heart rhythm can be evaluated using the 10-second-rhythm strip in V1. The diagnosis of multifocal atrial rhythm is made based on the presence of multiple P-wave morphologies and a variable P-R interval. Frequent premature atrial complexes (PACs) are common with this rhythm; PACs produce an abnormal QRS complex because the premature impulse arrived at the bundle branch when it was still refractory. It is not uncommon for this rhythm to progress into atrial flutter or atrial fibrillation. Severe pulmonary disease is the most common cause of this rhythm.

Nursing Actions

Obtain an ECG with correct electrode placement. This rhythm is not typically associated with untoward consequences; therefore, there is no specific treatment.

**ANSWERS**

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)
   - Positive and >0.12 seconds (right bundle branch block)

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

8. T Wave
   - Normal
   - Inverted

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