

Intermittent Claudication

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2/15/12

History

- Claudius, Roman emperor (41-54 AD) was said to walk with a limp
- Bouley (1831) in Paris – vet who first described IC; identified aneurysmal & chronically thrombosed femoral a. in horse with progressive limping
- Charcot (1858) – first to describe in humans
 - Vasospasm vs. insufficiency



History (cont.)

- 1960s – DeBakey, Haemometakinesia; “borrowing-lending phenomenon”
 - Shunting based on vasodil. metabolites prod by exercise
 - Vicious cycle causes less blood capillaries prox. to occlusion
- 1970s – Dormandy and Hess, Viscosity and Poiseuille’s Law
 - PAD pts with higher blood viscosity than age-matched controls
 - Hematocrit, plasma fibrinogen, and blood cell deformability
 - Pentoxifyline
 - Decreases whole blood viscosity (dec. fibrinogen levels, inc. RBC flexibility, etc.)
 - Efficacy prob overestimated

Case Presentation

- 64 yoM presents with complaints of pain with walking...
- HPI:
 - Distance to onset of symptoms / cessation of activity
 - Relief with rest?
 - Consistent vs. occasionally
 - Description of pain? crampy, dull, wrenching, etc.
 - Location of pain – gives idea of location of occlusive disease
 - Associated symptoms? chest pain, DOE, etc.

Case Presentation

- PMH:
 - CAD
 - HTN
 - COPD
 - DM II
 - CKD
- PSH:
 - Inguinal Hernia x2
 - L2 Laminectomy
 - PCI x1 in '09
- FH:
 - Mother with DM II and HTN
 - Father died of MI at age of 61
 - Brother with HTN
- SH:
 - 1-2 beers per day
 - 80 pack yrs. (2ppd)

PE

- T 37.0, P 82, R 16, BP 148/93, O2 94% (RA)
- Gen: Thin, appears older than stated age
- HEENT: normal
- CV: normal
- Pulm: normal
- Abd: normal, no pulsatile masses
- Ext: muscle wasting, thinning skin, thickened nails, hair loss in extremities
- Vascular: palpable radials, carotids, and femorals, no palpable popliteals, DP or PTs; monophasic DP and PT signals bilaterally

