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ACOI
Internal Medicine Board Review

Peripheral Vascular Disease

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Peripheral Vascular Disease (PVD)

Arteriosclerosis Obliterans (ASO)

Aneurysmal Disease

Acute Arterial Occlusion

Thromboangiitis Obliterans (Buergers Disease)

Arteriosclerosis Obliterans (ASO)

- Overview:
  - Manifestation of atherosclerosis
  - 95% of chronic occlusive arterial disease
  - Generalized disease of aorta and branches
  - Slow progression

ASO

- Demographics:
  - Age > 50 years old
  - Male > female x 2
  - 1/3 have clinical CAD
  - > 50% have severe CAD by cath
  - Up to 1/3 = diabetic
  - ¼ have sigificant carotid stenosis

ASO

- Risk Factors:
  - Diabetes, smoking, HTN, Lipids, ↑ homocysteine
  - Diabetes & Smoking = highest rel. risk
- Pathophysiology:
  - Atheromatous plaque

    ⇓

    arterial narrowing

    ⇓

    complete arterial occlusion

    (due to plaque or thrombus)
  - Tissue ischemia, collaterals

ASO

- Clinical
  - Claudication = muscle ischemia
    - aorto-iliac disease = hips, thighs, buttocks
    - femoral - popliteal disease = lower leg
    - popliteal - tibial disease = foot
  - Rest Pain
  - Ulceration
    - foot, toes = most common
    - painful
    - may progress to gangrene
  - Acute Occlusion = thrombus, embolism

ASO - Clinical

* Pulses = location of decreased pulse clue to site of stenosis
* Ankle-Brachial index = ratio of DP or PT / highest brachial systolic BP
    - 1.0-1.4 = normal
    - 0.91-0.99 = borderline
    - 0.4 - 0.9 = abnormal
    - $\leq$ 0.4 = severe, indicates ↑ risk of development of critical limb ischemia
    - *NB = may not correlate with symptoms

Bruits = not indicative of degree of stenosis

ASO - Clinical

- Skin color changes
  - pallor with elevation
  - reactive hyperemia (rubor) and delayed venous filling (>15 sec) with dependency
- Trophic changes:
  - hair loss; dry, scaly skin
  - cool foot
  - ± chronic hyperemia
- Ulcers: spontaneous, post-traumatic
  - pale, painful, irregular border

ASO – diagnostic tests

ABI's = very sensitive (~90%) and specific (>95%) in detecting presence of PAD using 0.9 as a cut-off

Exercise ABI's = may help to differentiate claudication from pseudoclaudication and to assess functional status in patient's with PAD

Ultrasound = simple, inexpensive, location and severity, f/u

CTA = pre-intervention

MRA = pre-intervention

Contrast Angiography = at time of intervention

ASO

- Treatment
  - 75% = stable course
  - 25% = progressive
    - ¼ = amputation
  - Critical Limb Ischemia (rest pain, tissue loss) = prompt eval for revasc
  - Morbidity / Mortality = CAD, stroke

ASO

- Treatment:
  - Asymptomatic = risk factor mods (including statin tx), anti-platelet rx (class IIa), +/- ACEI, long term f/u
  - Mild to moderate disease
    - medical treatment = risk factor mod., ASA or clopidogrel (class I), Cilostazol (not with CHF/LV dysfunction)
    - cornerstone = walking (supervised vs home program 30-45 min $\geq$ 3x/week)
  - Severe or rapidly progressive disease
    - endovascular intervention, surgery
    - goal = symptom relief, functional improvement, limb salvage

Abdominal Aortic Aneurysm (AAA)

- Overview:
  - Defined = minimum A-P diameter $\geq$ 3cm.
  - Etio. = atherosclerosis (90-95%), hereditary, inflam, infect, aortopathy (Marfans, Bicuspid AV)
  - Prevalence
    - 2% of elderly
    - 10% at autopsy in males > 60 y.o.
    - males > females 5-8 x
  - Most common arterial aneurysm
  - 98% = infra-renal

AAA

* Risk Factors = HTN, smoking, ?familial
* Progression = enlargement 1-4 mm/yr. (<4cm AAA) to 7-8 mm/yr (large)
* Complications = rupture, thrombo-embolism, compression, erosion
* 10% of patients with lower extrem. ASO have an AAA = so screening reasonable for AAA (class IIa) in pts with sx PAD

