Peripheral Artery Disease (Chronic Limb Ischemia) and Acute Limb Ischemia

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Resident Teaching Rounds
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Peripheral Artery Disease (Chronic Limb Ischemia)

- Atherosclerotic plaque buildup in the peripheral arteries
- Narrows blood vessel lumen and decreases flow to the muscle
- Results in pain of the muscle group distal to the lesion
Risk factors for PAD

- Smoking
- Diabetes
- Hypertension
- Hyperlipidemia
- Obesity
- History of coronary artery disease, stroke, or vascular disease
• Advanced age
  • Race (non-Hispanic blacks)
  • Male gender
  • Hyperfibrinogenemia
  • Diabetes mellitus
  • Hyperhomocysteinemia
  • Smoking
  • Hypercoagulability
  • Hypertension
  • Elevated C-reactive protein
  • Dyslipidemia
  • Chronic renal insufficiency

How does claudication present?

- Pain, aching, cramping, or tightness of the calf and/or thigh with ambulation
- Is defined by a set distance
- Relieved by rest
- Must be distinguished from musculoskeletal etiologies
- Erectile dysfunction in men
Presentation depends on the *level* of disease

- Symptoms of ischemia from the muscle group distal to significant obstruction/occlusion
- Aortoiliac-buttock/thigh/hip
- Femoral-calf
Presentation depends on the severity of disease

- Single level disease (iliac or SFA occlusion) - claudication
- Multilevel disease - rest pain/tissue loss
- Remember your physics: principle of additive serial resistances
Clinical categories of chronic limb ischemia: Fontaine and Rutherford classifications

<table>
<thead>
<tr>
<th>Grade</th>
<th>Category</th>
<th>Clinical description</th>
<th>Objective criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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<td>Asymptomatic—no hemodynamically significant occlusive disease</td>
<td>Normal treadmill or reactive hyperemia test</td>
</tr>
<tr>
<td>1</td>
<td>Mild claudication</td>
<td></td>
<td>Completes treadmill exercise†; AP after exercise &gt;50 mm Hg but at least 20 mm Hg lower than resting value</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Moderate claudication</td>
<td>Between categories 1 and 3</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>Severe claudication</td>
<td>Cannot complete standard treadmill exercise† and AP after exercise &lt;50 mm Hg</td>
</tr>
<tr>
<td>II*</td>
<td>4</td>
<td>Ischemic rest pain</td>
<td>Resting AP &lt;40 mm Hg, flat or barely pulsatile ankle or metatarsal PVR; TP &lt;30 mm Hg</td>
</tr>
<tr>
<td>III*</td>
<td>5</td>
<td>Minor tissue loss—nonhealing ulcer, focal gangrene with diffuse pedal ischemia</td>
<td>Resting AP &lt;60 mm Hg, ankle or metatarsal PVR flat or barely pulsatile; TP &lt;40 mm Hg</td>
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<tr>
<td></td>
<td>6</td>
<td>Major tissue loss—extending above TM level, functional foot no longer salvageable</td>
<td>Same as category 5</td>
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AP, Ankle pressure; PVR, pulse volume recording; TP, toe pressure; TM, transmetatarsal.

*Grades II and III, categories 4, 5, and 6, are embraced by the term chronic critical ischemia.

†Five minutes at 2 mph on a 12% incline.

Rutherford et al. JVS, 1997
Physical Exam

- No tissue loss, may have minimal findings aside from lack of palpable pulses in feet
Noninvasive studies: The role of the Vascular Lab

• Blood pressure cuffs placed at the brachial artery as well as high thigh, low thigh, calf, ankle, metatarsal level
Noninvasive studies: The role of the Vascular Lab

- Pulsed Volume Recording - Gives you information on level of disease
- Ankle Brachial Index - severity of disease
- Claudication - 0.5-0.7
- Rest pain - below 0.5
Additional imaging

- If the history, physical exam and ABI indicate lifestyle-limiting claudication
- Intervention is contemplated
  - May be helpful for preoperative planning
- Patient has noncompressible vessels which make the ABI artificially high
CT Angiography: abdomen/pelvis with lower extremity runoff

