

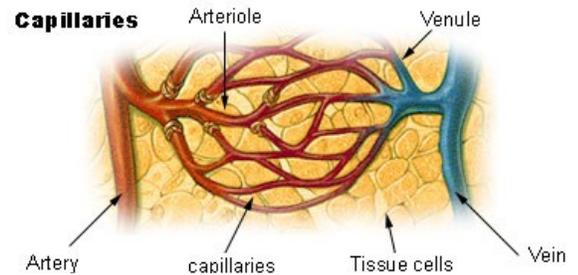
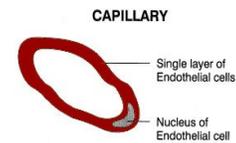
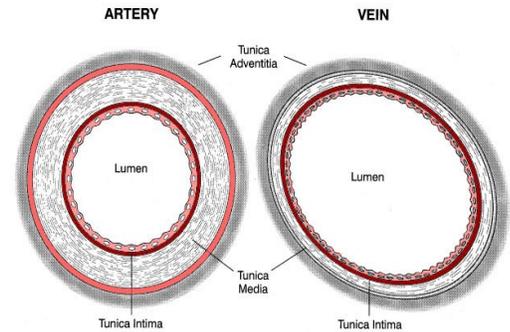
The Vascular System 2023

The Vascular System--Purposes

- Provides route from heart to tissues
- Carries waste to excretory organs
- Allows lymphatic flow to drain back into circulation
- Returns blood to heart for recirculation

Types of Blood Vessels

- Arteries
 - Thick walled
 - Elastic tissue
 - Some smooth muscle
 - Transport oxygen **away** from heart to tissues
 - Examples of major arteries:
 - Branch into arterioles
 - Major controllers of BP
- Capillaries
 - Single layer cells in tissues
 - No elastic or muscle tissue
 - Exchange essential cellular products
 - Oxygen moves to capillaries then tissues
 - Waste products move out
- Veins
 - Thin walled, large diameter
 - Transports deoxygenated blood **to the** heart
 - Valves
 - Prevent backflow
 - Examples of large veins:
 - Branch into venules



Aging and Your Vessels

- Arterial Changes
 - Arterial stiffening caused by
 - Loss of elastin in vessel walls
 - Thickening of intima
 - Progressive fibrosis of media
 - Clinical Manifestations
 - Increased SBP
 - Widened pulse pressure (PP)
 - Diminished pedal pulses
 - Intermittent claudication
- Venous Changes
 - Vessels become more tortuous/prominent
 - Valves less effective
 - Clinical Manifestations
 - Lower extremity varicosities
 - Dependent edema

Peripheral Vascular Assessment

Subjective Assessment

- HPI: chief complaint = "what brings you here?" "what are your symptoms, how long have you had them, what makes them better or worse?"
- PMH -HTN, DM, CVA, TIA, PE, varicose veins, phlebitis, blood clots, edema, leg ulcers
- Surgeries – for CV problems – also look for the giant scars during assessment
- Medications: Past and present Rx, OTC, aspirin herbal meds, Hormones
- Allergies: especially Iodine or dyes for diagnostic studies
- Lifestyle: Activity, occupation- sitting, standing long periods, are current symptoms causing the decreased activity, Smoking/Nicotine, Diet history, fluid intake, exercise, endurance, alcohol
- Family history- helps determine risk factors esp for CAD, cardiomyopathy, and HTN
- Specific vascular history: Pain in legs with activity/at rest, Past vascular impairment- frostbite, clots, ulcers, swelling, change in color or temperature to extremities- pale, rubor, cool, cyanosis

Physical Assessment: Inspection

- Color
- Hair Distribution
- Varicosities
- Edema
- Nail beds
- Scars/Wounds/Ulcers

Physical Assessment: Palpation

- Assess bilaterally
 - o Temperature
 - o Moisture
 - o Pulses
 - Thrill
 - o Edema
 - o Capillary Refill

Physical Assessment: Palpation

● Edema (Pitting)

- 0 =no edema
- +1= 2mm indentation
- +2 = 2-4mm indentation
- +3 = 5-7mm indentation
- +4 = < or = to 8mm indentation



Non-pitting edema



Pitting edema

Physical Assessment: Palpation

● Assess pulse amplitude using the following scale:

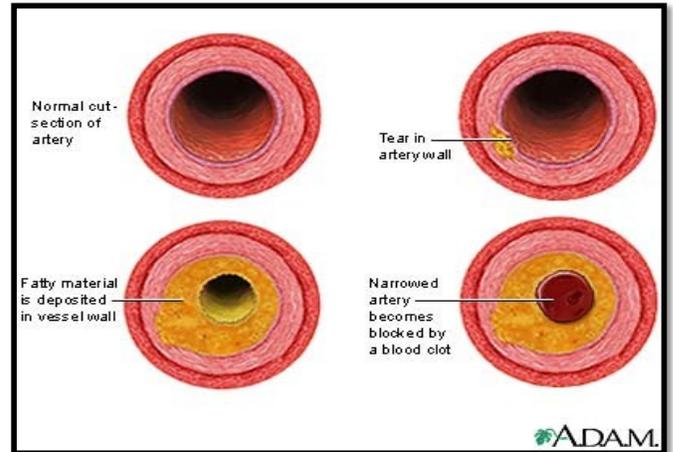
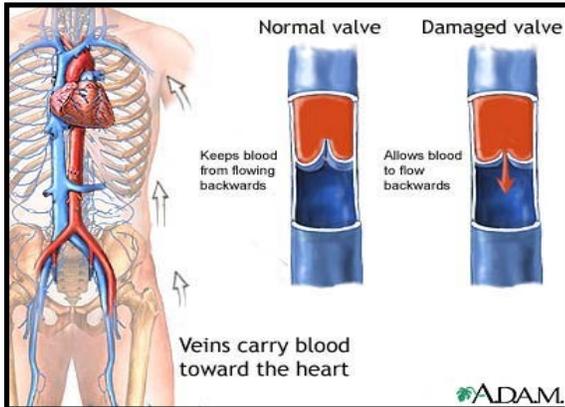
- +3 Bounding, full, increased
- +2 Normal
- +1 Weak, thready
- +0 Absent

