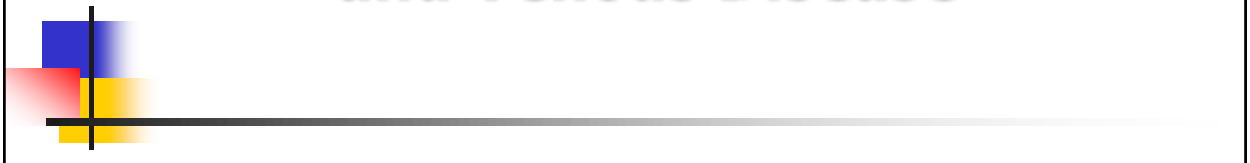
Distinguishing Between Arterial and Venous Disease



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Peripheral Vascular Disease

Peripheral Vascular Disease (PVD)

- Includes disorders that alter natural flow of blood through the arteries & veins outside the brain & heart- peripheral circulation
- 10 Million Americans
- 50% Asymptomatic
- 1 in 3 Diabetics over age 50
- Biblical Times- King Asa 867-906 BC

http://www.emedicinehealth.com/peripheral_vascular_disease/article_em.htm

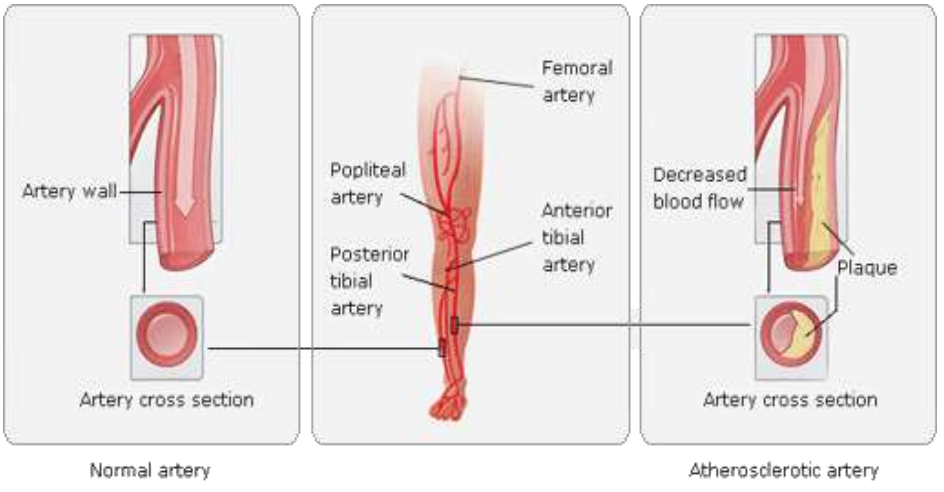
PVD Risk Factors

- Hypertension-
  - 2 to 3X risk of claudication
- Hyperlipidemia
- Smoking-
  - ↑ risk PAD by 400%
  - 2X incident amputation
- Diabetes Mellitus-
  - 20% PAD
- Obesity- Abdominal
- Kidney Disease
- Transplant recipient
- Familial Predisposition
- Advancing Age
- Gender
- Stress
- Sedentary Lifestyle

Peripheral Arterial Disease

- PAD is a chronic condition in which partial or total arterial occlusion deprives the lower extremities of oxygen and nutrients
- Sources of blockage include: Atherosclerosis – 90%, Atheromatous plaques, Thrombus, Emboli or Arterial Spasm

