Riverside Health

Acute vs Chronic Limb Ischemia

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Objectives

- Differentiate acute vs chronic limb ischemia
- Review clinical presentation
- Discuss diagnostic workup and interpretation
- Outline treatment strategies
- Pearls and Pitfalls
- Case Studies

Definitions

- Acute Limb Ischemia (ALI) :
  - Sudden drop in perfusion, <2 weeks of symptoms
- Chronic Limb Threatening Ischemia (CLTI):
  - >2 weeks, rest pain, ulcer, gangrene
- Causes:
  - Embolism- cardiac, atherosclerotic, paradoxical embolism
  - Thrombosis- aneurysm, bypass, dissection, vasospasm
  - Trauma (ALI) Progressive PAD (CLTI)

Clinical Presentation

- ALI : "6 Ps"
  - Pain, Pallor, Pulselessness, Paresthesia, Paralysis, Poikilothermia (perishingly cold)
- CLTI :
  - Claudication, Rest Pain, Non-healing Wounds, Gangrene

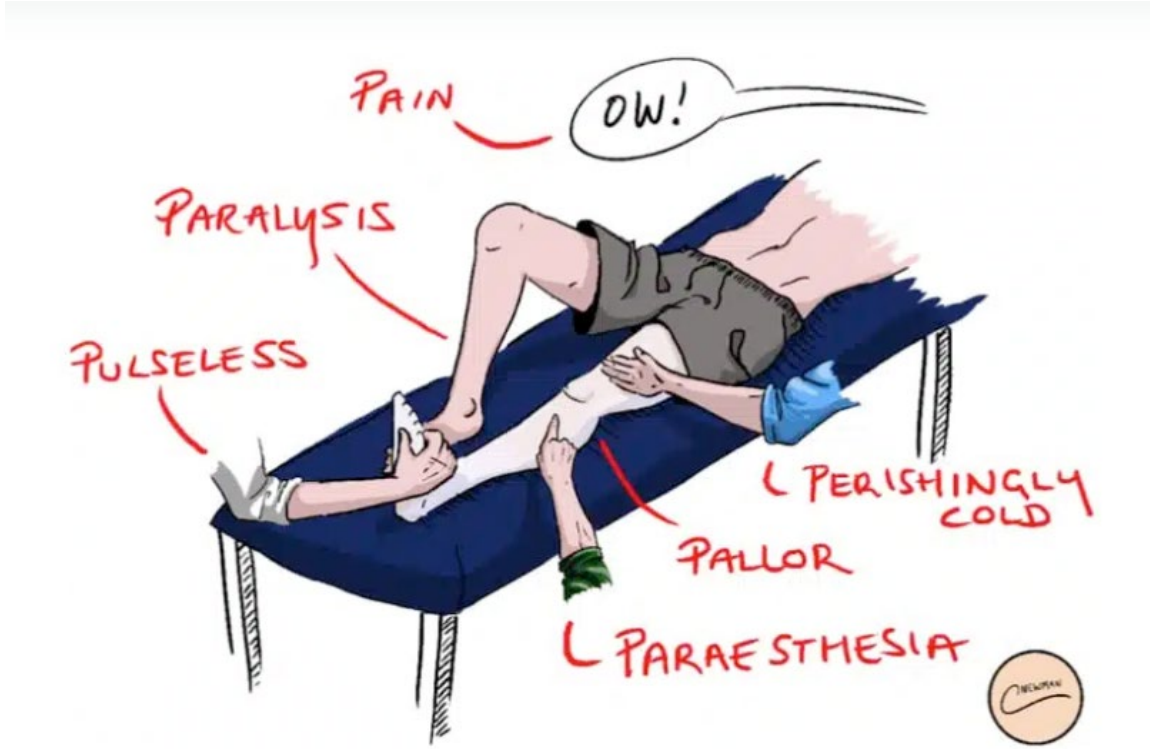

Figure 1

The 6 Ps of Acute Limb Ischaemia

Diagnostic Tools

- HISTORY AND PHYSICAL EXAM
  - Palpation, doppler
  - Timing, Better/Worse, Hx of same?, Loss of sensation/motor function
- ABI/ NIVL Arterial without Exercise
  - Helpful to understand level of flow limitation, useful outpatient
- CTA- prefer CTA iliofemoral with runoff
  - Roadmap, comparison, visualization of lesions for surgical planning
- Arterial Duplex
  - Can be obtained in ED if hx of PAD/arterial intervention and/or limited by CKD

Ankle Brachial Index (ABI)

