



Peripheral Vascular Examination

Dr. Gary Mumaugh – Western Physical Assessment

Competencies



1. Inspection of upper extremity for:

- size
- symmetry
- swelling
- venous pattern
- color
- Texture
- nail beds

Competencies



2. Inspection of lower extremity for:

- size
- scars
- symmetry
- color
- swelling
- nail beds
- rashes
- ulcerations
- texture
- venous enlargement
- unusual pigmentation
- hair distribution

Competencies



3. Palpate these pulses:

- carotid
- brachial
- radial
- ulnar
- femoral
- popliteal
- dorsalis pedis
- posterior tibial

Competencies

4. Technique for detecting edema
5. Detect and describe varicosities
6. Perform an Allen test
7. Assess blood pressure
8. 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

Health History



- 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.

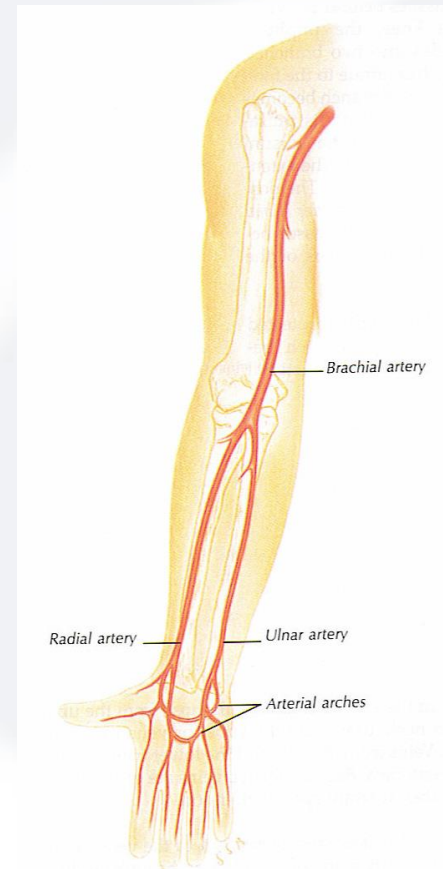
Health History

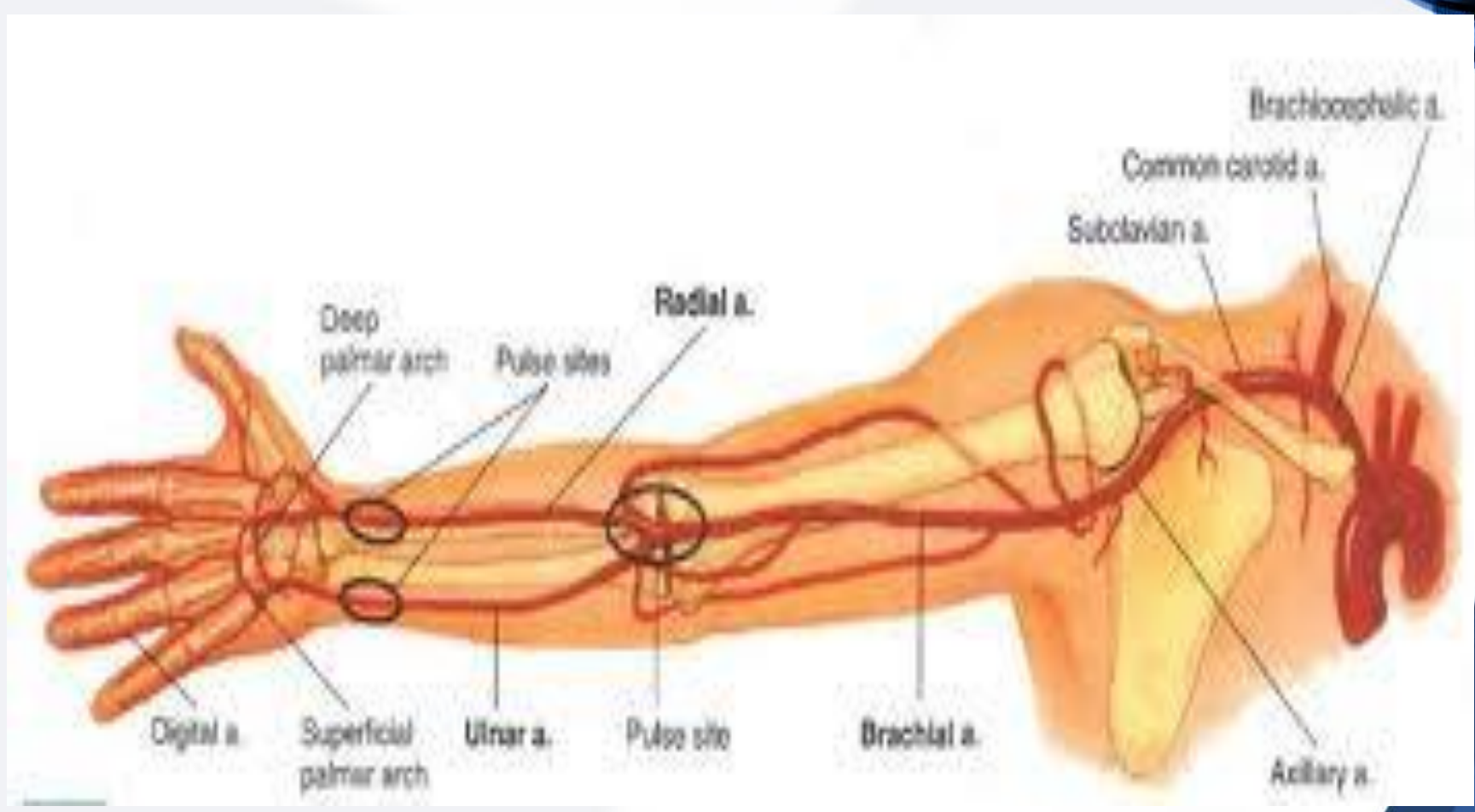


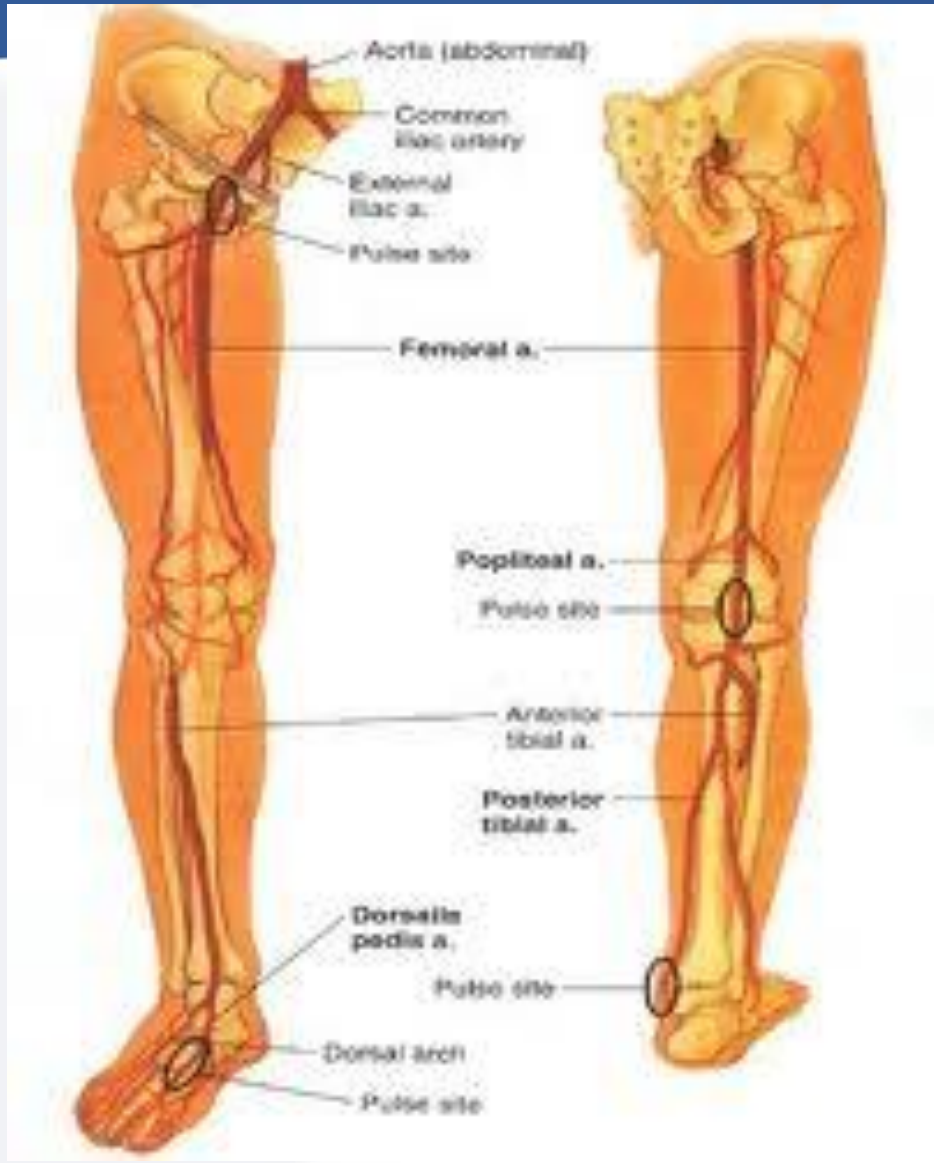
- Arterial spasm of fingers and toes
 - Ask “Do your fingertips or toes ever change color in cold weather or when you handle cold objects?”
- Venous peripheral vascular disease
 - Swelling of feet and legs
 - Ask about ulcers on lower legs, often near ankles