Atherosclerosis



Atherosclerosis- Aorta

Arterial Vasospasm

PAD Epidemiology

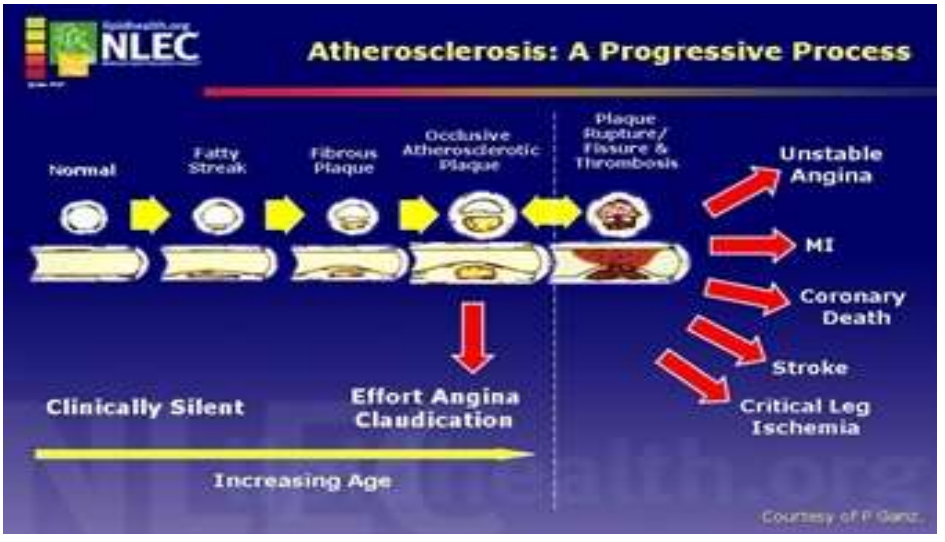
- 8 to 12 Million Americans
  - 19 Million by 2050
  - 12 - 20% Over age 60
  - 60 - 90% Asymptomatic
  - 25% Public Awareness
- Onset in Teen Years ~ 33%
  - 2/3 of Americans age 20-30
- Men & Women- Equal
  - African Americans higher risk
  - Hispanics higher risk

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2733014/

Ancient Egyptian Princess
(Ahmose Meyret-Anon 1585-1550 BC)

Kenneth Garrett / National Geographic via Getty Images

PAD- Systemic & Progressive



PAD Mortality

- 30% from MI or CVA within 5 years
- 50% in 10 years; 70% at 15 years
- Highest mortality among Women with Diabetes
- 4-7X risk of CAD, MI, Stroke/TIA
- 1 in 3 chance of PAD in legs with diagnosis of Heart Disease

Four Stages of PAD

75% of the vessel occluded before onset S/S

- Stage I- Asymptomatic
  - Bruit, aneurysm on physical exam
- Stage II- Claudication "to limp"
  - Reproducible muscle pain with exercise
- Stage III- Rest Pain
  - Wakes Up- dependent position relieves
- Stage IV- Necrosis & Gangrene

Inflow Obstructions

Inflow- Distal aorta & common, internal & external iliac arteries

- Buttock & Hip – Aortoiliac artery disease
- Impotence – Bilateral aortoiliac artery disease
- Gradual obstructions may not cause significant tissue damage
- Pain is key indicator- Hip, Thigh, Buttock

Inflow Obstruction Procedures

- Stent & Endovascular procedures
- Aortoiliac
- Aortofemoral- extra-cavity bypass grafts
- Abdominal Aortic Aneurysm Repair
- Axillofemoral Synthetics
- Less chance re-occlusion/ischemia

Outflow Obstructions

Outflow- Femoral, Popliteal & Tibial arteries or infra-inguinal arterial segments below superficial femoral artery (SFA)

- Thigh – Common femoral or Aortoiliac Artery
- Upper two-thirds of calf – Superficial Femoral Artery
- Lower one-third of the calf – Popliteal Artery
- Foot claudication – Tibial or Peroneal Artery
- Rest Pain- Pain key indicator
- Gradual- May cause significant tissue damage

Dhaliwal G, Mukherjee D.Int J Angiol. 2007 Summer; 16(2): 36–44 *www.ncbi.nlm.nih.gov/pubmed/22477268*

Outflow Obstruction Procedures

Lower Extremity Occlusion Interventions

- Stent procedures
- Femoropopliteal, Femorotibial, or Femoroperoneal Bypass Grafts
  - Synthetic & Autogenic (vein) materials
- Higher incidence of re-occlusion
- More common with Diabetes

Critical Limb Ischemia or Acute Arterial Occlusion "6 Ps"

- Pain- Earliest & Major sign- Rapid Peak
  - Sharp, distal to or below obstruction
- Paresthesia- Sensory- touch, pressure, numbness; Motor- can't move- not recover
- Pallor- Mottled, No edema
- Pulse Changes- Diminished to absent
- Poikilothermia- Adapt to air temperature
- Paralysis- Muscle rigidity