Additional Studies

- ABI

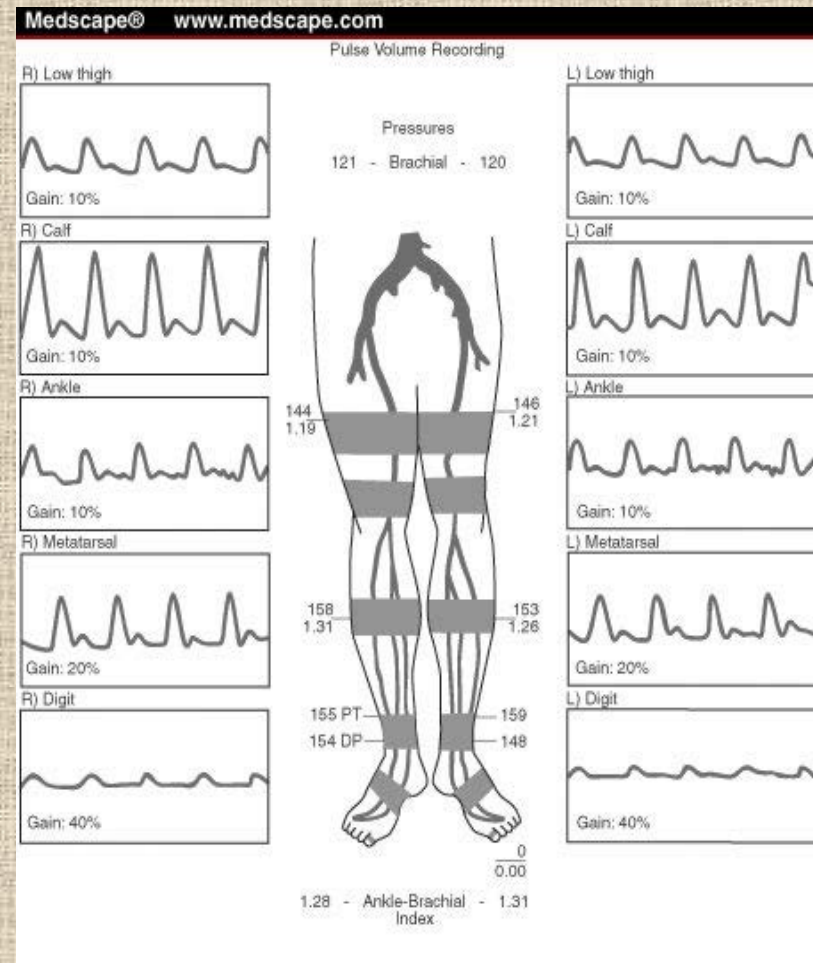
- Ratio of BP in legs to BP in arms

$$ABPI_{Leg} = \frac{P_{Leg}}{P_{Arm}}$$

- Can be preformed at rest or with exercise induction

- Interpretation?

- 0.9 – 1.25: Normal
- > 1.3: non-compressible vessels (DM, CKD)
- 0.4 – 0.9: mild/moderate PVD
- < 0.4: severe PVD



Additional Studies

- TBI – used for pts with non-compressible vessels
 - Interpretation:
 - 0.65: normal
 - 0.3-0.6: claudication in extremity
 - < 0.3 : poor healing potential
- Exercise ABI – used for patients with claudication symptoms but normal ABIs at rest
 - Interpretation: essentially the same as resting ABIs
- CTA, MRI/MRA, etc.



Risk Factors for PVD

- Essentially same for atherosclerotic dz in rest of the body (coronaries, carotids, etc.)
 - Hypertension
 - Hyperlipidemia
 - Diabetes
 - Tobacco abuse
 - Male sex
- Risk for cardiovascular mortality & limb loss:
 - Annual risk?
 - 5% and 1% respectively
 - Improvement/stability of symptoms with non-operative measures?
 - 50%
 - Will progress to needing an operation within 5 years of diagnosis?
 - 20-30%

Non-operative management

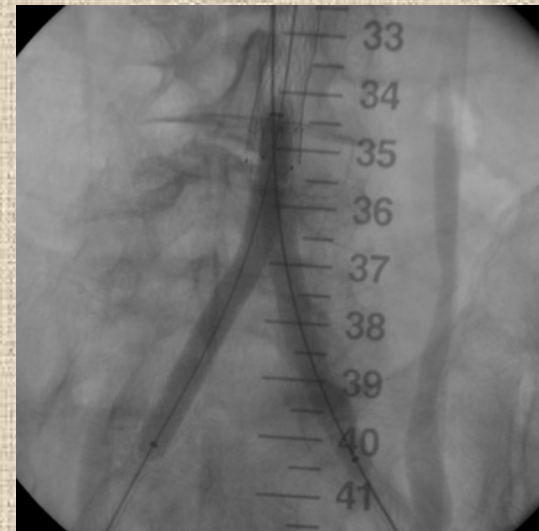
- Optimization of modifiable risk factor profile:
 - Smoking cessation
 - Control of DM and BP
 - ASA and statin therapy
- Exercise regimen:
 - Increases muscle's ability to adapt to anaerobic metabolism and overall increase in mitochondria
 - Walking is preferred mode of exercise
 - 3x per week
 - At least 30 minutes per session
 - Near-maximal claudication pain is indication for stopping
 - Continue regimen for 6 months

Operative Management

- Indications for operative intervention:
 - Disabling / Lifestyle Limiting Claudication
 - Limb-threatening Ischemia
 - Rest pain or Tissue ulceration
- Arteriography - Gold standard
 - Allows for simultaneous diagnosis & intervention
 - Limits exposure to contrast dye
 - MAC sedation vs. general anesthesia
 - Address inflow issues even if more distal bypass indicated

