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First-degree atrioventricular blocks

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An atrioventricular (AV) block is a common cardiac abnormality. It involves a slowing or blockage of the electrical impulse coming from the sinoatrial (SA) node at or around the AV node (**Figure 1**). AV blocks are characterized by the slowing or partial or complete blocking of the impulse. This discussion will focus on first-degree atrioventricular block, which is the slowing or partial blocking of the impulse; complete blockade will be discussed in a future segment of this department.

Despite the name, no impulse is actually blocked in first-degree AV block. Instead, each impulse is simply slowed at or near the atrioventricular node. On an ECG, AV block is manifested by a prolonged PR interval, which is measured from the beginning of the P wave to the beginning of the QRS complex. The ECG criterion for a first-degree atrioventricular block is a PR interval greater than 200 milliseconds.

Symptoms First-degree AV block by itself does not result in symptoms. This is because all the impulses get through eventually, and the delay has no ill effect on cardiac function.

Etiology While first-degree atrioventricular block may occur in otherwise normal hearts, some patients will have underlying causes. These include AV node disease, MI, medications (most commonly beta blockers), or electrolyte abnormalities.

ECG challenge

A 57-year-old man who had no symptoms presented for a preoperative evaluation. Three years prior to this visit, the patient had had an MI; he was taking aspirin 325 mg per day and metoprolol 25 mg twice daily. See **Figure 2**.

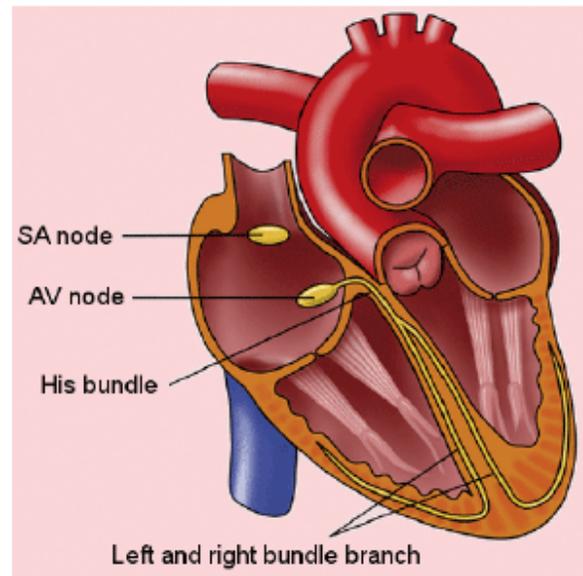


FIGURE 1. Conduction system of the heart

Source: ECGpedia.org

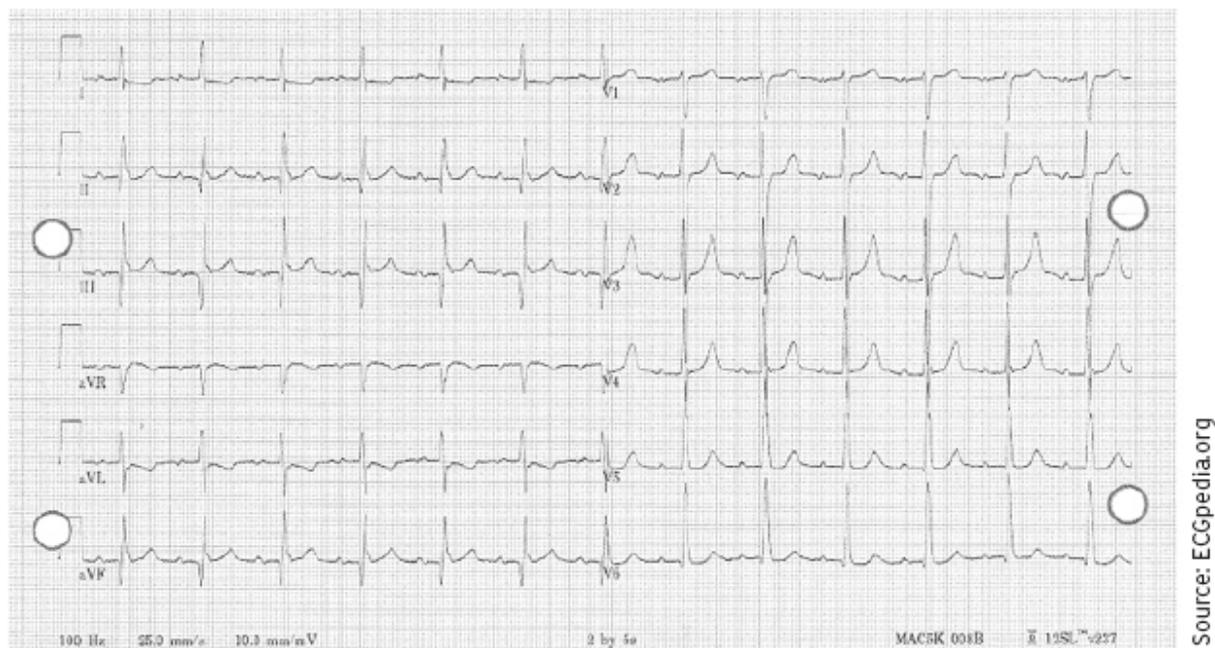


FIGURE 2. Preoperative ECG of an asymptomatic patient

Stepwise approach to ECG interpretation:

1. Is the rhythm of the heartbeat **regular**? Yes. The QRS complexes march out.

2. Estimate the **heart rate**. Find a QRS complex on or near a dark line.

Method A: There are just under 4 large boxes before the next QRS complex. Four boxes would put the heart rate at 75 beats per minute. Because the next QRS complex comes between the lines assigned a rate of 100 beats per minute and 70 beats per minute, the rate could be estimated at 80 beats per minute.

Method B: Approximately eight QRS complexes occur in 6 seconds (30 large boxes), which estimates the rate at 80 beats per minute (8 x 10).

Method C: Dividing 300 by the number of large boxes (four) gives us an estimated heart rate of 75 beats per minute ($300 \div 4 = 75$).

3. There is a **P wave** for every QRS complex, and all P waves look the same.

4. The **PR interval** is about 5.5 small boxes, which is 220 milliseconds. This exceeds the criterion for a first-degree atrioventricular block.

5. The **QRS complex** spans less than two small boxes, which is normal. There are Q waves in leads II, III, and aVF that have a deflection of greater than 0.1 mm. These are pathologic for MI, age undetermined, and would be consistent with the patient's known history.

6. The **ST segments** are normal.

7. Peaked **T waves** in leads V₃ and V₄ are a nonspecific finding. However, they could suggest an electrolyte abnormality, such as hyperkalemia, and should be investigated further.

8. There are **no U waves**.

Diagnosis The patient's prolonged PR interval indicates a first-degree AV block, most likely the result of his past MI. However, the beta blocker he takes or an electrolyte abnormality could also be the culprit and would need to

be investigated.

Treatment There is no specific treatment for first-degree atrioventricular block. Underlying causes should be addressed, but if none is found, the block requires no further consideration. [JAAPA](#)

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