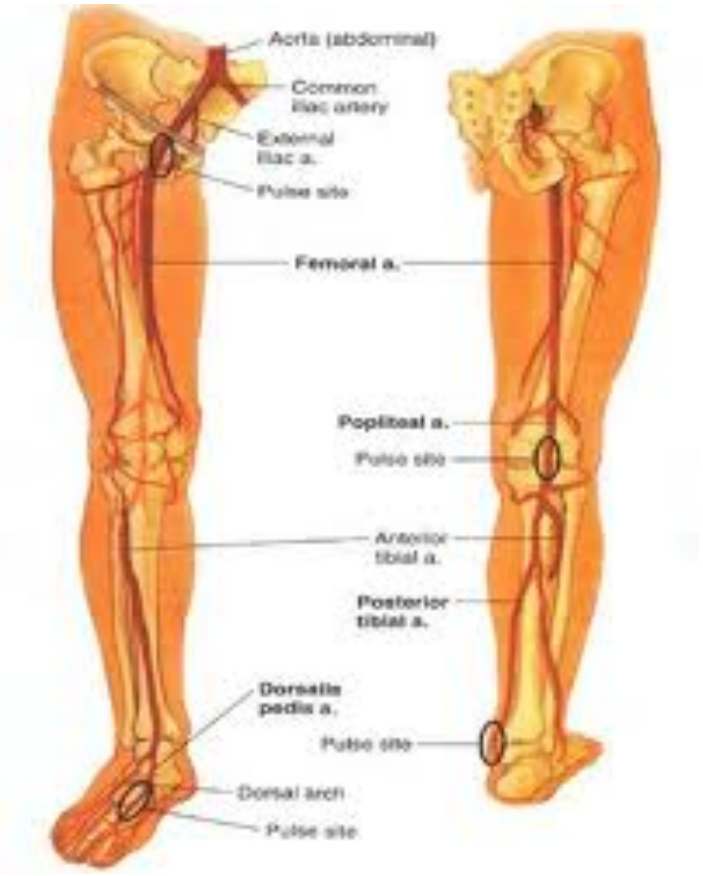
Peripheral Vascular Examination

Dr. Gary Mumaugh – Physical Assessment

Competencies

- Inspection of upper extremity for:
  - size
  - symmetry
  - swelling
  - venous pattern
  - color
  - Texture
  - nail beds
- Inspection of lower extremity for:
  - size
  - scars
  - symmetry
  - color
  - swelling
  - nail beds
  - rashes
  - ulcerations
  - texture
  - venous enlargement
  - unusual pigmentation
  - hair distribution
- Palpate these pulses:
  - carotid
  - brachial
  - radial
  - ulnar
  - femoral
  - popliteal
  - dorsalis pedis
  - posterior tibial
- Technique for detecting edema
- Detect and describe varicosities
- Perform an Allen test
- Assess blood pressure
- Assess capillary refill