AAA

- Clinical:
  - Symptoms = with active enlargement or rupture
    - Abdominal or back pain
    - Less common
      - G-I bleeding (d/t erosion)
      - rupture into IVC
      - lower extrem. emboli
  - 90% ruptures = retroperitoneal
  - Ominous triad = abdominal/back pain, pulsatile abdominal mass, low blood pressure

AAA-Clinical

- Physical Exam:
  - incidental finding
  - pulsatile mass = epigastric
  - 25% = bruit
  - tenderness = pending rupture
  - rupture = “shock”

AAA

- Diagnostic tests:
  - Abdominal x-ray = calcific outline
  - Ultrasound = inexpensive, serial testing
  - CT Angiography or MRA = pre-op testing

AAA

- Pre-op Evaluation
  - Pulmonary
  - Cardiac
    - Nuclear Stress/Persantine
    - Cardiac Catheterization
      - positive stress test
      - symptomatic
- Operative mortality = related to age and presence of CAD
- Leading cause of Peri-Op Death = CAD

AAA

* Monitoring
  - < 4 cm = US q 2-3 yrs
  - 4 – 5.4 cm = US q 6-12 months

* Surgery or endovascular repair
  - Timing:
    - Diameter $\geq$ 5.5cm
    - Size > 0.5cm/6 mos.
    - Symptomatic = emergent
  - Rupture = high mortality

Thoracic Aortic Aneurysm

Abnormalities of Aortic Media

- Bicuspid Aortic Valve
- Marfan's
- Turner's Synd
- Loey's-Dietz Synd
- Familial/non-syndromic

screen pt. and 1st degree relatives

Popliteal Artery Aneurysm

70% of all lower extrem aneurysms

Can be bilateral

↑ Risk of AAA

Complications:

*distal emboli

*thrombosis in-situ

*rupture = uncommon

Surgical repair = symptoms or > 2 cm dia

Acute Arterial Occlusion

- Etiology = embolic, thrombotic, traumatic
  - Embolic=
    - Cardiac origin = 80-90%
      - Afib = 75%
      - LV thrombus
      - Endocarditis
      - Left atrial myxoma
    - Non-Cardiac
      - aortic plaque ulceration or disruption
      - embolus from aneurysm
      - paradoxical venous thrombo-embolism

Acute Arterial Occlusion

- Etiology (continued):
  - Thrombotic =
    - ASO
    - Lower extrem. Aneurysm (with thrombosis in-situ)
    - Buergers disease/Arteritis
    - Local trauma
    - Hypercoagulable states

Acute Arterial Occlusion

- Clinical = 6 -“P”s
  - Pain = rapid onset
  - Polar (poikilothermia) = cold limb
  - Pallor = with venous collapse
    - progression to bluish mottling = tissue ischemia and necrosis
  - Pulseless =
    - Thrombus propagation with time
  - Paresthesia = ischemic neuropathy
    - May progress to complete loss of sensation and motor function
  - Paralysis = ischemic nerve injury and muscle rigidity
    - chance of limb salvage ↓

Acute Arterial Occlusion

- Pathophysiology:
  - Release of K^+, myoglobin, lactic acid = hyperkalemia, acidosis, renal failure
  - Flow restoration = wash-out of K^+ and lactic acid, arrhythmia, hemo. Instability, post-revasc compartment syndrome.

Acute Arterial Occlusion

- Differential Diagnosis =
  - Phlegmasia cerulea dolens = acute extensive DVT
    - Lower extrem. cyanosis, acute swelling, edema, leg vein distension, ↓ or absent pulses
  - Ergotism
  - Acute aortic dissection
  - Low Cardiac - Output State in patient with pre-existing ASO/stenosis = ↓ perfusion pressure

Acute Arterial Occlusion

- Treatment =
  - Heparin = prevent thrombus propagation
    - * Unless category III / irreversible = amputation
  - Rapid Evaluation and Revascularization = endovascular, surgery