- >0.9 = Normal
- 0.5- 0.9 = Claudication
- <0.5 = Critical Ischemia

- Note: May be falsely elevated in diabetics with calcified vessels. Assess waveform as well as number, then clinical correlation

Initial Management: Acute Limb Ischemia

- **Immediate Anticoagulation (heparin gtt)**
- Rutherford Classification

Class	Category	Prognosis	Sensory loss	Muscle weakness
I	Viable	No immediate limb threat	None	None
IIa	Threatened: marginal (salvageable if promptly treated)	Salvageable if treated promptly	Minimal–none	None
IIb	Threatened: immediate (salvageable with immediate revascularisation)	Salvageable if treated immediately	More than just toes	Mild–moderate
III	Major tissue loss or permanent nerve damage inevitable	Limb loss or permanent damage	Profound, anesthetic	Profound, paralysis

DUS: two-dimensional ultrasonography.
It is modified from the classification of Rutherford et al.[6]

Treatment: Acute Limb Ischemia

Endovascular

- catheter-directed thrombolysis, thrombectomy

Surgical

- Open embolectomy, bypass

Supportive

- anticoagulation, fasciotomy for compartment syndrome

Treatment: Chronic Limb Ischemia

Lifestyle:

- smoking cessation, structured exercise program

Medical:

- antiplatelet, statin, cilostazol, anticoagulation, DM management

Revascularization:

- angiogram (PTA, Stent, atherectomy), bypass

Adjunct:

- wound care, podiatry

Endovascular vs Surgical

- Endovascular
  - Less invasive, good for short lesions, high risk surgical patients
- Surgical
  - durable for long segment disease, younger patients

Acute vs Chronic: Key Differences

	Acute	**Chronic**
Onset	Sudden	Gradual
Pain	Severe with acute onset of neuro/motor dysfunction	Progressive Claudication/ Rest pain
Exam	Pale, Cold, Pulseless	Ulcers, Gangrene,
Imaging	Rapid	Detailed Planning
Treatment	Urgent	Multidisciplinary

Case 1: Acute Limb Ischemia

- 84yo F with a PMHx of HTN, DM, CHF, Afib S/P watchman, Hx of LLE thrombectomy in 2023, who presented to ED for LLE pain and numbness. She developed severe cramps all of a sudden this evening. She attempted to walk, but her left leg could not support her. She is having difficulty moving her foot. No RLE complaints.

- **Exam:**
  - 2+ RLE Femoral Pulse.
  - L Femoral waterhammer pulse.
  - Cool, pale, mottled LLE

Case 1: Acute Limb Ischemia

- **Imaging:**
  - CTA with iliofemoral runoff- No flow in the L CFA, large segment occlusion of the proximal mid L SFA with recon distally. Marked narrowing of the distal L pop with attenuated flow. No significant flow within the arterial system of the L calf throughout
  - **TEE:** thrombus adherent to L atrial appendage closure device
- **Dx:**
  - Rutherford IIB acute limb ischemia
- **Plan:**
  - To OR emergently for LLE thrombectomy and possible fasciotomy

Case 1: Acute Limb Ischemia

- **RESULT:**
  - Due to quick recognition of event, she was revascularized emergently with full restoration of sensation and motor function, and with palpable DPA/PTA pulses on physical exam. She was discharged on therapeutic AC per cardiology indefinitely.

Case 2: Acute Limb Ischemia

- 85yo M with a PMHx of HTN, HLD, Afib, AAA S/P EVAR and Fem-Fem bypass, pacemaker, OSA, metastatic prostate cancer, recent GIB requiring coil embolization <2 weeks prior, who presented to ED for acute onset of BL LE numbness. Tingling started earlier in the evening, so he took a Gabapentin and went to bed. He got up to go to the bathroom and unable to stand due to weakness. No dysarthria or UE complaints.

- **Exam:**
  - No palpable femoral, popliteal, or pedal pulses. Diffuse LE weakness, difficulty wiggling toes. Chronic stasis changes, 1+ edema BL.

