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Third-degree atrioventricular block

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Previous discussions have focused on first-degree heart block, which is an abnormal slowing of the impulse through the cardiac conduction system, and second-degree heart block, which includes varying degrees of partial blocks. In contrast, third-degree heart block involves a complete blockade of electrical transmission from the atria to the ventricles. The result is atrioventricular (AV) dissociation. This disorder is also commonly known as complete heart block or AV dissociation.

The location of third-degree atrioventricular block is the AV node itself or lower. In patients with third-degree heart block, the atria are beating at 60 to 100 beats per minute with normal impulses (unless there is also sinus node dysfunction or another disorder present). The problem arises when the ventricles do not receive this impulse from the atria because of the block. Sensing this lack of impulse, the ventricles begin to generate their own intrinsic rhythm in order to pump blood to the body. However, the intrinsic ventricular rhythm is only 30 to 45 beats per minute, which cannot sustain life for very long. Atria contracting at 60 to 100 beats per minute and ventricles contracting at 30 to 45 beats per minute are essentially beating independently of each other, and the result is incoordination of heart activity. On the ECG, P waves and QRS waves are unrelated.

Symptoms Third-degree heart block may manifest with no symptoms (rare), fatigue, dizziness, exercise intolerance, generalized weakness, syncope, or sudden death. Symptoms depend on the location of the actual block (generally, the higher it is located, the less severe the symptoms) and the rate of the intrinsic ventricular rhythm.

Etiology Causes of third-degree heart block include congenital defects, antiarrhythmic medications, MI, cardiomyopathy, or severe electrolyte abnormalities.

Treatment When treating a patient with third-degree heart block, begin by managing the underlying etiology (eg, remove the offending medication, correct electrolyte abnormalities). Symptomatic patients may be treated temporarily with anticholinergic agents, such as atropine or dopamine, and external pacing. Definitive treatment of persistent third-degree heart block is the placement of a permanent pacemaker.

ECG challenge

An 87-year-old man complained of weakness and occasional “drop attacks” during the preceding two months. He had a history of diabetes and hypertension but denied any cardiac history. Workup included an ECG (**Figure 1**).



FIGURE 1. The ECG of an elderly man who has been experiencing weakness and “drop attacks.”

Stepwise assessment

1. Is the ECG **regular**? The QRS complexes march out, but they are independent of the P waves.
2. What is the **heart rate**? The ventricular rate on this ECG is about 40 beats per minute (four QRS complexes in 30 large boxes or 6 seconds). The atrial rate is about 100 beats per minute (10 P waves in 30 large boxes or 6 seconds). Note: The pink arrows highlight some of the P waves, while the purple arrows highlight some of the QRS complexes.
3. There is **not a P wave** for every QRS complex, although all the P waves look the same.
4. The **PR interval** cannot be determined because of the atrioventricular dissociation that is present.
5. The **QRS complex** spans less than two small boxes, which is normal.
6. The **ST segments** are normal.
7. The **T waves** appear normal, although some P waves fall on the T waves, giving them an abnormal appearance.
8. There are **no U waves**.

The dissociation of P waves from QRS complexes indicated the patient had a third-degree heart block. He underwent placement of a pacemaker without incident, and his symptoms resolved. [JAAPA](#)

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