Critical Limb Ischemia
Acute Arterial Occlusion

Characteristics- Bilateral Comparison

- Acute, dramatic changes & sudden- Usually thrombus or embolus
- Asymmetrical- Usually one extremity
- Pain unrelenting- Distal to or Below obstruction
- Absent or Diminishing pulse- Below occlusion
- Blanching/refill times increase; No edema
- Neurologic Changes:
  - Sensory- Diminished response to touch pressure- Need to apply nail bed compression; Numbness; Tingling; Pins & Needles
  - Assess peroneal vessel- Touch lateral side of great toe & medial aspect 2nd toe
  - Assess tibial vessel- Touch medial & lateral side of the soles of feet
  - Motor- Inability to move; Foot drop
    - May or may not recover nerve function post ischemic event
- Six hour window from onset of neurologic changes before irreversible damage

Chronic Limb Ischemia
Initial Onset

- Intermittent Claudication
  - Muscle ischemia from activity- lactic acid
  - Pain in muscle groups not joints
- Major & Earliest Sign of PAD
- Cramping, numbness, accompanied by burning- Reproducible with exercise & relived by Rest (2-5 minutes)

Chronic Limb Ischemia Advanced or Severe

- Pain- Severe at rest- moving relieves
  - Numbness, Burning, "Toothache"
  - Distal portion of extremities
  - Toes, foot arches, fore-feet and heels
  - Rarely in calves & ankles
  - Greater risk- Ulcers, Gangrene & Limb loss
  - Worse at night
  - Prefer dependent "**A**" position

Chronic Limb Ischemia Inspection

Bilateral Comparison

- Gait & Posture unaffected
- Pale feet, rubor red, red to bluish color
- Elevation pallor & Dependent rubor
- Trophic Changes- Malnutrition, Poor perfusion
  - Skin - thin, scaly, dry
  - Hair loss over calf, ankle, foot
  - Thick nails
  - Little or no edema

Chronic Limb Ischemia
Dry Gangrene

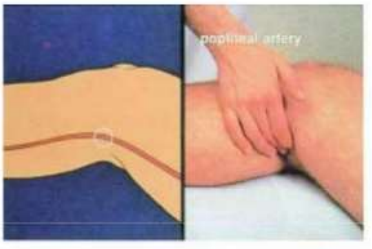
Chronic Limb Ischemia Palpation

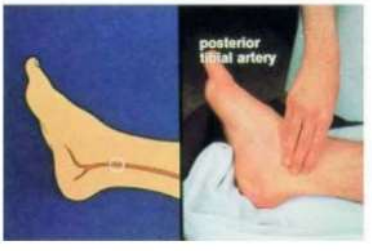
- Feel cool even in warm ambient air
  - Coolness or coldness- Use back of hand
- Pulses
  - Use distal pads of index & middle fingers
    - Changes distal to or below obstruction
  - Low amplitude, diminished to absent
  - Indicate palpable or doppler method

Chronic Limb Ischemia Pulse Detection

- Bilateral Comparison
  - Exaggerated with aneurysm, trauma or infection
- Use distal pads of index & middle fingers
- Gentle, varying pressure
- Palpate a Thrill- fine, rushing vibration
- Auscultate (hear) Bruit- blowing, purring

Locating Pulses





Arterial & Venous Sounds

Chronic Limb Ischemia or Arterial Ulcers

- End of the toes, between toes or dorsum of the foot, heel, nail, bony or pressure sites
- Initially irregular edges- Progress to "punched out" even, concentric lesion
- Pale, yellow, brown, grey or black ulcer bed
- Little to no granulation
- Swelling, redness surrounding tissues
- Prone to infection
- Healing- Poor to non-healing
- Painful- Especially at night

PAD Evidence-Based Care

- Complete smoking cessation
- Supervised walking exercise program
- Weight loss- Target BMI, 18.5-24.9 kg/m2
- Healthy diet; Foot & Skin care
- Optimize diabetes management
- Hyperlipidemia—Use high dose statin - If low HDL, high TG, add fibrate or niacin; if high Lp(a), add niacin
- HTN— ACEIs, ARBs, diuretics; Achieve target BP < 140/90 mm Hg; Diabetes or renal insufficiency <130/80 mm Hg
- Uncontrolled HTN- beta blocker especially with coexistent CAD; Low-dose ACEI when normotensive
- Antiplatelet therapy—Use ASA (75-325 mg/day) or clopidogrel Plavix (75 mg/day)
- Claudication- cilostazol or Pletal; superior to Trental
- Percutaneous or surgery- Indicated for acute limb ischemia, critical limb ischemia, or lifestyle-limiting claudication

http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/cardiology/peripheral-arterial-disease/

Venous Disorders

- Peripheral Venous Disease
  - Includes disorders that result from increased venous pressure or valve damage of a vein wall
- Veins must be patent with competent valves

"Has anyone seen my
other elastic stocking?"