- Particularly helpful if patient has suspected inflow and outflow disease
- Delineates anatomy
- Look at noncontrast and contrast runs to distinguish calcium from contrast
CT Angiography: abdomen/pelvis with lower extremity runoff

- Helps with planning endovascular approach-femoral retro/antegrade, brachial
- Knowing about patient’s anatomy in light of co-morbid status may influence aggressiveness of endovascular approach
How does critical limb ischemia present?
In contrast to claudication, which has a low risk of limb loss over time (estimated 5% over 5 years)

Patients with critical limb ischemia have a high risk of amputation (30-40% in a year) without revascularization

Patients may not have antecedent claudication before developing limb threatening ischemia
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Rutherford et al., JVS, 1997
WI-FI classification for critical limb ischemia

The Society for Vascular Surgery Lower Extremity Threatened Limb Classification System: Risk stratification based on Wound, Ischemia, and foot Infection (WIfI)

(J Vasc Surg 2014;59:220-34.)
Table II. Society for Vascular Surgery Lower Extremity Threatened Limb (SVS WIFi) classification system

I. Wound
II. Ischemia
III. Foot Infection
WIFI score

W: Wound/clinical category
SVS grades for rest pain and wounds/tissue loss (ulcers and gangrene):
0 (ischemic rest pain, ischemia grade 3; no ulcer) 1 (mild) 2 (moderate) 3 (severe)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Ulcer</th>
<th>Gangrene</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No ulcer</td>
<td>No gangrene</td>
</tr>
<tr>
<td></td>
<td>Clinical description: ischemic rest pain (requires typical symptoms + ischemia grade 3); no wound.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Small, shallow ulcer(s) on distal leg or foot; no exposed bone, unless limited to distal phalanx</td>
<td>No gangrene</td>
</tr>
<tr>
<td></td>
<td>Clinical description: minor tissue loss. Salvageable with simple digital amputation (1 or 2 digits) or skin coverage.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Deeper ulcer with exposed bone, joint or tendon; generally not involving the heel; shallow heel ulcer, without calcaneal involvement</td>
<td>Gangrenous changes limited to digits</td>
</tr>
<tr>
<td></td>
<td>Clinical description: major tissue loss salvageable with multiple (≥3) digital amputations or standard TMA ± skin coverage.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Extensive, deep ulcer involving forefoot and/or midfoot; deep, full thickness heel ulcer ± calcaneal involvement</td>
<td>Extensive gangrene involving forefoot and/or midfoot; full thickness heel necrosis ± calcaneal involvement</td>
</tr>
<tr>
<td></td>
<td>Clinical description: extensive tissue loss salvageable only with a complex foot reconstruction or nontraditional TMA (Chopart or Lisfranc); flap coverage or complex wound management needed for large soft tissue defect</td>
<td></td>
</tr>
</tbody>
</table>

TMA, Transmetatarsal amputation.

I: Ischemia
Hemodynamics/perfusion: Measure TP or TcPO₂ if ABI incompressible (>1.3)
SVS grades 0 (none), 1 (mild), 2 (moderate), and 3 (severe).

<table>
<thead>
<tr>
<th>Grade</th>
<th>ABI</th>
<th>Ankle systolic pressure</th>
<th>TP, TcPO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>≥ 0.80</td>
<td>&gt;100 mm Hg</td>
<td>≥60 mm Hg</td>
</tr>
<tr>
<td>1</td>
<td>0.6-0.79</td>
<td>70-100 mm Hg</td>
<td>40-59 mm Hg</td>
</tr>
<tr>
<td>2</td>
<td>0.4-0.59</td>
<td>50-70 mm Hg</td>
<td>30-39 mm Hg</td>
</tr>
<tr>
<td>3</td>
<td>≤ 0.39</td>
<td>&lt;50 mm Hg</td>
<td>&lt;30 mm Hg</td>
</tr>
<tr>
<td>Clinical manifestation of infection</td>
<td>SVS</td>
<td>IDSA/PEDIS infection severity</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------------------</td>
<td>-----</td>
<td>------------------------------</td>
<td></td>
</tr>
<tr>
<td>No symptoms or signs of infection</td>
<td>0</td>
<td>Uninfected</td>
<td></td>
</tr>
<tr>
<td>Infection present, as defined by the presence of at least 2 of the following items:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Local swelling or induration</td>
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<td></td>
<td></td>
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<tr>
<td>• Erythema &gt;0.5 to ≤2 cm around the ulcer</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• Local tenderness or pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Local warmth</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• Purulent discharge (thick, opaque to white, or sanguineous secretion)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local infection involving only the skin and the subcutaneous tissue</td>
<td>1</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>(without involvement of deeper tissues and without systemic signs as described below)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exclude other causes of an inflammatory response of the skin (eg, trauma, gout, acute Charcot neuro-osteoarthropathy, fracture, thrombosis, venous stasis)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table II. Continued.