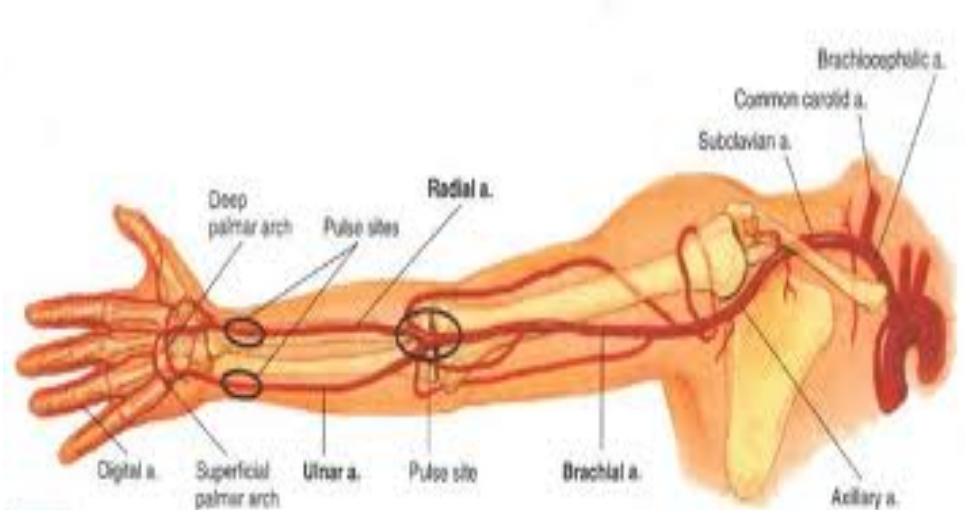


Health History

- Common or concerning symptoms
    - Pain in arms or legs
    - Intermittent claudication
    - Cold, numbness, pallor in legs, hair loss
    - Swelling in calves, legs, or feet
    - Color changes in fingertips or toes in cold weather
    - Swelling with redness or tenderness
- P.A.D Peripheral arterial disease
    - Aka - Intermittent claudication
    - Ask “Have you ever had any pain or cramping in the legs when walking or with exercise?” “Does the pain get better with rest?”
    - Most patients with P.A.D. have no symptoms or non-specific symptoms
        - Exercise-induced calf pain that causes the patient to stop exercise and experience pain relief in 10 minutes is present in only 10% of affected patients
    - Screen for subclinical P.A.D.
- Arterial spasm of fingers and toes
    - Ask “Do your fingertips or toes ever change color in cold weather or when you handle cold objects?”
- Venous peripheral vascular disease
    - Swelling of feet and legs
    - Ask about ulcers on lower legs, often near ankles

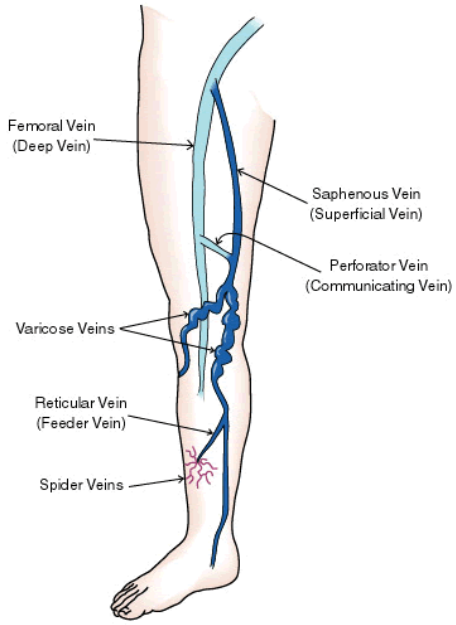
Arteries

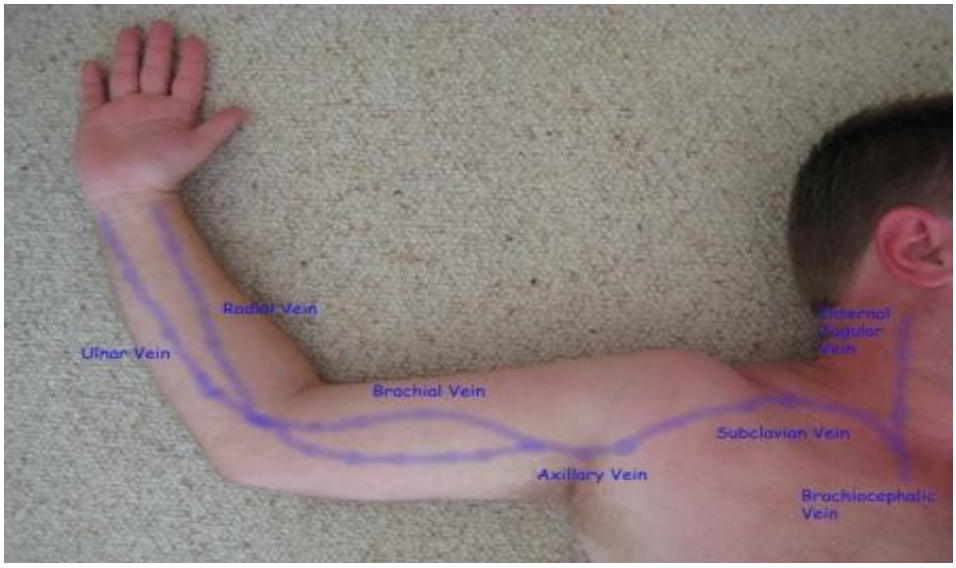
- Arterial pulses are palpable when an artery lies close to the body surface
- In the upper extremity the ulnar pulse may be obscured by overlying tissues