Thromboangiitis Obliterans – Buerger's Disease

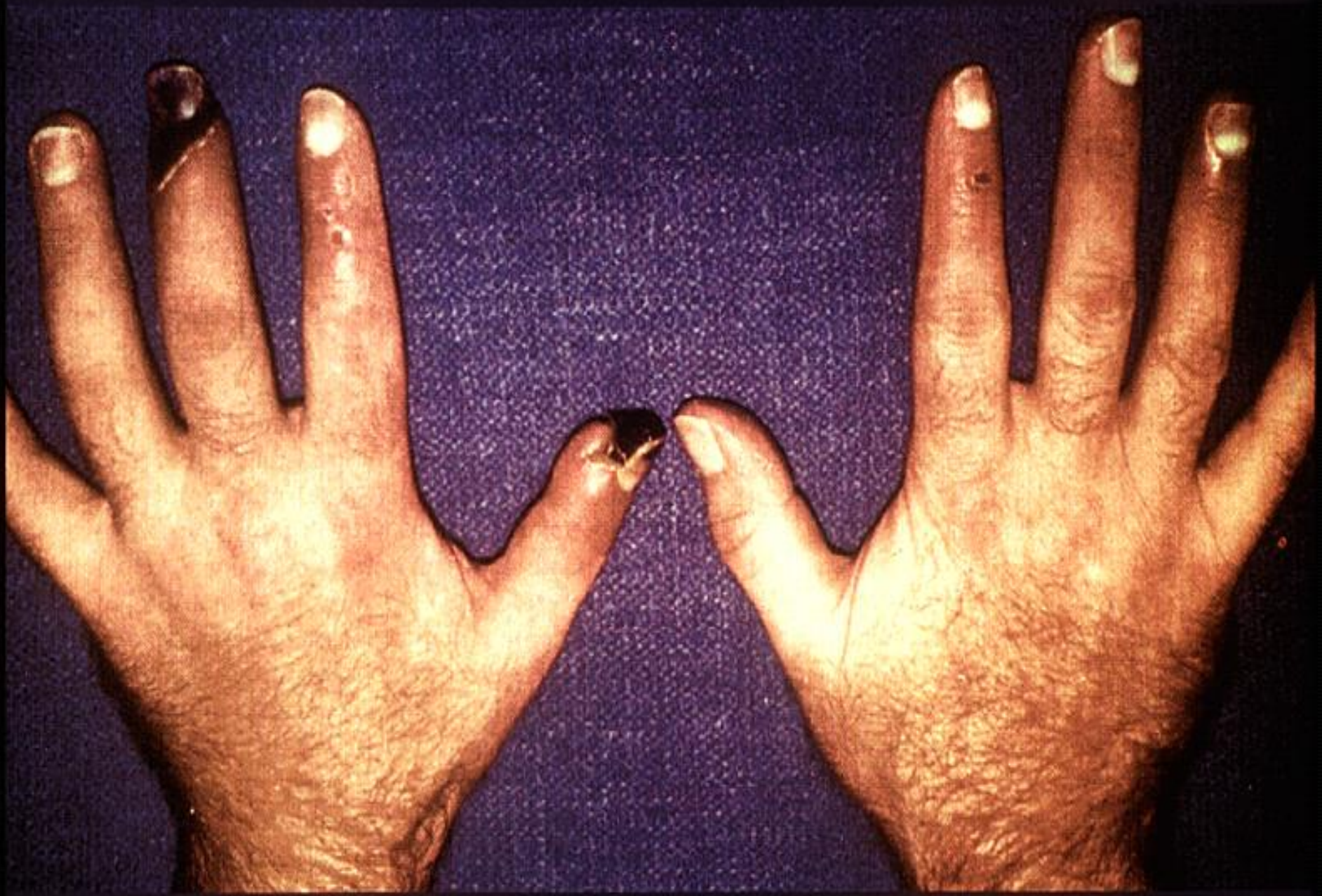
- Pathophysiology = inflam. occlusive disease of small and medium size peripheral arteries and veins in young male smokers
- Age of onset = < 50 y.o./freq. < 30 y.o.
- Absence of Risk Factors = except smoking
- > 90% male
- Prevalence mid and far-east