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





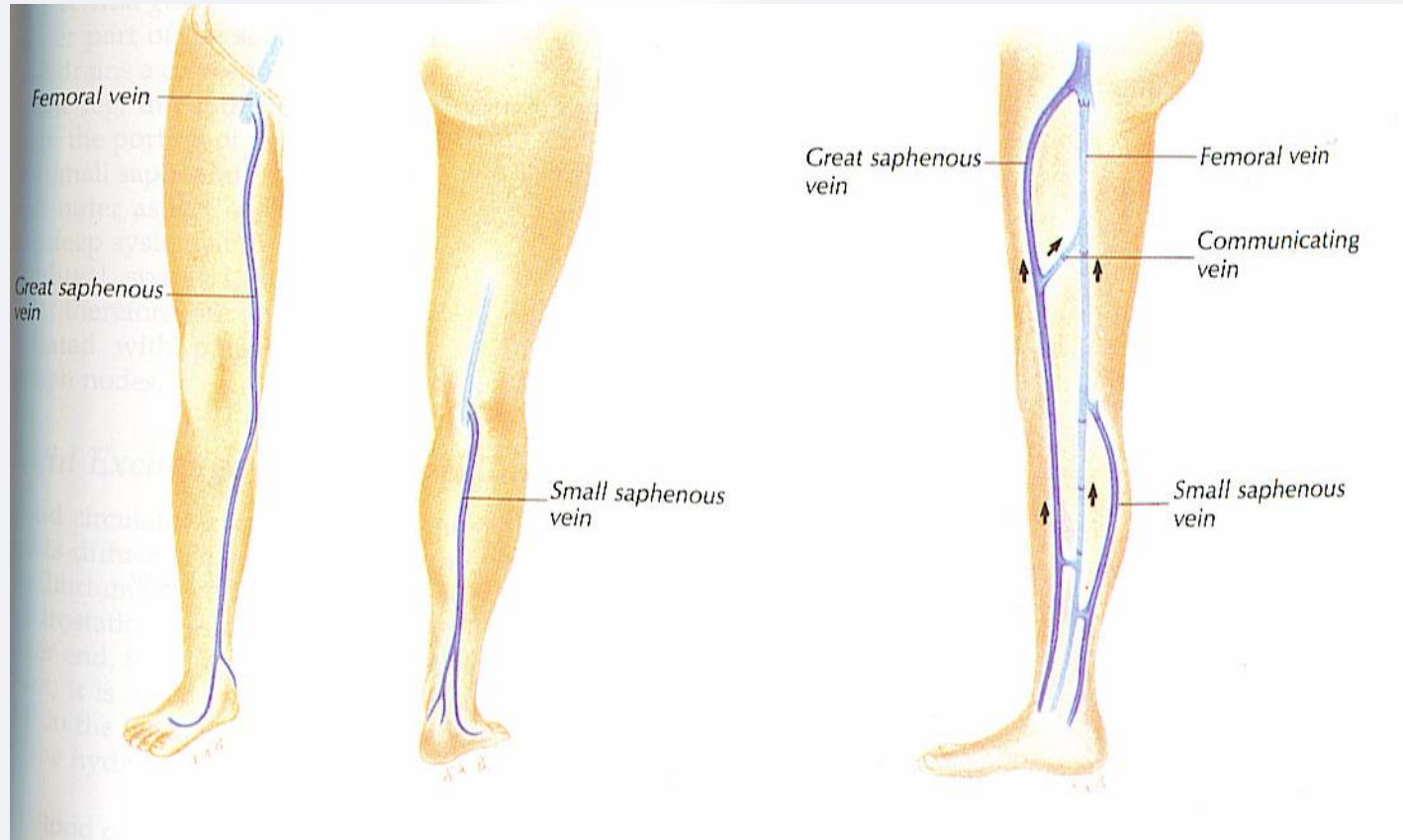


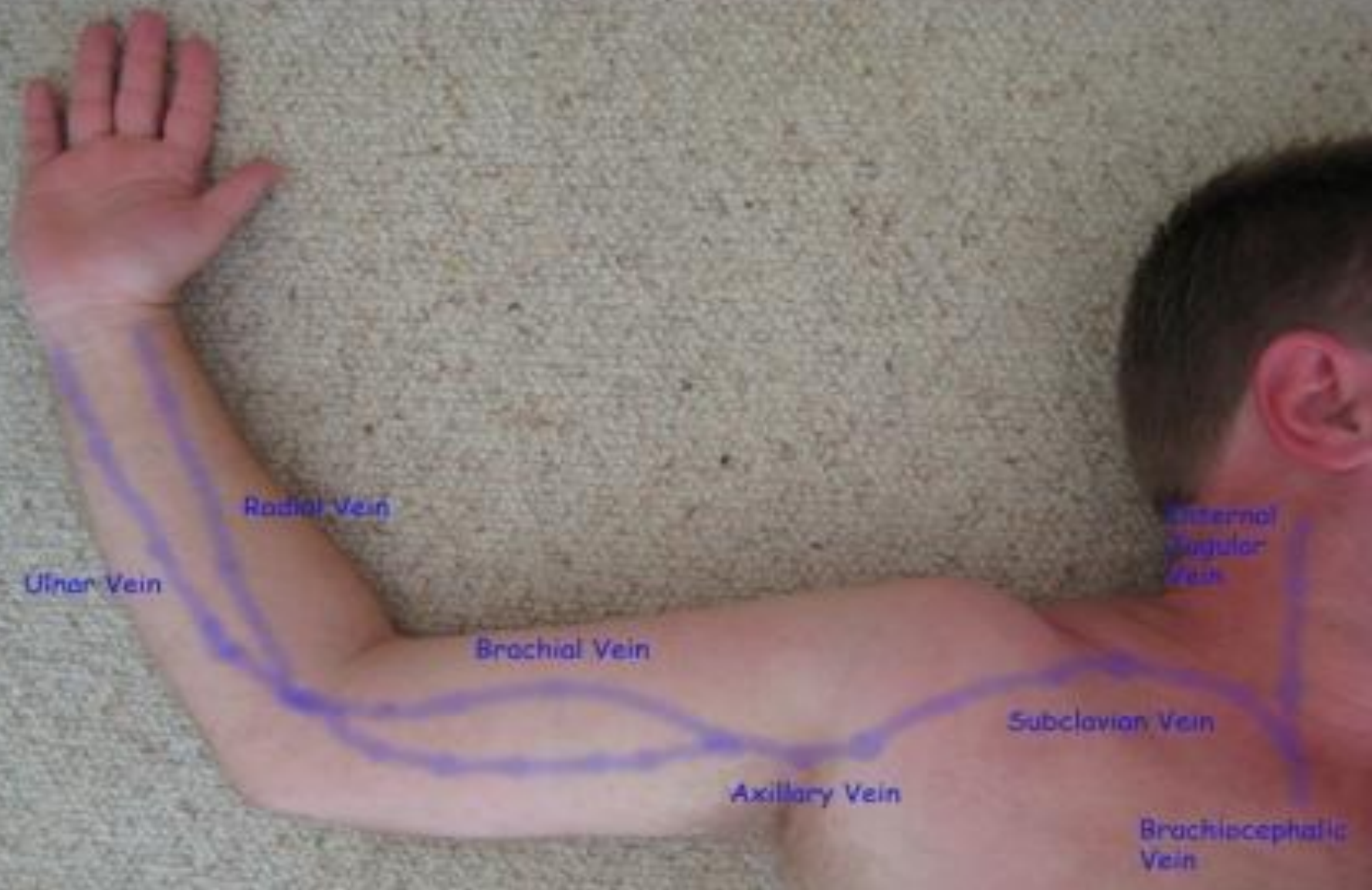
Veins



- Deep veins carry 90% of the venous return from the lower extremity
 - well supported by surrounding tissues
- Superficial veins are located subcutaneously
 - Supported poorly