Veins

- Deep veins carry 90% of the venous return from the lower extremity
    - well supported by surrounding tissues
- Superficial veins are located subcutaneously
    - Supported poorly
- Deep, superficial and communicating veins all have one way valves
- Blood flows from the superficial to deep system toward the heart
- Muscles contract and blood is squeezed upward against gravity
- Competent valves keep it from falling back again

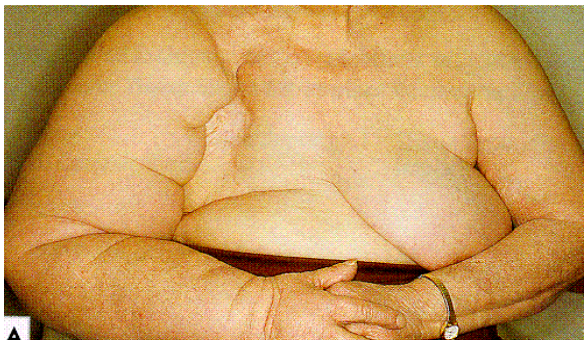




Fluid Exchange

- Blood circulates from arteries to veins through the capillary bed

- Dynamic equilibrium between vascular and interstitial spaces
- Maintains dynamic equilibrium between vascular and interstitial space
    - Higher blood pressure in arteries
    - Lower osmotic attraction in tissue spaces
    - Opposed by hydrostatic pressure in spaces
    - Blood pressure drops at venous end
    - Osmotic pressure increases plasma pressure
    - Pulls back fluid into vascular tree
    - Lymphatics pull up excessive fluid

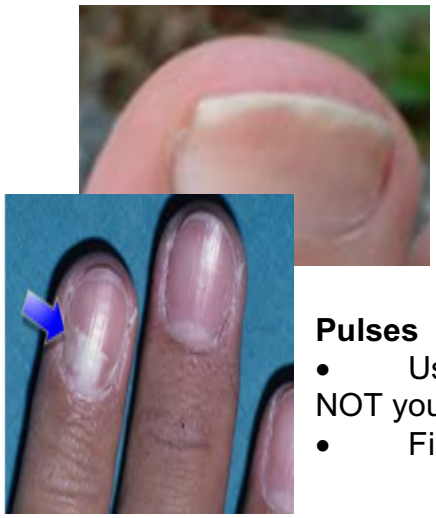


Inspection: Upper Extremity

- Size and Symmetry
- Upper Extremity Swelling
- Upper Extremity Venous Pattern
- Upper Extremity Color
- Upper Extremity Texture
- Upper Extremity Nail beds

Inspection: Lower Extremity

- Size and Symmetry
- Lower Extremity Swelling
- Lower Extremity Venous Enlargement
- Lower Extremity Pigmentation, Scars
- Lower Extremity Rashes, Ulcerations
- Lower Extremity Color
- Lower Extremity Texture
- Lower Extremity Nail beds
- Lower Extremity Hair Distribution



Pulses

- Use your fingertips NOT your thumbs
- Firm even pressure

- Be sure the pulsations you are perceiving are the patient's and not your own
- NEVER palpate both carotids at once
- Described as :
    - Increased, Normal, Diminished, Absent. Aneurysmal
- Diminished or absent pulse indicates partial or complete occlusion proximally
    - Example: If femoral pulse absent occlusion is aortic or iliac and all pulses distally are affected
- Widened pulse suggests aneurysm

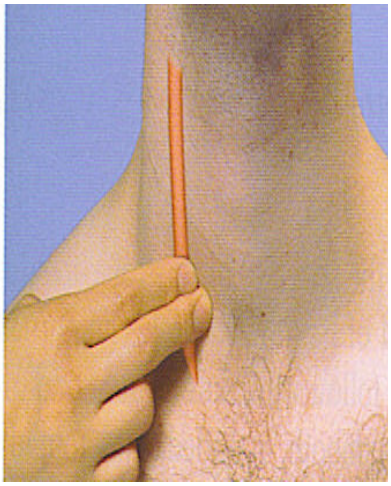
Arterial Occlusion

- Most common cause is arteriosclerosis obliterans in which fatty plaques impede blood flow
- Most often occurs in the thigh
- Symptoms are cold, pale, pulseless extremity
- Decreased or absent foot pulses suggest occlusive disease of the lower popliteal artery
- Commonly seen in diabetics