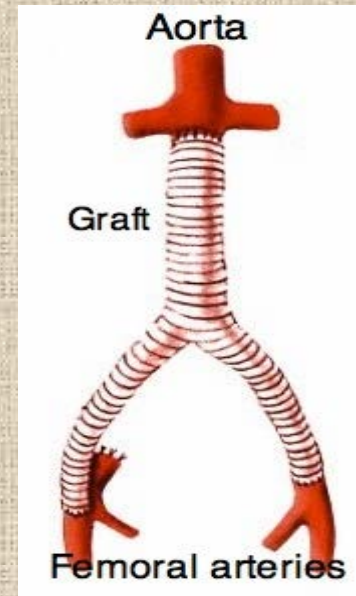
Percutaneous Angioplasty

- Gen more indicated for more prox. aortoiliac segments rather than distal tibioperoneal dz.
- Most useful for short-segment occlusions or multi-segmental dz,
 - especially if large distance between lesions
- Can be used alone or in conjunction with stent deployment.



Bypasses

- Aorto-Bifemoral Bypass
- Aorto-Iliac Bypass
- Femoral-Femoral Bypass
- Extra-anatomic Bypass (Axillofemoral, etc.)
- Femoral-Popliteal Bypass
- Synthetic vs. Autologous vein conduits based on bypass location, length, and availability of suitable native conduits.



Non-Atherosclerotic Claudication

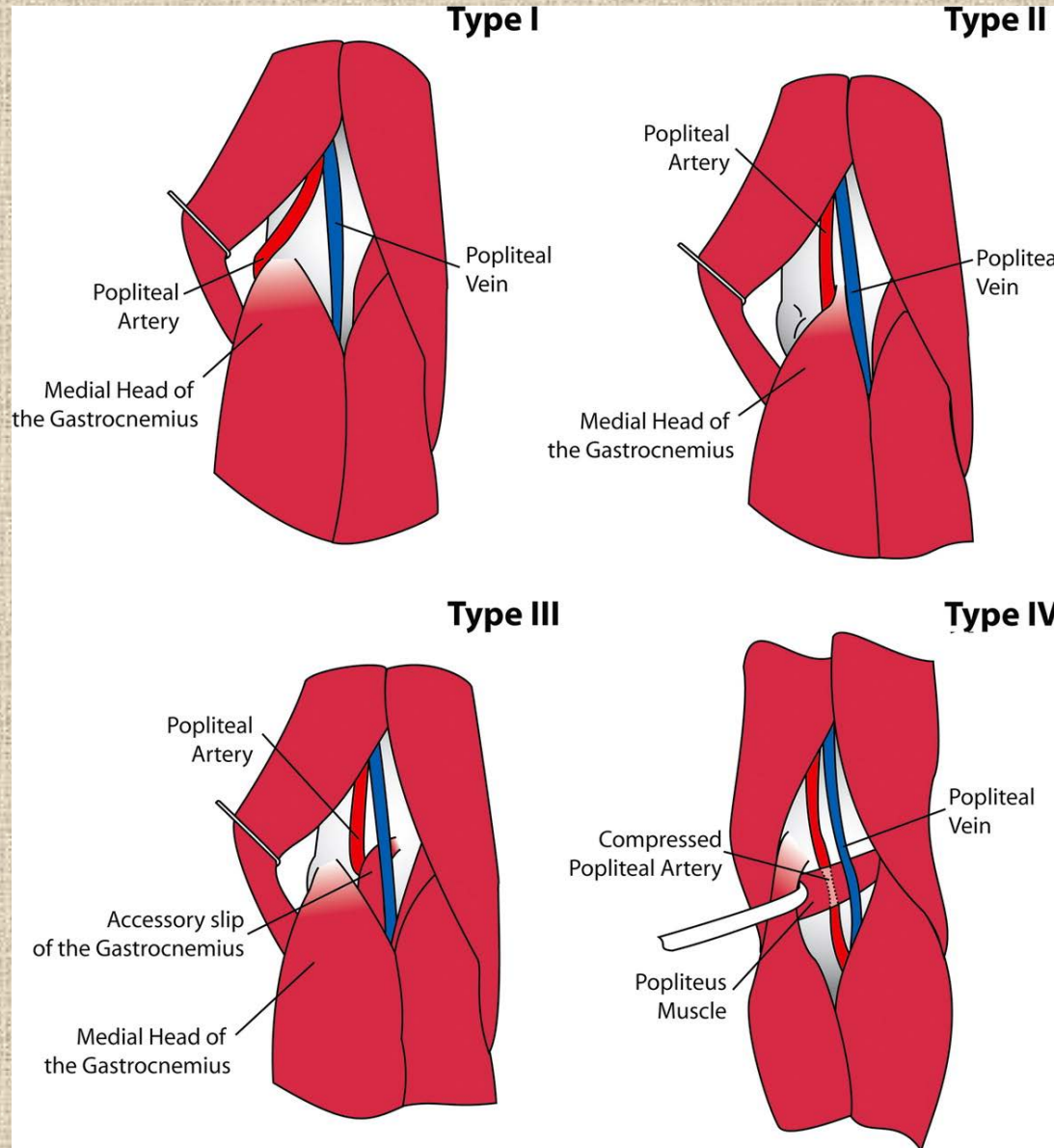
- Congenital – metabolic
 - Ehlers-Danlos Syn
 - Pseudoxanthoma Elasticum
- Congenital – anatomic
 - Popliteal Entrapment Syn
 - Persistent Sciatic Artery
 - Abdominal Aortic Coarctation
 - Cystic adventitial Dz
- Behcet's
- Radiation Arteritis
- Ergot Intoxication
- Neurogenic Claudication



