

Acute Mesenteric Ischemia

A plain-English guide for you and your family

WHAT IS HAPPENING

Your intestines need a steady stream of oxygen-rich blood, especially after you eat. That blood arrives through a large artery called the superior mesenteric artery (SMA), which branches off your aorta like a garden hose off the main spigot. The middle section of your gut has almost no backup pipes, so if that one artery gets clogged, the bowel loses its oxygen supply fast. Most of the time a clot breaks off from inside your heart—especially if you have atrial fibrillation (an irregular, quivering heartbeat), which is when the top chambers of your heart quiver instead of squeeze—and floats downstream until it wedges into the SMA. Sometimes a clot forms right on top of cholesterol buildup inside the artery wall, or your blood pressure drops so low that not enough blood reaches the gut, or a clot blocks the vein that carries used blood away from the intestine. No matter which path, the end result is the same: your intestine is starving. Within hours the bowel tissue starts to die. The signature clue is sudden, severe, constant belly pain that feels way worse than your belly looks; early on, when the doctor presses, your abdomen is still soft because the outer lining of the belly has not been irritated yet—the damage is deeper inside. As hours tick by, the dying bowel swells, leaks bacteria and digestive juices into your belly, and may bleed, so you see bloody or dark maroon stools, a bloated tender belly, fever, confusion, and a racing heart. A blood test called lactate shoots up very late, once a lot of bowel is already dead, so a normal lactate early on does NOT rule this out. This is a true surgical emergency. Every hour of delay means more bowel dies. If the bowel gets a hole in it, bacteria flood your bloodstream, your organs start to fail, and even with surgery 50 to 80 out of every 100 people die. The key is to think of this condition the moment an older adult—especially someone with an irregular heartbeat, clogged arteries, a recent heart attack, or a drop in blood pressure—shows up with sudden terrible belly pain, and to get a special CT scan with dye (CT angiogram) right away to look at the blood vessels.

What you might feel

- Sudden, severe belly pain that does not match what the exam shows
- Feeling sick to the stomach and throwing up
- Sudden need to poop, watery diarrhea, or blood in the stool

- Belly swells up and feels tight (distension)
- Belly becomes rigid, and pressing then letting go hurts sharply (guarding and rebound)—this is a late sign
- Fast heart rate (over 100 beats per minute) and fast breathing
- Fever
- Blood pressure drops and thinking becomes confused or drowsy—this is a late, dangerous sign
- Lab test shows very high lactate (over 3 to 4 mmol/L) and acidic blood (pH under 7.35)

Call the doctor right away if...

- Sudden awful belly pain in someone who has atrial fibrillation (an irregular, quivering heartbeat) (irregular heart rhythm) or just had a heart attack—think a clot shot from the heart into the superior mesenteric artery (the main gut artery).
- Pain out of proportion to exam—screaming pain but a soft belly with barely any tenderness—the classic early warning sign of mesenteric starved blood flow (ischemia).
- Blood in stool or positive stool blood test plus sudden belly pain—the gut lining is sloughing off from lack of blood.
- Lactic acidosis (acid from oxygen-starved tissues) (lactate over 4 mmol/L) with belly pain—means extensive bowel has already died; this is a race-against-time surgical emergency.
- Belly becomes rigid, guarded, and rebounds hours after pain started—the bowel wall has died all the way through, perforation is happening or about to happen, and death rates soar without immediate surgery.

What the care team will do

- Establish large-bore intravenous access with at least one 18-gauge or larger IV catheter and draw blood for complete blood count, comprehensive metabolic panel, lactate, and coagulation studies before giving any fluids or medications.
- Start intravenous unfractionated heparin with an 80 units per kilogram bolus followed by continuous infusion at 18 units per kilogram per hour as soon as the physician orders it, and monitor for any signs of bleeding.
- Keep the patient NPO (nothing by mouth—no food or liquids) and place a nasogastric tube to low intermittent suction if there is vomiting or abdominal distension.
- Give intravenous normal saline or lactated Ringer solution at the rate ordered—often 500 to 1000 milliliters over the first hour—and monitor urine output with a Foley catheter to keep output above 0.5 milliliters per kilogram per hour.

- Monitor vital signs every 15 minutes, watching especially for a fast heart rate (tachycardia) (heart rate over 100), low blood pressure (hypotension) (systolic blood pressure below 90), or fever, and notify the physician immediately if any of these develop or worsen.
- Perform focused abdominal assessments every 30 to 60 minutes, checking for new rigidity, rebound tenderness, or increasing distension, and report any change immediately.
- Prepare the patient for emergency CT angiography by confirming IV access for contrast dye, checking the most recent creatinine (a kidney function test) result, and asking about shellfish or iodine allergy.
- Notify the surgical team immediately when acute mesenteric starved blood flow (ischemia) is suspected, and prepare for possible emergency exploratory laparotomy by ensuring the patient has signed consent, removing jewelry and dentures, and confirming blood type and screen is complete.