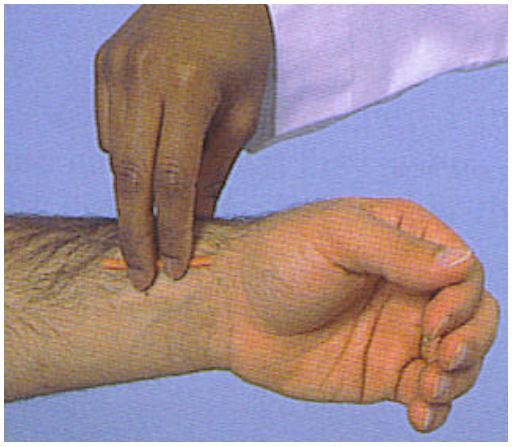
Carotid pulse

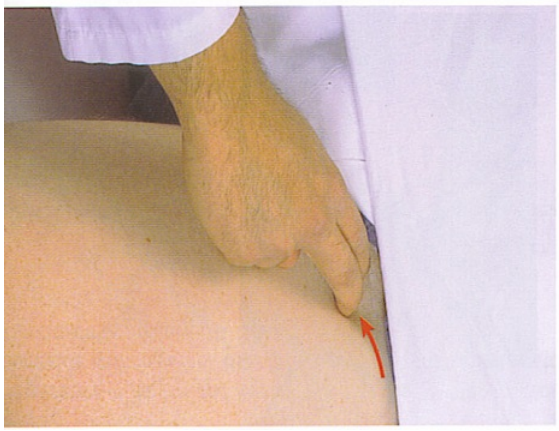
- Inspect the neck for pulsations just medial to the SCM
- Place 2nd and 3rd fingers on lower third of neck
- Press posteriorly and feel for pulse

Cardotid **Brachial**



Radial **Ulnar** **Femoral**





Brachial Pulse
- Patient's arm should rest with elbow extended palm up
- Use 2nd and 3rd digits of opposite hand
- Cup your hand under the patient's elbow
- Feel for pulse just medial to biceps tendon

Radial Pulse
- Use pads of your fingers on the flexor surface of the wrist laterally
- Partially flexing the patient's wrist may help

Ulnar Pulse
- Using the pads of your fingers feel for the pulse deeply on the flexor surface of the wrist medially

Femoral Pulse
- Press deeply below the inguinal ligament and about midway between the anterior superior iliac spine and the symphysis pubis

Popliteal Pulse
- Patient should be prone
- Flex the knee to 90°
- Let the leg rest against you
- Use your thumbs to press deeply into the popliteal fossa

Dorsalis Pedis Pulse
- Feel the dorsum of the foot just lateral to the extensor tendon of the great toe
- If no luck, try more laterally

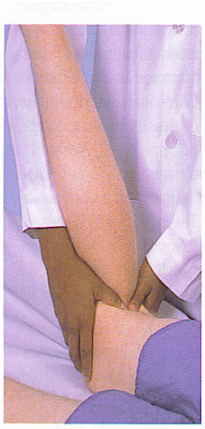
Posterior Tibial Pulse

- Curve your fingers behind and slightly below the medial malleolus of the ankle

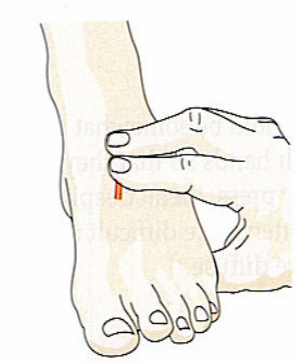
Grading Amplitude of Arterial Pulses

- 3 + Bounding
- 2 + Brisk, expected, normal
- 1 + Diminished, weaker than expected
- 0 Absent, unable to palpate