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<thead>
<tr>
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<th>SVS</th>
<th>IDSA/PEDIS infection severity</th>
</tr>
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<tbody>
<tr>
<td>Local infection (as described above) with erythema &gt; 2 cm, or involving structures deeper than skin and subcutaneous tissues (eg, abscess, osteomyelitis, septic arthritis, fascitis), and No systemic inflammatory response signs (as described below) Local infection (as described above) with the signs of SIRS, as manifested by two or more of the following:</td>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>• Temperature &gt;38°C or &lt;36°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Heart rate &gt;90 beats/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Respiratory rate &gt;20 breaths/min or PaCO₂ &lt;32 mm Hg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• White blood cell count &gt;12,000 or &lt;4000 cu/mm or 10% immature (band) forms</td>
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<td></td>
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</tbody>
</table>
Wifi staging

Three components are graded by severity:

- Wound
- Ischemia
- Foot Infection

A Wifi overall class is assigned

They are then assigned a clinical stage from 1-4 which assigns the risk of amputation

Example 1: A patient with ischemic rest pain, an ABI of 0.30, no wound, and no signs of infection would be classified as: Wound 0 Ischemia 3 foot Infection 0 or WIfI 030. The consensus clinical stage is 2 (low) for risk of major limb amputation at one year.

Example 2: A 55-year-old man with diabetes, dry gangrene of two toes, and a <2-cm rim of cellulitis at the base of the toes, but without systemic or metabolic toxicity has absent pedal pulses. The ABI is 1.5. The toe pressure is 35 mm Hg. Wound 2 Ischemia 2 foot Infection 1 or WIfI 221. The clinical stage would be 4 (high risk of amputation).
Outcome within 6 months of being diagnosed with Critical limb ischemia

- Alive without amputation: 40%
- Alive with amputation: 40%
- Dead: 20%
These patients oftentimes have multilevel disease

- Pain localized to the forefoot or toes
- Pain associated with elevation of foot to level of the heart
- Awakening at night
- Relief with “dangling” of limb
- Dependent rubor

Physical exam findings:

- Hair loss
- Dry skin
- Paleness of skin
- Muscle atrophy
- Thick toenails
- Onychomycosis (fungal infection)
- Dependent rubor with edema
- Cyanosis
- Tissue ulceration-toes or heel
- Gangrene
Physical exam findings

- Take note of where the ulcers are
- Forefoot vs Hindfoot
Neuropathic ulcers

- Diabetics have propensity to develop “hammertoe” or “claw foot” lesions develop at pressure points at tips of toes and plantar aspect of metatarsal heads—“forefoot”

- In diabetics that also have ESRD, or are otherwise chronically debilitated
  - Prolonged periods of immobility on unprotected heels—“hindfoot”
Neuropathic ulcer

- Positioned over bony prominence (metatarsal head)
- Portal of entry for deeper space infections
- Painless
- Surrounded by hyperkeratotic, calloused tissue
Ulcers with associated infection

- For ulcers with extensive infections (particularly in diabetics)
- Initial debridement and parenteral abx
- Arteriogram to evaluate anatomy and revascularization options
- Restoration of pulsatile perfusion in the foot most important
Peripheral arterial disease

