

AV block

AV block: say the degree (first, second, third). Say the level (nodal or below).
Decide if a pacemaker is needed.

THE ONE-LINE TRUTH

The electrical signal from the top chambers gets delayed or blocked before it reaches the bottom chambers.

The chain — how it unfolds

1. The AV node delays or blocks the electrical signal from the atria. — why: Damage, drugs, inflammation, or starved blood flow (ischemia) (not enough blood flow) slows or stops conduction through the AV node or the bundle branches below it, so fewer or no signals reach the ventricles.
2. First-degree AV block: every signal gets through, but slowly (PR interval longer than 0.20 seconds on the ECG). — why: The AV node is sluggish but still working, so every atrial beat eventually triggers a ventricular beat. You feel nothing because your heart rate and rhythm are normal—this is often found by accident on a routine ECG.
3. Second-degree AV block, Mobitz type I (Wenckebach): the PR interval gets longer with each beat until one signal is completely blocked and a QRS is dropped, then the cycle resets. — why: The AV node gets more and more tired with each beat (like a failing relay) until it cannot pass the next signal, so one ventricular beat is skipped. Because only occasional beats are dropped and the average heart rate stays near normal, most people have no symptoms or feel only mild lightheadedness or palpitations.
4. Second-degree AV block, Mobitz type II: the PR interval stays constant but suddenly a QRS is dropped without warning. — why: The block is below the AV node—in the bundle of His or bundle branches—so when conduction fails, it fails completely and unpredictably. Because this can progress to complete block at any moment, people often feel dizzy, weak, or faint, and this type always requires close monitoring or a pacemaker.

5. Third-degree (complete) AV block: no signals get through; the atria and ventricles beat independently (AV dissociation). — why: The AV node or infranodal conduction system is completely blocked, so the atria fire at their own rate (driven by the SA node, usually 60 to 100 per minute) and the ventricles fire at their own escape rate (40 to 60 if the escape focus is junctional, 20 to 40 if ventricular). The slow ventricular rate drops cardiac output, so you feel very tired, dizzy, short of breath, or faint. If the escape rhythm is too slow or stops, you lose consciousness and can die without emergency treatment.
6. Blood flow to the brain drops, causing dizziness, near-fainting, or fainting (syncope) (Stokes-Adams attacks). — why: When the heart beats too slowly or pauses for several seconds during the transition to an escape rhythm, blood pressure falls and the brain does not get enough oxygen. You feel lightheaded or faint; in severe cases you black out for a few seconds until the escape rhythm starts or the block resolves.
7. If compensation fails and no escape rhythm rescues the heart, asystole and cardiac arrest occur. — why: Complete heart block with no backup pacemaker means the ventricles stop beating entirely—no pulse, no blood flow, and death within minutes unless CPR and a temporary pacemaker are started immediately.
8. Finding and fixing the upstream cause determines whether the block is reversible or needs a permanent pacemaker. — why: If the block is caused by a reversible problem—medicine overdose, Lyme carditis treated with antibiotics, or starved blood flow (ischemia) from a heart attack that resolves—it may go away. If the block is from permanent scarring, degenerative disease, or congenital wiring, a pacemaker is the only way to keep the heart beating at a safe rate and prevent sudden death.

Spot it — what you see, and why

- Slow heart rate (bradycardia): The electrical signals between the top chambers (atria) and bottom chambers (ventricles) of the heart are blocked or delayed, so the ventricles beat more slowly than normal because they're waiting longer for the signal to arrive.
- Feeling dizzy or lightheaded: When the heart beats too slowly, it pumps less blood to the brain with each minute, so the brain doesn't get enough oxygen and feels foggy or dizzy.
- Feeling very tired or weak: The body's muscles and organs need a steady supply of oxygen-rich blood, and a slow heartbeat means less blood is delivered, leaving you feeling drained like a phone on low battery.
- Shortness of breath: When the heart can't pump enough blood forward, fluid can back up into the lungs, making it harder to breathe, especially during activity or when lying flat.
- Chest discomfort or pressure: The heart muscle itself needs blood and oxygen, and when the heart rate drops too low, the heart may not get enough fuel, causing a squeezing or heavy feeling in the chest.

- Fainting or near-fainting (syncope): If the block is severe, the heart may pause for several seconds, and the brain runs out of oxygen so quickly that you lose consciousness and collapse.

Red flags — act now

- Fainting or near-fainting (syncope)
- Sudden severe dizziness or confusion
- Chest pain or pressure that doesn't go away
- Very slow heart rate (under 40 beats per minute) with symptoms
- Shortness of breath at rest or worsening quickly

Treat it — in this order

1. Atropine 0.5–1 mg IV push (can repeat every 3–5 minutes, max 3 mg total) for symptomatic AV block at or above the AV node level → Atropine blocks the vagus nerve signals that slow the AV node. This speeds up electrical conduction from atria to ventricles and raises the heart rate. It works best for Mobitz type I (Wenckebach) and some cases of first-degree block.
2. Transcutaneous pacing (electrical pads on the chest delivering pacing pulses) or transvenous temporary pacemaker wire inserted through a vein into the right ventricle → Pacing sends electrical signals directly to the ventricles, forcing them to contract at a safe rate (usually 60–80 beats per minute). This bypasses the broken AV node and restores blood flow to the brain and body immediately. Use this urgently if atropine fails or the block is Mobitz II or third-degree.
3. Permanent pacemaker implantation (a small device placed under the skin with wires threaded into the heart) → A permanent pacemaker continuously monitors the heart rhythm and delivers electrical pulses whenever the natural signal fails. It keeps the heart rate steady for life and prevents fainting (syncope) (fainting), heart failure, and sudden death. Guidelines (AHA/ACC/HRS 2018) recommend permanent pacing for Mobitz II, third-degree AV block, or symptomatic Mobitz I that does not reverse with treatment of the cause.
4. Restore blood flow to the right coronary artery (RCA) with percutaneous coronary intervention (PCI) or thrombolytics if AV block is caused by acute inferior MI → The RCA supplies the AV node. Opening the blocked artery brings oxygen back to the AV node cells, allowing them to recover electrical function. Many cases of AV block from inferior MI improve or resolve completely within hours to days after reperfusion.

5. Stop or reduce the dose of AV-blocking drugs (beta-blockers like metoprolol, calcium channel blockers like diltiazem or verapamil, digoxin, amiodarone) → Removing the drug that is slowing the AV node lets the natural conduction speed return to normal. Many medication-induced AV blocks resolve within hours to days after stopping the drug.

Your top priorities at the bedside

1. Place patient on continuous cardiac monitor (telemetry) and watch for pauses longer than 3 seconds or heart rate dropping below 40 beats per minute — why: Long pauses mean the ventricles (bottom chambers) are not getting signals to pump, causing low cardiac output (amount of blood the heart pumps) and risk of cardiac arrest (heart stopping)
2. Establish IV access (intravenous line) with at least one large-bore (18-gauge or bigger) catheter — why: You need immediate IV access to give atropine (a medicine that speeds up the heart) or start a dopamine or epinephrine drip if the heart rate drops dangerously low
3. Keep atropine 1 mg prefilled syringe and transcutaneous pacing pads at bedside, and know how to activate the pacer function on the defibrillator — why: Symptomatic a slow heart rate (bradycardia) (slow heart rate causing symptoms) can deteriorate to cardiac arrest within minutes, so you must be ready to give atropine or start emergency pacing immediately