Peripheral Venous Disorders

- Sources of damage include:
  - Inflammation- Recurrent phlebitis
  - Diminished blood flow through stretching
  - Dilation from defective vein walls
- Predisposition or Preexisting Condition
  - Systemic conditions- Obesity, CHF result in bilateral disease
- Chronic edema with an accumulation of catabolic wastes & tissue malnutrition

Chronic Venous Insufficiency History

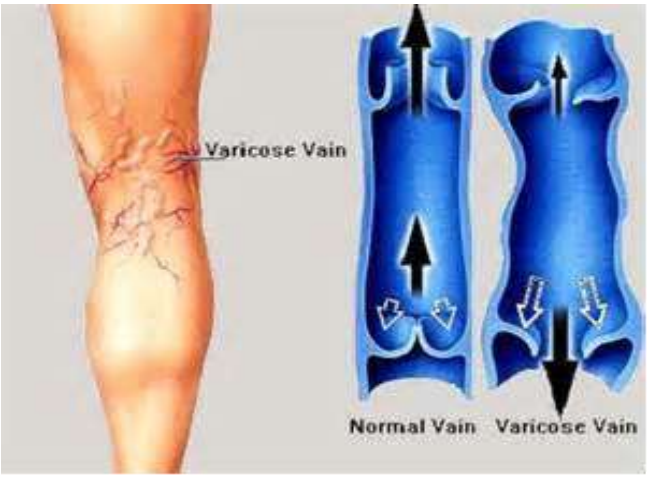
- **Votive tablet at base of the Acropolis in Athens, Greece**

Peripheral Venous Disorders

Venous Insufficiency

- Varicose Veins
  - Result of defective valves
    - Overstretched due to excessive or persistent pressure
  - Inability to drain blood from the extremity
  - Not life threatening
  - Problematic & painful

Varicose Veins



Chronic Venous Insufficiency
Varicose Veins

http://www.emedicinehealth.com/peripheral_vascular_disease/article_em.htm

Chronic Venous Insufficiency

- Causes
  - Heredity or family history of varicose veins
  - Working on feet all day
  - Airline travel
  - Obesity
  - Pregnancy
  - Heart Disease

Chronic Venous Insufficiency

- Advancing age
- Hormonal influences during pregnancy
- Oral contraception
- Post-menopausal hormonal replacement therapy
- Prolonged sitting with legs crossed
- Wearing tight undergarments or clothing
- History of blood clots
- Injury to veins
- Conditions that cause increased pressure in the abdomen including liver disease, fluid in the abdomen, previous groin surgery
- Other- Topical steroids, trauma or injury to the skin, previous venous surgery & exposure to ultra-violet rays

Chronic Venous Insufficiency
Varicose Veins

Chronic Venous Insufficiency Varicose Veins

Varicose veins

- Dilated blood vessels- weakening in the vessel wall
- Swollen, twisted clusters of blue or purple veins
- Spider Veins or Telangiectasias- Tiny blood vessels close to skin surface & surrounded by thin, red capillaries

Chronic Venous Insufficiency Characteristics

- Dull ache
- Cramping not reproducible consistently with activity
- Unilateral or bilateral
- No neurological changes or deficits
- Pain relieved by elevation- worse later in the day, less at night

Chronic Venous Insufficiency Characteristics

- Thick, tough, woody, brawny, brown pigmented skin
- Veins full when leg slightly dependent
- Scarring from recurrence of ulcers
- Pulses intact
  - May be difficult to locate due to edema

Chronic Venous Insufficiency Characteristics

- "**V**" position
- Edema present
- Ankle or leg edema increases throughout the day
- Decreases when lying down
- Paresthesias- burning, itching
- Premenstrual, salt & water retention exacerbate symptoms

Chronic Venous Insufficiency Ulcers

- Venous ulcers- 500,000 to 600,000 Americans per year
- Comprise 80 to 90% of all leg ulcers
- Below the knee - inner aspect of the leg; just above the ankle
- Ulcers- Unilateral or bilateral
- Wound Base: Red in color, yellow fibrous tissue
- Significant drainage- Serous, straw, yellow color
  - Green discharge or foul odor- suspect infectious process
- Irregular edges
- Surrounding skin- discolored & swollen
- Skin may feel warm or hot; Skin- shiny & tight
- Granulation tissue; Take up to one year to heal; high recurrence
- History of leg edema, varicose veins, DVT in either the superficial or the deep veins