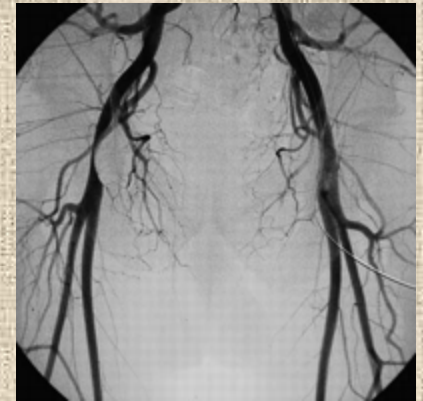
Non-Atherosclerotic Claudication

- Ehlers-Danlos Syn
 - 9 types; biochemical defects leading to disorder of collagen synthesis
 - Present with spontaneous rupture of arteries, aneurysms, etc. – friable arteries
 - Avoid arteriogram; high operative M&M
- Popliteal A. Entrapment Syn
 - Congenital anomaly in popliteal fossa resulting in arterial compression or occlusion (65% have popliteal a. medial to medial head of gastroc)
 - Dx with dynamic duplex or arteriogram
 - Operate early to avoid occlusion or embolization; divide entrapping structure

Popliteal Entrapment Syndrome Variants



Non-Atherosclerotic C.



- Cystic Adventitial Dz
 - Intramural cyst b/w media and adventitia
 - Intermittent claudication exacerbated by knee flexion
 - “Scimitar sign” on arteriogram
- Radiation Arteritis
 - Radiation to pelvic or LE structures; results in endothelial injury, going to fibrosis of adventitia > media > intima, progressing on to occlusion
- Neurogenic Claudication
 - Intrinsic process vs. extrinsic spinal cord compression
 - See pain, paresthesias, and/or weakness, usu in dermatomal distribution
 - Usu have relief with spinal flexion or recumbancy
 - Tx. conservative vs. surgical decompression