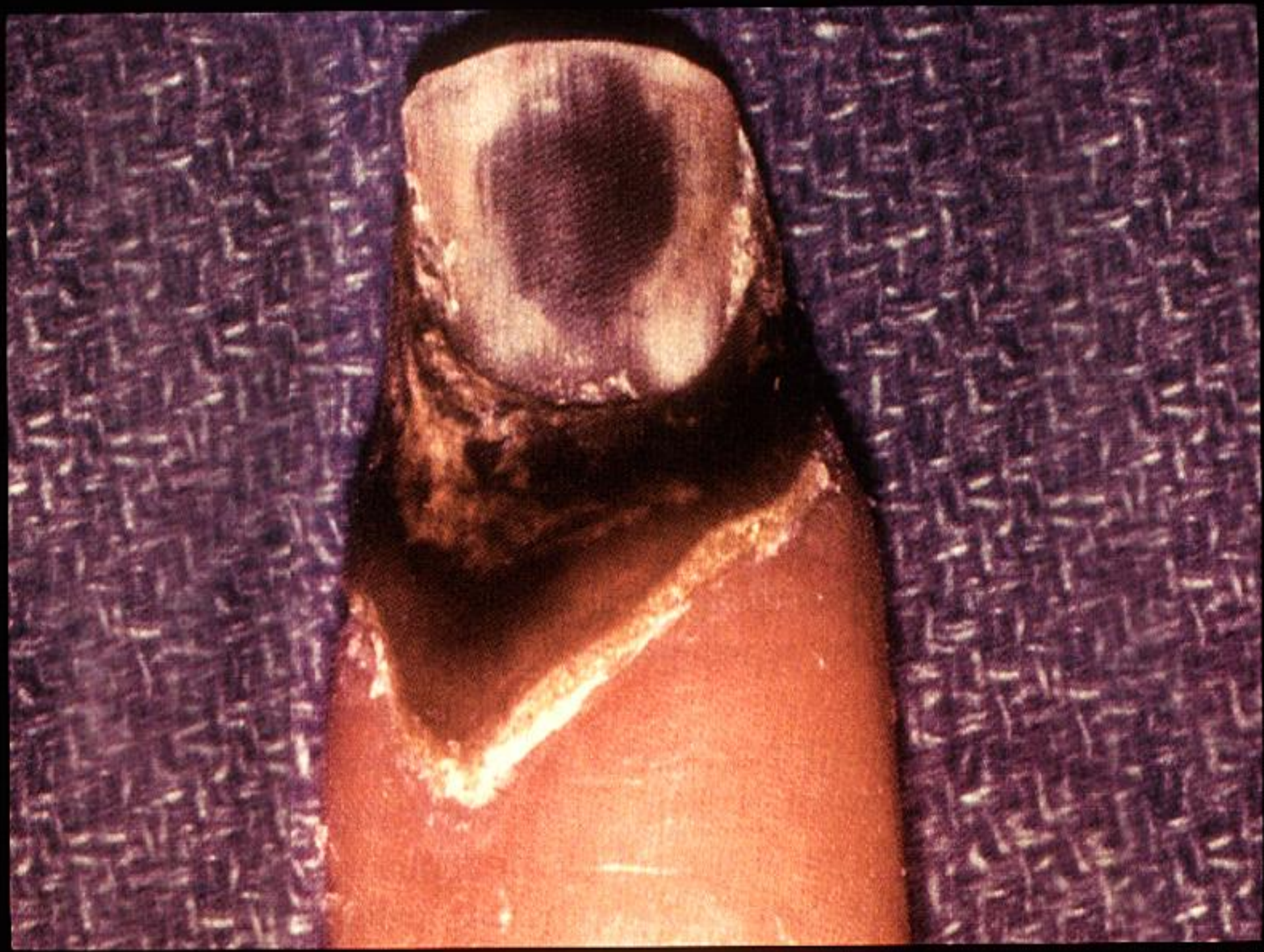
Buerger's Disease

- Etiology = uncertain, but…
  - Smoking is related to progression or remission
  - Cessation of smoking = improved prognosis
  - Continuation of smoking = disease progression
  - Ischemic symptoms = distal extrems.

Buergers Disease

- Clinical =
  - Claudication
    - instep of foot
    - hand = “writers cramp”
  - Numbness/paresthesias, Raynauds
  - Ulceration, gangrene
  - Thrombophlebitis = superficial or deep
    - classically migrating and transient (“phlebitis migrans”)





Buerger's Disease

- Treatment
  - STOP SMOKING
  - Surgical revascularization = generally dismal long term results
  - Sympathectomy (thoracic, lumbar) = symptom relief
  - Amputation = gangrene, severe infection, debilitating pain
  - "Growth Factor" angiogenesis = ?