Veins





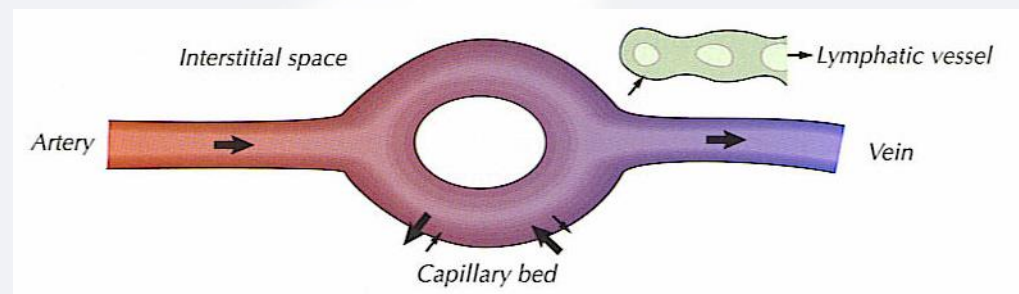
Veins

- 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

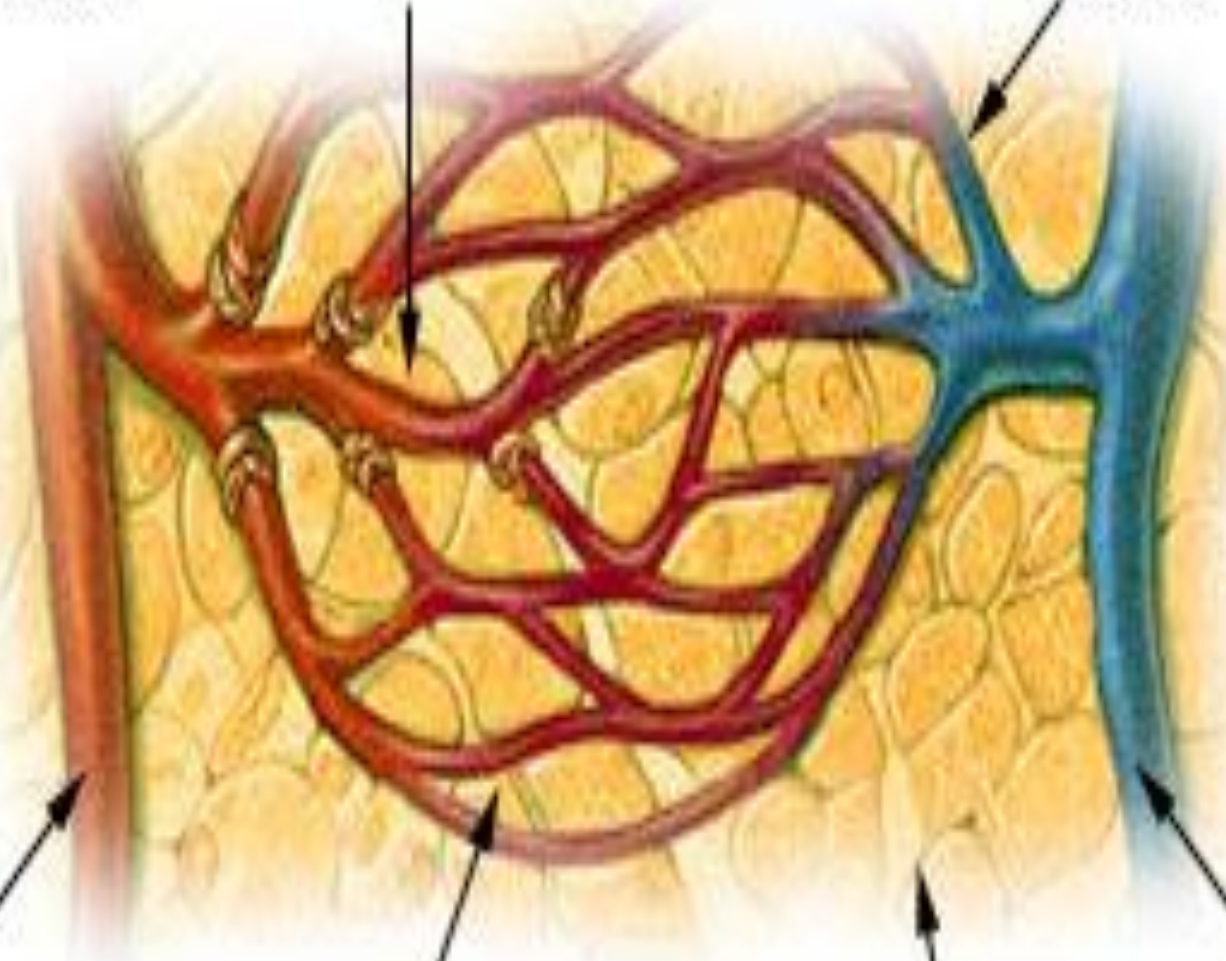
- Blood circulates from arteries to veins through the capillary bed