Risk factor modification:
- Smoking cessation
- LDL cholesterol <100 mg/dL (2.59 mmol/L)
- LDL <70 mg/dL (1.81 mmol/L) if high risk
- HbA1c <7.0%
- BP <140/90 mm Hg
- BP <130/80 mm Hg with diabetes or renal disease
- Antiplatelet therapy

No limitation to quality of life or reduced exercise capacity:
- Monitor patient for loss of function

Limitation that affects quality of life:
- History of significant exercise limitation
- Reduced treadmill performance
- Reduced function by questionnaire

CLi confirmed

Candidate for revascularization
- Imaging (duplex, angiography, MRA, CTA)
- Revascularization as appropriate

Not candidate for revascularization
- Stable pain and lesion
- Pain intolerable or spreading infection
  - Medical treatment (nonoperative)
  - Amputation

Claudication medical therapy
- Supervised exercise or pharmacotherapy

Suspected proximal lesion

Improved symptoms
- Continue

Symptoms not improved or deteriorated

Localize the lesion:
- Conventional angio
- MRA or CTA
- Ultrasound
- Hemodynamic localization

Revascularization:
- Endovascular
- Surgical
Revascularization strategies

- Endovascular vs open strategies
- Must take the level of disease, extent of disease and patient co-morbidities into account
Endovascular versus Surgical bypass

- **Endovascular**
- Ideal for short, focal lesions
- Iliac, superficial femoral artery stenoses/occlusions
- Endovascular therapy at the infrapopliteal level can be done with modest short term (months) success
- Treating one “level” of disease may be enough to heal an ulcer/relieve their rest pain
- **Surgical bypass** for long length occlusions and tissue loss
Iliac artery kissing balloon/stents

70 year old smoker with bilateral buttock claudication
Case scenario: Totally occluded aorta in 45 year old man

- Aortobifemoral bypass
- If patient cannot tolerate aortic cross clamp... axillary-fem-fem bypass
Open revascularization

Aortic endarterectomy

Aortobifemoral bypass
Case scenario: Totally occluded aorta in 78 year old with CAD, history of multiple laparotomies

Extra-anatomic bypass

Axillary-fem-fem bypass
85 yo female with ESRD, cardiomyopathy presenting with R great toe gangrene

- Patient also had infrageniculate disease (accounting for tissue loss)
- Focal stenotic lesion in the SFA
Superficial Femoral Artery stent

- Hydrophilic glidewire passed through subintimal plane
- Confirm with your catheter that you are intra-arterial
- Switch out for 0.014 wire/laser
- Angioplasty/stent
- ABI improved 0.22 to 0.58
- Wound healed 1 month later
Superficial Femoral Artery Occlusion

61 year old mailman with short distance claudication
Superficial Femoral Artery Laser Atherectomy and stent
Infrageniculate disease: endovascular

- Small caliber vessels with long-length occlusions
- Laser atherectomy (debulking)
- Can get smaller ulcers to heal to moribund or high risk patients
Open revascularization

- Best option for large areas of tissue loss
- Long extensive segments of occlusive disease
- “Fem-distal”
- Patient is a good revascularization candidate
Open revascularization

- Pulsatile perfusion to the foot to allow ulcer to heal
- Inflow, outflow, conduit
- For Infrainguinal Disease: Saphenous vein preferable to prosthetic
Choose your distal target according to where the ulcer is
Most diabetics have “sparing” of the dorsalis pedis artery, making this a favorable distal target
Use vein if at all possible below the knee!

- Ipsilateral/Contralateral GSV
- LSV, Arm vein
- Can use SFA/popliteal artery as inflow (if not diseased) to minimize the length of conduit needed and ensure best quality of vein
PAD Summary

- The level, extent of disease and patient’s clinical status must be taken into consideration
- Endovascular options more successful in larger vessels with short focal lesions
  - Treatment of a single level may be enough to heal an ulcer in a frail patient
- Bypass is the best option patients with long-segment occlusive disease if the patient can tolerate it
Acute limb ischemia
Assessing the patient

