



Acute Limb Ischemia

Heparin now, vascular surgery now · Muscle dies in hours, not days

IIb = 3–6 HOURS
to revascularize

RECOGNIZE IT *the six Ps, but two of them decide everything*

THE SIX PS

Pain · Pallor · Pulselessness · Perishing cold (poikilothermia) · **Paraesthesia · Paralysis**. They outline the syndrome, but **a clinical diagnosis needs more nuance** than ticking them off.

THE TWO THAT MATTER MOST

Sensory loss and motor weakness are the time-critical findings. They mark the transition from a threatened limb to one that is dying. **Paralysis with a tense, tender calf suggests irreversible change.** Everything else can look dramatic without being urgent.

ALWAYS COMPARE SIDES

Examine and document pulses and sensation in both limbs, and use **handheld Doppler** for arterial and venous signals — audible arterial Doppler is the single most useful bedside discriminator between categories.

CLASSIFY IT — RUTHERFORD *the category dictates the urgency and the procedure*

Category	Findings	What it means
I — Viable	No sensory or motor loss. Arterial Doppler audible.	Not immediately threatened. Anticoagulate, image, plan revascularization.
IIa — Marginally threatened	Minimal sensory loss (toes), no weakness. Arterial Doppler often inaudible.	Salvageable if treated promptly . Time for imaging and possibly catheter-directed therapy.
IIb — Immediately threatened	Sensory loss beyond the toes with rest pain, and mild-to-moderate weakness.	Revascularization required within 3–6 hours for limb salvage. Usually open surgery , which is more time-effective than catheter-directed thrombolysis.
III — Irreversible	Profound anesthesia, paralysis, absent Doppler signals , fixed skin mottling, muscle rigor.	The limb is not salvageable. Primary amputation — attempted revascularization risks fatal reperfusion injury.

ACT IMMEDIATELY *the first three steps take minutes*

- 1 Systemic anticoagulation immediately** — an intravenous unfractionated heparin bolus and infusion in every patient unless clearly contraindicated. This limits propagation of thrombus while the plan is made, and applies from Rutherford I upward.
- 2 Call vascular surgery now**, before imaging. In category IIb, the referral and the imaging happen in parallel — **the clock is on the muscle**.
- 3 Analgesia, oxygen, and keep the limb warm but not heated.** Keep it **dependent**, avoid pressure on the heel, and do **not** elevate the limb, which reduces perfusion further.
- 4 CT angiography** defines the anatomy and the level of occlusion. It should **not delay surgery in category IIb**, though where it can be done rapidly it improves planning.
- 5 Establish the cause**, because it changes the operation. **Embolic** — sudden onset, atrial fibrillation, no claudication history, normal contralateral pulses; typically **embolectomy**. **Thrombotic** — on a background of peripheral arterial disease with prior claudication and abnormal contralateral pulses; usually needs **bypass or endovascular reconstruction**.

AFTER REVASCULARIZATION *the dangerous part is often the reperfusion*

REPERFUSION SYNDROME

Washout of ischemic muscle products causes **hyperkalemia, metabolic acidosis, myoglobinemia and arrhythmia** — and can be fatal. **Check potassium, creatine kinase, lactate, pH and renal function immediately after reperfusion and repeatedly.** Give generous fluids for myoglobinuric renal protection, and monitor the ECG continuously.

COMPARTMENT SYNDROME

Common after prolonged ischemia and reperfusion, and the classic reason a technically successful revascularization still loses the limb. **Pain on passive stretch is the early sign — a palpable pulse does not exclude it.** Have a low threshold for **fasciotomy**, and in many cases it is performed prophylactically at the time of revascularization.

EMBOLIC OR THROMBOTIC *the distinction changes the operation and the follow-up*

	Embolic	Thrombotic (on existing disease)
Onset	Sudden and severe — the patient can often name the minute	More gradual , often over hours, and less profound
History	Atrial fibrillation , recent MI, prosthetic valve, aneurysm, endocarditis. No claudication history	Pre-existing claudication , known peripheral arterial disease, prior bypass or stent
Contralateral limb	Normal pulses — the giveaway finding	Abnormal pulses and signs of chronic disease
Typical treatment	Embolectomy , often via a simple femoral approach	Bypass or endovascular reconstruction — a plain embolectomy will fail
Afterwards	Find and treat the source — ECG and prolonged rhythm monitoring for AF, echocardiography, aortic imaging. Long-term anticoagulation.	Secondary prevention for atherosclerosis — antiplatelet, high-intensity statin , smoking cessation, diabetes and blood pressure control, supervised exercise.
Also consider	Aortic dissection presenting as limb ischemia — ask about chest or back pain and check blood pressure in both arms, because anticoagulating or thrombolysing a dissection is catastrophic. Also popliteal aneurysm thrombosis , paradoxical embolism through a patent foramen ovale, trauma, and phlegmasia cerulea dolens from massive venous thrombosis, which looks ischemic but is treated entirely differently.	

PEARLS & PITFALLS

- **Recheck the compartments after revascularization, not just the pulses.** Reperfusion swelling causes compartment syndrome hours later, and **pain on passive stretch with a tense compartment is the finding**: a palpable pulse does not exclude it.
- **Heparinize with real doses, not a token infusion: 80 units/kg bolus, then 18 units/kg/h**, targeting an aPTT of roughly 60–80 s. The bolus is the part that gets omitted, and it is the part that stops propagation while the patient waits for the operating room.
- **Heparinise before imaging and before the surgical opinion arrives.** It is the one thing you can do immediately that limits the damage.
- **Sensory loss and weakness are the time markers.** Pain and pallor alone do not tell you how urgent this is.
- **Do not elevate the limb.** Keep it dependent and warm, and protect the heel.
- **Do not revascularize a category III limb.** Reperfusing dead muscle can kill the patient to save nothing.
- **Check potassium and CK immediately after reperfusion** — hyperkalemic arrest is a recognized early event.
- **Find the source.** Look for atrial fibrillation, an aneurysm, endocarditis or a proximal atheromatous source, or the same thing happens again.