Chronic Venous Insufficiency Ulcers

Deep Vein Thrombosis Acute

- Virchow's Triad
  - Thrombus from endothelial lining damage
  - Venous stasis
  - Hypercoagulability

Deep Vein Thrombosis Pathophysiology

- Venous Thrombus- Life Threatening
  - Endothelial injury-Clot-Venous stasis and/or Hypercoagulability
  - Thrombophlebitis- inflammatory process
  - Phlebothrombosis- without inflammation
  - *Deep veins of lower extremities
    - Most frequently- Above knee- Emboli
  - Occur in superficial veins as well

Deep Vein Thrombosis Acute

- Warm to hot
- Cool to cyanotic with severe edema
- Red to red-blue color
- +/- Edema
  - Localized or Unilateral
  - Depends on Site
  - Calf vein thrombosis- None
  - Femoral vein thrombosis- Mild to Moderate
  - Ileofemoral vein thrombosis- Severe

Deep Vein Thrombosis Acute

- 50% Asymptomatic
- Pain- Most reliable sign
  - Squeeze from front to back (anteroposteriorly)
  - Squeeze from side to side (laterally)
  - Squeeze quickly, Avoid rubbing calf
    - Minimize dislodging clot
  - Pain on dorsiflexion-Homan's = Less reliable

Deep Vein Thrombosis Acute

- Nodules, Lumps, Cords
  - Reflect inflammation of walls of vein
- Low grade fever
- Fatigue
- Malaise
- Extremity may feel- Tense, Full, Heavy

Deep Vein Thrombosis Risk Factors

- Risk Factors (DVT)
  - *Hip Surgery & * Prostate Surgery
    - *Greatest Risk General Surgery over age 40
  - Immobility- Bed rest, CHF, MI,
  - Leg trauma-especially fractures, casts
  - Blood dyscrasias, Polycythemia vera
  - Malignancies/Neoplastic disease
  - Ulcerative colitis
  - Pregnancy

Deep Vein Thrombosis Risk Factors

- History of venous disease
- Infection
- Systemic Lupus Erythematosus
- Obesity
- Oral Contraceptives
- Phlebitis- Intravenous therapy, Invasive procedures Trauma

- Thrombus-Inflammation-Vein wall thickening-Embolus formation-Emboli to Pulmonary Artery

Critical Limb Ischemia

- **P**ain- Early onset
- Rapidly Peaks
- **P**allor- Mottled
- Capillary refill time lengthens
- **P**aresthesia- Sensory- touch, pressure, numbness; Motor function impaired/lost
- **P**ulse Changes- Diminished to absent
- **P**oikilothermia- Adapt to air temperature
- Cool to Cold
- **P**aralysis- Muscle rigidity
- No edema

Acute DVT

- 50% Asymptomatic
- Pain most reliable sign
- Red to red-blue color
- Quick refill, engorged veins
- Motor function intact
- Tense, heavy, full
- Pulses intact- Diminished due to edema
- Fatigue
- Malaise, Low grade fever
- Warm to Hot
- Unilateral
- +/- Edema- Localized, site

Chronic Limb Ischemia

- Prefer **"A"** position
- Pain- Severe at rest- moving relieves- Toes, fore-feet, heels
- Worse at night
- Claudication
- Pale feet, rubor red, red to bluish color
- Elevation pallor & Dependent rubor
- Skin - thin, scaly, dry; Thick nails
- Hair loss over calf, ankle, foot
- Numbness, Burning, "Toothache"
- Pulses diminished to absent
- Ulcers- Distal, concentric, pale
- Gangrene & Limb loss
- Little or no edema

Chronic Venous Insufficiency

- Prefer **"V"** position
- Aching- Relieved by elevation or rest
- Worse later in the day
- Cramping-not activity dependent
- Woody, brawny, brown pigmented
- Multiple risk factors
- Veins full if leg slightly dependent
- Skin- Thick, tough, scarring
- Premenstrual, salt & water retention
- Itching & burning
- Pulses intact
- Ulcers- Distal calf, irregular, pink bed, large yellow drainage
- Edema moderate to severe

Thank You