Case 2: Acute Limb Ischemia

- **Imaging:**
  - CTA Abd/Pelv- interval occlusion of the aortic graft just below the level of the renal arteries with reconstitution at the level of the L CFA via collaterals with minimal flow in the Fem-Fem bypass and R CFA.
- **Dx:**
  - Rutherford IIa vs Iib ALI due to Aorto-iliac occlusion after stopping AC for GIB
- **Plan:**
  - Initate hep gtt. Transfer to RRMC. Emergent open thrombectomy of EVAR and fem-fem bypass

Case 2: Acute Limb Ischemia

- **RESULT:**
  - Complete resolution of pain and numbness (above baseline) Pt ambulating in room with walker. Hospitalization complicated by recurrent GIB. Eliquis and Plavix resumed after hep gtt. Long term outcome TBD

Case 3: Chronic Limb Ischemia

- 59yo M with a PMHx of HTN, HLD, Alcohol Abuse, Tobacco Dependence, Hep C, chronic LLE weakness, who presented to RRMC due to increased LLE pain and swelling. Pain started 3 mos earlier after he dropped a can on his foot, then stubbed his toe. He saw podiatry who put him in post op shoe, and was prescribed gabapentin with minimal effect and referred to neurology. Over the past couple weeks the swelling has worsened and he has decreased sensation and motor function in foot, LLE is very tender up to proximal calf with some scattered dark lesions.
- *confounding details- swelling, chronic LLE weakness due to prior low back stab injury 20+ yrs ago. NO PULSE EXAM DOCUMENTED BY PODIATRY OR PRIOR ED VISITS.
- **Exam:**
  - LLE non palp fem/ pedal pulses. 2+ R fem, 2+ R DPA. LLE with non-blanchable discoloration around 1st toe, edematous and tender up to proximal calf, necrotic lesion to proximal shin. (+) sensory and motor deficit.

Case 3: Chronic Limb Ischemia

- **Imaging:**
  - L DVT study (-). ABIs R 1.07 L 0.03- monophasic, no flow in toes. CTA with LLE CFA occlusion, scattered multilevel stenoses, atrophic L thigh muscles.

- **Plan:**
  - L CFA endarterectomy to restore inflow.

Case 3: Chronic Limb Ischemia

- **RESULT:**
  - Symptoms overall improved, but still with some persistent rest pain vs ischemic neuropathy in foot. Repeat angiogram with popliteal stent later. Slow resolution of gangrenous lesions overtime.
  - KEY POINT: ALWAYS CHECK PULSES IN EXTREMITY COMPLAINT. ISCHEMIC LIMBS MAY BE SWOLLEN BECAUSE THEY ARE DANGLING DUE TO REST PAIN. NERVE INJURIES DO NOT TYPICALLY PROGRESS ACUTELY AFTER 20 YRS

Case 4: Chronic Limb Ischemia

- 67yo F with PMHx of HTN, HLD, CAD, Hep C, Alcohol Abuse, Tobacco Dependence who presented to office for eval of PAD per podiatry. 2 mos prior, developed significant RLE pain with ambulation requiring cane for support, sleeping on the couch, with leg hanging down, unable to move toes, progressive ulcer x 1 mo. Previously loved to dance.

- **Exam:**
  - R foot cool and erythematous, edematous, eschar to dorsal foot, dependent rubor

Case 4: Chronic Limb Ischemia

- **Imaging:**
  - NIVL PVR w ABIs monophasic flow into CFA, and essentially no flow distally on R. R ABI 0 L BAI 0.44.

- **Plan:**
  - admitted to hospital from office. Angiogram performed the next day noting extensive multilevel PAD. R Fem- AT bypass recommended. Cardiology consulted for risk assessment.

Case 4: Chronic Limb Ischemia

- **RESULT:**
  - Bypass performed successfully, but pt developed severe reperfusion pain, and lesions became wet and infected. Pt required guillotine BKA amputation, but given minimal motor control of knee, revised to AKA. Pt discharged to rehab

- Of note, she was seen in ED 3 weeks prior with swollen, erythematous limb, significant TTP documented. DVT study (-). Afebrile, VS WNL, pt discharged with abx for presumed cellulitis. NO PULSE EXAM DOCUMENTED. If she had underwent revasc earlier, she very well may have had a better outcome.

Clinical Pearls

- "Time is Tissue" in ALI
- Rutherford Classification guides urgency
- CLTI carries high CV mortality → aggressive risk reduction
- If the complaint is leg pain, leg numbness, or leg swelling- ALWAYS document a pulse exam.
- Don't be afraid to document NO PULSES if you do not feel them, and investigate properly.
- Don't be thrown off by swelling! Patients in rest pain will often hang leg off bed, resulting in dependent edema.

QUESTIONS?

- I am always happy to field any questions regarding case discussion, imaging review, referral timeline. Can epic chat or reach out by email.

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References

- Rutherford RB et al. J Vasc Surg. 1997
- Conte MS et al. J Vasc Surg 2019
- Norgren L et al. Eur J Vasc Endovasc Surg 2007