Popliteal



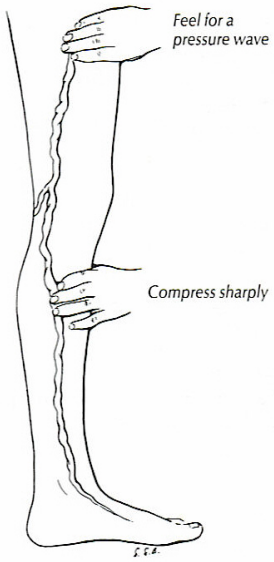
Dorsalis Pedis



Posterior Tibial

Edema

- Press firmly but gently for 5 seconds over:
  - Dorsum of each foot
  - Behind medial malleolus of each ankle
  - Over each shin
- Pitting is a depression caused by the pressure of your fingers
- Edema is graded on a 5 point scale from trace to +4
  - Trace: minimal edema of foot
  - +1: edema of foot
  - +2: edema to ankle
  - +3: edema halfway up shin
  - +4: edema to knees
- Edema - Possible causes:
  - Recent deep venous thrombosis
  - Chronic venous insufficiency
  - Incompetent venous valves
  - Lymphedema



Varicosities

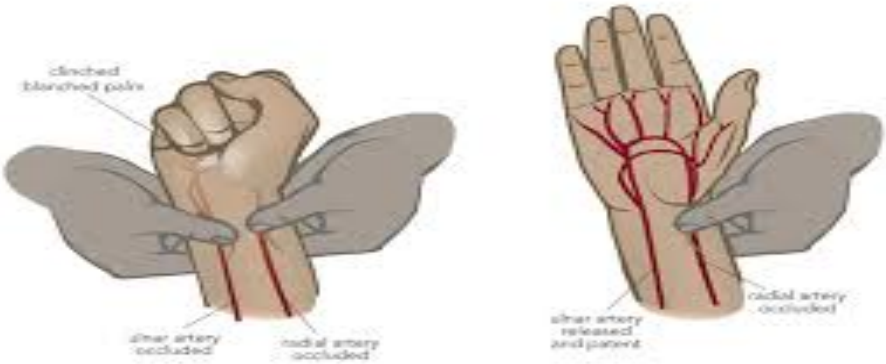
- You can map the course of varicosities by transmitting pressure waves in filled veins
- Patient must stand
- Place fingers gently on vein
- Compress sharply

Lower Extremity: Pathology

- Local swelling, redness, warmth and a palpable cord suggest superficial thrombophlebitis
- Brownish color or ulcers just above the ankle suggest chronic venous insufficiency
- Thickened skin occurs in lymphedema

Allen Test

- Used to evaluate arterial supply to the hand
- Must be done to assess ulnar artery patency before puncturing radial artery for blood draws or line placement
- Palms up
- Occlude radial and ulnar arteries
- Make tight fist
- Release fist and hand is pale
- Open one artery and hand turns pink



Blood Pressure

- Learned in cardiovascular exam
- Practice again today with special attention to technique in relation to pulses of upper extremity

Capillary Refill

- Used to assess ability of capillaries to refill with blood when emptied
- Normal is < 2 seconds
- Must be performed on clear nails with NO polish, blood, or fungus
- Press on end of nail until nail bed becomes pale
- Release and assess time to turn pink

Special Techniques

- If chronic arterial insufficiency is suspected (pain or diminished pulses), check for postural color changes
    - Raise both legs to 60 degrees until maximum pallor of feet develop (usually within one minute)
    - Ask patient to sit up with legs dangling
    - Compare both feet
    - Normally returns to pink in less than 10 seconds
    - Filling of veins takes about 15 seconds
- Mapping varicose veins

- Map out the course & connection of varicose veins by transmitting pressure waves along the blood filled veins
- Patient in standing position
- Press veins at two points
- Press sharply & feel the pressure at the top end
- A palpable pressure wave suggests two points are connected (patent)
- Wave may be transmitted downwards but not easily

Special Techniques - Trendelenburg Test

- Competency of Venous Valves
  - Patient supine – elevate leg 90 degrees to empty veins
  - Occlude greater saphenous vein in upper thigh
  - Ask patient to stand up and keep vein occluded
  - Watch for venous filling
    - Normally fills from below upwards and takes about 35 seconds as blood flows from capillary bed into veins
  - 20 seconds after standing release the compression
    - Watch for any additional filling – normally none
    - Sudden retrograde filling suggests incompetent valves