- Where is the consult coming from?
  - ER, MICU, CT SICU, Rhoads 1, Cath lab recovery, Founders OR, trauma bay
- How long has the patient had symptoms?
  - May be difficult to determine if patient is intubated
- What is the level of ischemia?
- How severe is the level of ischemia?
  - Does the patient have an intact sensory/motor exam?
  - Do they have doppler signals?
  - This will help determine the approach
6 Ps of acute arterial ischemia:
- Pain, pallor, paresthesia, paralysis, pulselessness, poikilothermia
Level of ischemia

- Clot tends to lodge at sites of bifurcation
- Aortic - absence of femoral pulses, mottling of bilateral lower extremities extending to umbilicus, paralysis of lower extremities
- Iliac - similar to aortic but unilateral
- Femoral - coolness/mottling up to inguinal ligament
- Popliteal-femoral pulse will be intact
Differential diagnosis

- Aortic dissection
- Acute on chronic disease (severe aortoiliac occlusive disease with superimposed thrombus)
- Embolism-majority come from the heart (Atrial fibrillation or h/o MI, DVT and PFO)
- Thrombosis-acute on chronic, thrombosed bypass graft, s/p arterial line or balloon pump d/c
- Occlusion/lack of distal perfusion-large sheath/cannula in femoral artery (i.e., ECMO)
- Intimal injury-blunt trauma to popliteal artery
- Diagnosis can often be made on the basis of history and physical exam
- CTA of the (chest) abdomen with lower extremity runoff provided no renal insufficiency
Acute limb ischemia classification: Rutherford criteria

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<th>Description/prognosis</th>
<th>Findings</th>
<th>Doppler signals</th>
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<tr>
<td></td>
<td></td>
<td>Sensory loss</td>
<td>Muscle weakness</td>
</tr>
<tr>
<td>I. Viable</td>
<td>Not immediately threatened</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>II. Threatened</td>
<td></td>
<td></td>
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<tr>
<td>a. Marginally</td>
<td>Salvageable if promptly treated</td>
<td>Minimal (toes) or none</td>
<td>None</td>
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<td>b. Immediately</td>
<td>Salvageable with immediate revascularization</td>
<td>More than toes, associated with rest pain</td>
<td>Mild, moderate</td>
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<td>III. Irreversible</td>
<td>Major tissue loss or permanent nerve damage inevitables</td>
<td>Profound, anesthetic</td>
<td>Profound, paralysis (rigor)</td>
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Limb salvage in Class II patients is dependent on prompt recognition and treatment
Acute vs Acute on chronic limb ischemia

Both patients have occlusions of their superficial femoral artery but will have very different presentations secondary to presence of collaterals (compensatory mechanisms).
“The Golden Window”

- You have 6-8 hours to restore blood flow to avoid irreversible damage to muscle and nerves
Management for aortic occlusion

- Bolus with IV Heparin immediately-prevents proximal and distal clot propagation
- Bring patient to hybrid OR or open room with fluoroscopic table
- Aortic dissection-TEVAR with intravascular ultrasound
- Aortic occlusion from acute on chronic aortoiliac occlusive disease-kissing stents +/- lysis, ax-fem-fem or aorto-bifem
Management for ischemic leg (femoral level and distally)

- OR for embolectomy/+-bypass
- Consider thrombolysis for graft occlusion if no neurologic deficits (early Rutherford score)
  - Data from the STILE (Surgery or Thrombolysis for the Ischemic Lower Extremity) trial-most effective within 14 days
  - Thrombolysis occurs over 24-72 hr time period
- The key is to establish inflow/outflow
- Consider fasciotomies if ischemia has been greater than 4-6 hrs
Femoral embolectomy

Obtain control of CFA, SFA, Profunda
Transverse arteriotomy in CFA including orifice to profunda
Fogarty catheter passage to restore inflow and outflow
Popliteal embolectomy

Aim for good inflow/backbleeding
Angiography after arterial repair to confirm adequacy of thrombectomy
Exploration of tibial vessels at ankle/foot may be necessary to retrieve thrombi not accessible through the transpopliteal approach
Intra-arterial instillation of lytics can help dissolve microemboli
Thrombolysis

