

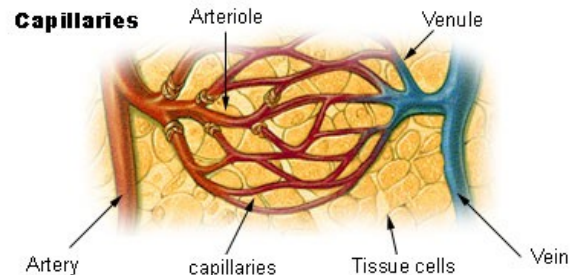
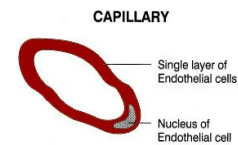
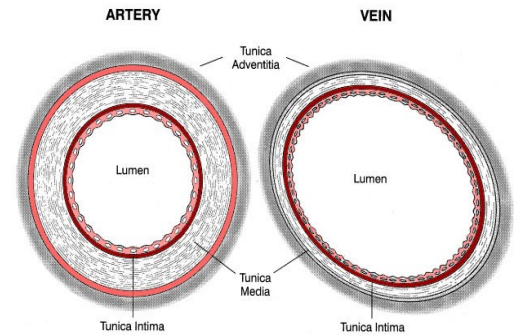
The Vascular System 2024

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:

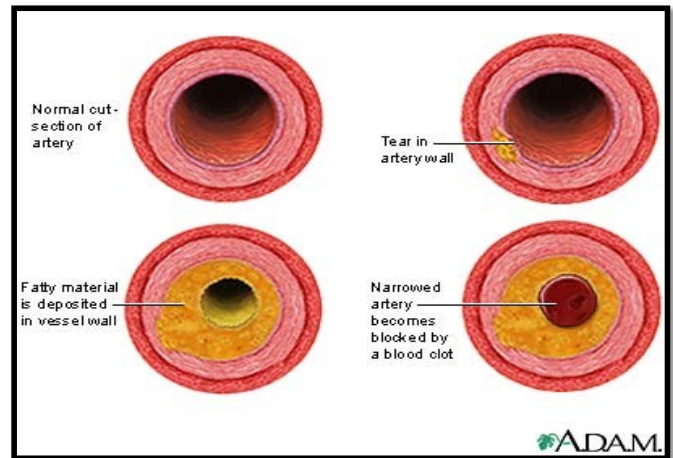
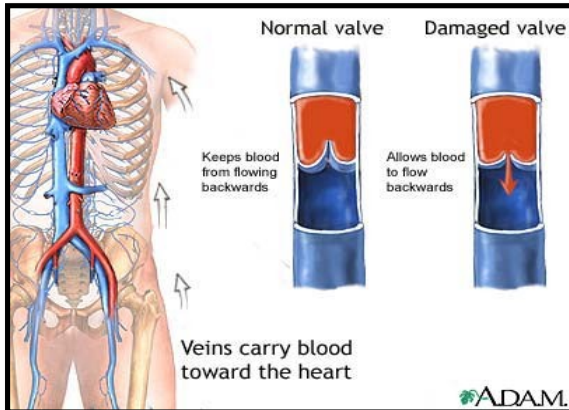
- +3 Bounding, full, increased
- +2 Normal
- +1 Weak, thready
- +0 Absent

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

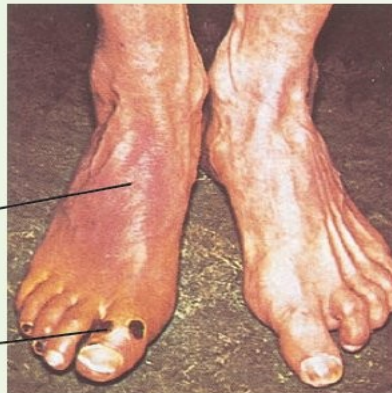
Ulcers

- 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)



Pain	Intermittent claudication, progressing to pain at rest
Mechanism	Tissue ischemia
Pulses	Decreased or absent
Color	Pale, especially on elevation; dusky red on dependency
Temperature	Cool
Edema	Absent or mild; may develop as the patient tries to relieve rest pain by lowering the leg
Skin Changes	Trophic changes: thin, shiny, atrophic skin; loss of hair over the foot and toes; nails thickened and ridged
Ulceration	If present, involves toes or points of trauma on feet
Gangrene	May develop

Chronic Venous Insufficiency (Advanced)



Pain	Often painful
Mechanism	Venous hypertension
Pulses	Normal, though may be difficult to feel through edema
Color	Normal, or cyanotic on dependency. Petechiae and then brown pigmentation appear with chronicity.
Temperature	Normal
Edema	Present, often marked
Skin Changes	Often brown pigmentation around the ankle, stasis dermatitis, and possible thickening of the skin and narrowing of the leg as scarring develops
Ulceration	If present, develops at sides of ankle, especially medially
Gangrene	Does not develop