Medicines you may be given — and why

Unfractionated heparin (IV)

Heparin grabs onto a protein in your blood called antithrombin III and makes it work much faster — about 1,000 times faster. Antithrombin III then shuts down several clotting proteins (thrombin, factor Xa, factor IXa) so your blood cannot form new clots. This stops the blockage from growing bigger while doctors work to reopen the artery. Heparin does NOT break up clots that are already there; it only prevents new ones.

Tissue plasminogen activator (tPA) - catheter-directed thrombolysis

tPA is a naturally occurring protein that your body makes to dissolve clots when they are no longer needed. When a radiologist threads a thin tube (catheter) right up to the clot in the superior mesenteric artery and injects tPA directly into it, the medicine converts plasminogen (an inactive protein stuck in the clot) into plasmin (an enzyme that cuts apart fibrin threads holding the clot together). The clot breaks apart and blood flow restarts. This is used when imaging shows a fresh clot and the bowel is still alive — not when bowel is already dead.

Papaverine (intra-arterial infusion)

Papaverine is injected through a catheter directly into the superior mesenteric artery when the problem is vasospasm (the artery squeezes tight and will not relax). Papaverine blocks an enzyme called phosphodiesterase inside the smooth muscle cells that line the artery wall. When phosphodiesterase is blocked, levels of cyclic AMP rise, which tells the muscle cells to relax. The artery opens wider, blood flows freely again, and oxygen reaches the intestines. Papaverine is mainly used for non-occlusive mesenteric starved blood flow (ischemia) (NOMI), where no clot or blockage exists but the artery is clamped shut by spasm, often in very sick ICU patients on high-dose pressors.

Warfarin (oral)

Warfarin blocks an enzyme in the liver that recycles vitamin K. Vitamin K is needed to activate several clotting factors (proteins II, VII, IX, X). When those factors run low, your blood clots much more slowly. Warfarin is started after the emergency is over — once the clot is removed and the bowel is safe — to prevent new clots from forming. It is used long-term in patients whose mesenteric starved blood flow (ischemia) was caused by atrial fibrillation (an irregular, quivering heartbeat) (irregular heartbeat that lets clots form in the heart and travel to the gut arteries) or other embolic sources.

Direct oral anticoagulants (DOACs): apixaban, rivaroxaban, edoxaban, dabigatran

DOACs are newer oral blood thinners that work faster and more predictably than warfarin. Apixaban, rivaroxaban, and edoxaban directly block factor Xa, a key protein in the clotting cascade that turns prothrombin into thrombin. Dabigatran blocks thrombin itself (the enzyme that cuts fibrinogen into fibrin strands to form a clot). By stopping these steps, DOACs prevent new clots from forming. They are used long-term after acute mesenteric starved blood flow (ischemia) when the cause is atrial fibrillation (an irregular, quivering heartbeat) or another clot-forming condition.

Broad-spectrum intravenous antibiotics (e.g., piperacillin-tazobactam, meropenem, or ceftriaxone + metronidazole)

When the bowel loses blood flow, the tissue dies and the protective lining breaks down. Bacteria that normally live in the gut leak through the dead tissue into the bloodstream and belly, causing sepsis (life-threatening infection). Broad-spectrum antibiotics are started immediately to kill these bacteria before they spread. Piperacillin-tazobactam and meropenem cover a wide range of gut bacteria, including gram-negative rods (like *E. coli*) and anaerobes (bacteria that live without oxygen, like *Bacteroides*). Ceftriaxone + metronidazole is an alternative combination. The antibiotics work by breaking bacterial cell walls (beta-lactams like piperacillin, ceftriaxone, meropenem) or stopping bacterial DNA/protein production (metronidazole).

Intravenous crystalloid fluids (normal saline or lactated Ringer's solution)

When blood flow to the intestines is blocked, the body often becomes dehydrated and blood pressure drops because fluid leaks out of dying tissue and patients may be vomiting. IV fluids are given rapidly to refill the blood vessels, raise blood pressure, and improve blood flow to all organs, including the gut. Normal saline and lactated Ringer's are isotonic fluids (same salt concentration as blood) so they stay in the bloodstream longer. This supports blood flow (perfusion) (the delivery of oxygen-rich blood) while doctors work to remove the clot or fix the

blockage. Good fluid resuscitation also helps the kidneys filter waste and lowers the risk of shock.

Where this information comes from

- American College of Gastroenterology (ACG)
- Society for Vascular Surgery (SVS) Clinical Practice Guidelines
- World Society of Emergency Surgery (WSES) 2017 Guidelines on Acute Mesenteric Ischemia
- AHA/ACC Cardiovascular Disease Guidelines (for embolic sources)

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