Physical Assessment: Auscultation

- Listen for bruits ("Brew-ee")
 - o Over major vessels
 - o Turbulent blood flow through an artery due to a narrowing in vessel
 - o Buzzing or humming

Arterial vs. Venous Disorders

- Arterial
 - Atherosclerosis
 - Difficulty getting oxygenated blood to tissues
- Venous
 - Incompetent Valves
 - Difficulty returning blood to the heart



The 6 P's of Peripheral Vascular Assessment

Pain

- Arterial
 - Intermittent claudication
 - Rest pain
 - Ulcers painful...or not
- Venous
 - Dull ache, heaviness
 - Ulcers painful

Pulses

- Arterial
 - Compare bilaterally (except carotids!!)
 - Decreased or absent
 - Doppler
 - Cap refill >3 sec
- Venous
 - Present
 - May be difficult to palpate due to edema
 - Cap refill <3 sec

Poikilothermia

- Arterial
 - Cool temperature gradient down leg
- Venous
 - Warm, no temperature gradient

Pallor (Skin Color)

- Arterial
 - Elevation pallor

- Dependent rubor
- o Venous
 - Brown discoloration
 - Varicose veins

Parasthesia

- o Arterial
 - Decreased sensation
 - Pins and needles
- o Venous
 - Usually none unless inflammation

Paralysis

- o Arterial
 - If severe ischemia
- o Venous
 - Not a problem

Skin Manifestations

- o Arterial
 - Loss of hair
 - Thick, brittle nails
 - Thin, shiny, taut skin
- o Venous
 - Hair unaffected
 - Normal or thick nails
 - Thick, leathery skin
 - Dry, itchy skin
 - Brown discoloration
 - Garter sign

Edema

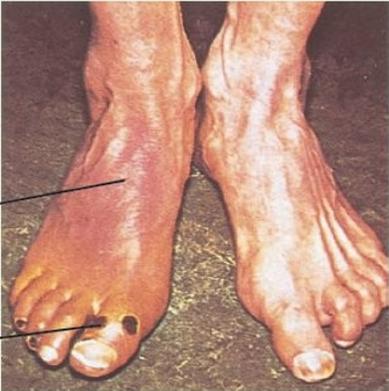
- o Arterial
 - None or mild
- o Venous
 - Moderate to severe; chronic; worse at end of the day

Ulcers

- o Arterial
 - Tips of toes, or lateral malleolus
 - Circular, "punched out"
 - Black eschar (gangrene)
 - Minimal drainage
 - Painful?
- o Venous
 - Near medial malleolus
 - Irregularly shaped
 - Yellow slough or dark red granulation
 - Chronic drainage
 - Often painful

Summary of Assessment Findings: Arterial or Venous?

- Decreased or absent pulses
- Cap refill < 3 seconds
- Ulcers
- Brown discoloration of the LE's
- Thin, shiny, hairless skin
- Chronic edema
- Notable temperature change distally
- Pain with ambulation
- Pain with leg elevation, or at night (rest pain)
- Skin temp warm – no change in gradient
- Cap refill >3 sec
- + Pulses
- Thick, hardened skin
- Ulcers near medial malleolus, weepy
- Color changes with position
- Dry, itchy skin

| Chronic Arterial Insufficiency (Advanced) | Chronic Venous Insufficiency (Advanced) |
|--|--|
| <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: left;"> <p>Rubor</p> <p>Ischemic ulcer</p> </div> </div> | <div style="text-align: center;">  </div> |
| <p>Pain Intermittent claudication, progressing to pain at rest</p> <p>Mechanism Tissue ischemia</p> <p>Pulses Decreased or absent</p> <p>Color Pale, especially on elevation; dusky red on dependency</p> <p>Temperature Cool</p> <p>Edema Absent or mild; may develop as the patient tries to relieve rest pain by lowering the leg</p> <p>Skin Changes Trophic changes: thin, shiny, atrophic skin; loss of hair over the foot and toes; nails thickened and ridged</p> <p>Ulceration If present, involves toes or points of trauma on feet</p> <p>Gangrene May develop</p> | <p>Often painful</p> <p>Venous hypertension</p> <p>Normal, though may be difficult to feel through edema</p> <p>Normal, or cyanotic on dependency Petechiae and then brown pigmentation appear with chronicity.</p> <p>Normal</p> <p>Present, often marked</p> <p>Often brown pigmentation around the ankle, stasis dermatitis, and possible thickening of the skin and narrowing of the leg as scarring develops</p> <p>If present, develops at sides of ankle, especially medially</p> <p>Does not develop</p> |