- Intra-arterial instillation of lytic therapy for distal lower extremity occlusion
- Low-dose heparin infused through co-axial system to prevent peri-catheter thrombosis
- Particularly useful for occluded grafts, where prior incisions may make surgical approach difficult
- Takes 48-72 hours to work
Sometimes bypass is needed

- Intimal injury s/p blunt or penetrating trauma
- Severe chronic occlusive disease which prevents embolectomy
45 yo obese woman s/p fall and posterior knee dislocation
• Above knee pop-below knee pop bypass using reversed greater saphenous vein
Consider fasciotomies if ischemia greater than 4-6 hours

- Clinical
- Pain with passive dorsiflexion of foot
- Swollen tense compartment
- Neurologic findings
- Elevated Compartment pressure
- 2-incisions-medial and lateral to tibia
Case scenarios
18 yo male with cardiomyopathy of unknown etiology and atrial fibrillation

- Patient has numbness of toes/ left foot
- Still has motor function
- EF 20%
- Management:
  - Arteriogram/thrombolysis
57 yo male with metastatic pancreatic cancer with abrupt onset RLE pain

- Palpable pulses in opposite leg
- Absent right femoral pulse
- Management:
- Right femoral thrombectomy
60 yo male s/p right fem-pop bypass with prosthetic at OSH with numbness and coolness right foot
You are called to the CT SICU...

- 30 yo peripartum woman crashed onto ECMO for ARDS, cardiomyopathy
- Right groin arterial cannula
- Left groin venous cannula
- Right lower extremity is cool, pale, and does not have distal signals
Figure out what vessels the lines are in and how big they are!

- An antegrade catheter is placed in the CFA/SFA with restoration of pulses
70 yo male s/p cardiac cath now noted to have pulseless right lower extremity

- Were they closed with a vascular closure device?
- Did they have preexisting PAD on the side of puncture, putting it at increased risk for complete femoral artery occlusion?
- Was the wire “tough to pass” are they concerned for dissection?

- If the answer is yes to either question (and even if not) right femoral exploration, thrombectomy, possible endarterectomy and patch angioplasty, stent…
CT SICU is calling again…

- IABP just pulled on an 82 yo patient
- Patient is POD#3 s/p CABG
- That leg is now pulseless and appears mottled
- Femoral thrombectomy
18 yo football player with deformed knee in trauma bay and right foot pain/numbness

- X-rays confirm right anterior knee dislocation
- No pulses in right foot
- OR for pop-pop artery bypass using reversed saphenous vein
45 yo hypertensive male presents with tearing chest pain and left lower extremity numbness

- CTA demonstrates Type B dissection with occlusion of left common iliac
- TEVAR with IVUS with or without adjunctive stenting
Thoracic Stent-Grafting for Dissection

Rationale: repressurize the true lumen with a central aortic stent
Intravascular ultrasound: A must for dissection cases!
You are called to the MICU...

- 40 yo female in septic shock
- On multiple vasopressors
- On exam, no pulses in bilateral hands and bilateral feet
- Palpable femoral and brachial pulses

Management:
- Anticoagulation
- Wean pressors
You are called to Rhoads 1

- They have just finished pulling a sheath on a carotid stent patient (7 French)
- The groin looks good, but the patient is complaining of numbness on the side of the sheath pull
- No distal pulses are dopplered

- What happened?
- Management:
  - OR for femoral exploration and thrombectomy
The CT SICU calls to ask your opinion

- About a 75 yo male POD 14 from a CABG/MVR with postop course complicated by VDRF, pneumonia and fevers
- Mottling of bilateral fingers and toes in bilateral feet
- Dopplerable posterior tibials bilaterally
- Platelet count 20,000

- Management:
  - Send HIT panel
  - Argatroban
The intern calls you:

- Regarding the patient you did a femoral embolectomy on for acute limb ischemia. You did fasciotomies because the patient was ischemic for 5 hours before getting restored blood flow.

- The nurse is concerned because the urine appears brown.

Management:
- ICU
- IVF +/- bicarbonate
- Foley
- Treatment for hyperkalemia
- Dialysis if refractory to other measures
Thank you