

Mitral Regurgitation

The mitral valve lets blood leak backward during every squeeze. The left atrium cannot hold it forever.

THE ONE-LINE TRUTH

Each heartbeat sends some blood backward into the left atrium instead of forward into the body.

The chain — how it unfolds

1. The mitral valve does not close all the way. — why: The valve flaps are damaged, floppy, torn, or pulled apart, so a gap remains when the ventricle squeezes.
2. Blood leaks backward into the left atrium during each heartbeat. — why: When the left ventricle contracts, high pressure inside pushes blood through the easiest path. Some goes forward through the aortic valve to the body, and some squirts backward through the leaky mitral valve into the low-pressure atrium.
3. In acute MR, the small stiff atrium cannot stretch fast, so pressure spikes. — why: The atrium is suddenly overloaded with extra blood it cannot hold. Pressure inside climbs rapidly and backs up into the pulmonary veins.
4. High atrial pressure floods the lungs with fluid (flash pulmonary edema (fluid flooding the lungs)). — why: Pressure in the pulmonary veins and capillaries rises above the pressure that holds fluid inside blood vessels, so fluid leaks out into the air sacs (alveoli), making it hard to breathe.
5. Forward cardiac output drops, causing low blood pressure and shock. — why: Blood leaking backward means less blood is pumped forward to the body with each beat. Organs do not get enough oxygen, blood pressure falls, and the kidneys and brain start to fail.
6. In chronic MR, the left atrium slowly stretches to hold the extra blood. — why: Over weeks and months, the atrium wall stretches like a balloon. A bigger atrium holds more blood at lower pressure, so lung swelling (edema) does not happen right away and you may feel fine.
7. The left ventricle enlarges to pump the extra volume. — why: The ventricle has to pump the normal amount PLUS the blood that leaked back. To handle this bigger load, the ventricle stretches (dilates) and its walls thicken slightly (eccentric hypertrophy).

8. Eventually the ventricle stretches too far and weakens. — why: Pumping the same blood over and over is exhausting. The muscle fibers stretch past the point where they can contract forcefully (beyond the optimal length on the Frank-Starling curve), ejection fraction drops, and the heart cannot keep up — this is heart failure.

Spot it — what you see, and why

- A blowing sound (murmur) during the heart squeeze, loudest at the top of the heart and spreading toward the left armpit: The mitral valve (the door between the upper and lower left chambers of the heart) doesn't close all the way, so blood leaks backward during each squeeze. That backward jet of blood makes a whooshing noise the stethoscope picks up.
- Feeling short of breath, especially when lying flat or during activity: Because blood leaks backward into the left atrium (the lungs' waiting room), pressure builds up and pushes fluid into the tiny air sacs in the lungs, making it harder to pull in oxygen.
- Feeling very tired and weak, even with light tasks: The heart can't pump enough fresh blood forward to the body because some leaks backward with every beat, so muscles and organs don't get the fuel and oxygen they need to work well.
- Swelling in the ankles, feet, or belly: When the heart struggles and pressure backs up through the veins, fluid is squeezed out into the tissues. Gravity pulls it down, so it pools in the lowest parts of the body.
- A fast or fluttering heartbeat (palpitations): The stretched left atrium (the upper left chamber) can develop chaotic electrical signals called atrial fibrillation (an irregular, quivering heartbeat), or the whole heart may speed up to try to keep blood flow normal despite the leak.
- The point where you feel the heart's strongest tap (PMI, or point of maximal impulse) is shifted down and to the left: Years of pumping extra blood to make up for the leak cause the left ventricle (the heart's main pumping chamber) to stretch and grow bigger, pushing the strongest tap farther out on the chest wall.

Red flags — act now

- Sudden, severe shortness of breath at rest or waking you from sleep (sign of acute heart failure or flash pulmonary edema (fluid flooding the lungs)—fluid flooding the lungs fast)
- Coughing up pink, frothy spit (sign that fluid and blood are filling the lungs under high pressure)
- New chest pain, dizziness, or fainting (may mean the heart can't keep up with the body's needs or dangerous heart rhythms like ventricular a fast heart rate (tachycardia) are starting)

- Rapid weight gain or swelling that gets worse quickly over days (sign that fluid is building up fast and the heart is decompensating)
- Lips or skin turning blue, especially around the mouth or fingertips (sign the body isn't getting enough oxygen)

Treat it — in this order

1. Vasodilators (sodium nitroprusside or nitroglycerin) plus diuretics (furosemide) in acute severe MR → Vasodilators lower the resistance the left ventricle pumps against (afterload), so more blood moves forward into the aorta and less leaks backward through the broken valve. Diuretics pull fluid out of the lungs by making the kidneys release extra water and salt into the urine, relieving shortness of breath.
2. Intra-aortic balloon pump (IABP) in cardiogenic shock from acute severe MR → A balloon in the aorta inflates between heartbeats and deflates just before the heart squeezes. This lowers the pressure the ventricle has to push against, forcing more blood forward into the body and less backward through the leaky valve. Blood pressure and organ blood flow (perfusion) improve.
3. Urgent mitral valve repair or replacement surgery → Repairing the leaflets, chords, or annulus (the ring around the valve) restores a tight seal and stops backward leak. If repair is not possible, replacing the valve with a mechanical or tissue prosthesis eliminates the regurgitation. Forward blood flow normalizes, pressure in the left atrium and lungs drops, and symptoms improve rapidly.
4. ACE inhibitors or ARBs, beta-blockers, and aldosterone antagonists in chronic secondary MR from heart failure → These medicines shrink an enlarged, failing left ventricle by lowering blood pressure, slowing the heart rate, and blocking hormones (angiotensin, aldosterone) that scar and stretch the muscle. As the ventricle gets smaller, the mitral valve leaflets can meet better in the middle, reducing the leak.
5. MitraClip or transcatheter edge-to-edge repair (TEER) in select patients with chronic secondary MR → A catheter threads through a vein to the heart and clips the two mitral leaflets together at their midpoint, creating a smaller opening that leaks less. Backward flow decreases without open-heart surgery. This is an option for patients too sick or frail for traditional surgery.

Your top priorities at the bedside

1. Monitor oxygen saturation continuously and apply supplemental oxygen to keep SpO₂ above 92 percent — why: Backward blood flow into the left atrium raises pressure in the pulmonary veins (lung blood vessels), pushing fluid into the alveoli (air sacs) and preventing oxygen from reaching the bloodstream

2. Position the patient upright at 45 to 90 degrees with legs dangling if tolerated — why:
Sitting upright uses gravity to pool blood in the lower body and reduce venous return (blood coming back to the heart), lowering pulmonary capillary pressure and decreasing lung fluid
3. Establish IV access and prepare to give loop diuretics like furosemide as ordered — why:
Diuretics reduce total blood volume by making kidneys excrete salt and water, lowering preload (volume stretching the heart) and decreasing the amount of blood regurgitating backward through the leaky valve