- Dynamic equilibrium between vascular and interstitial spaces



Capillaries

Arteriole

Venule



Artery

capillaries

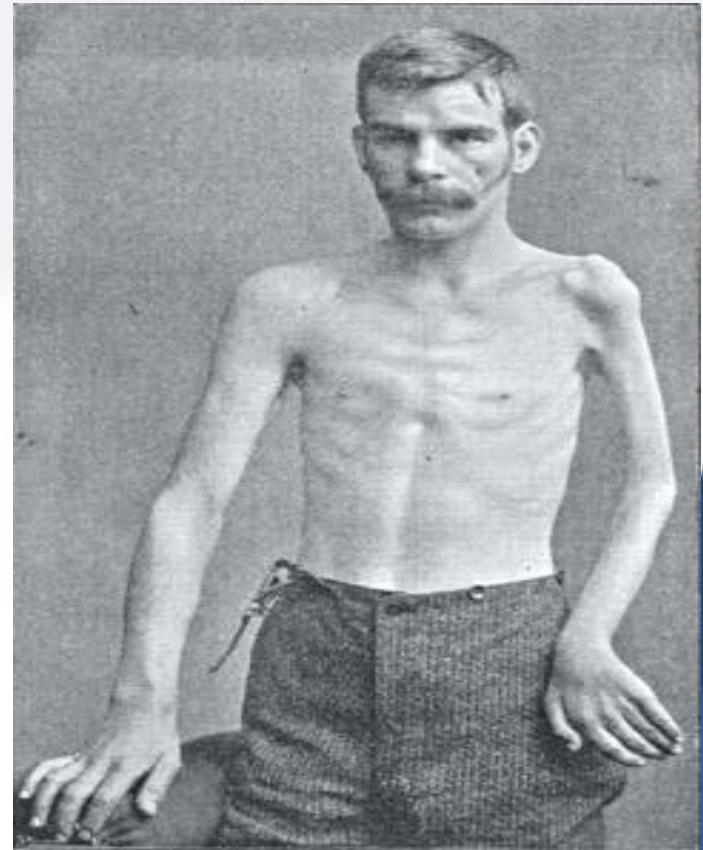
Tissue cells

Vein

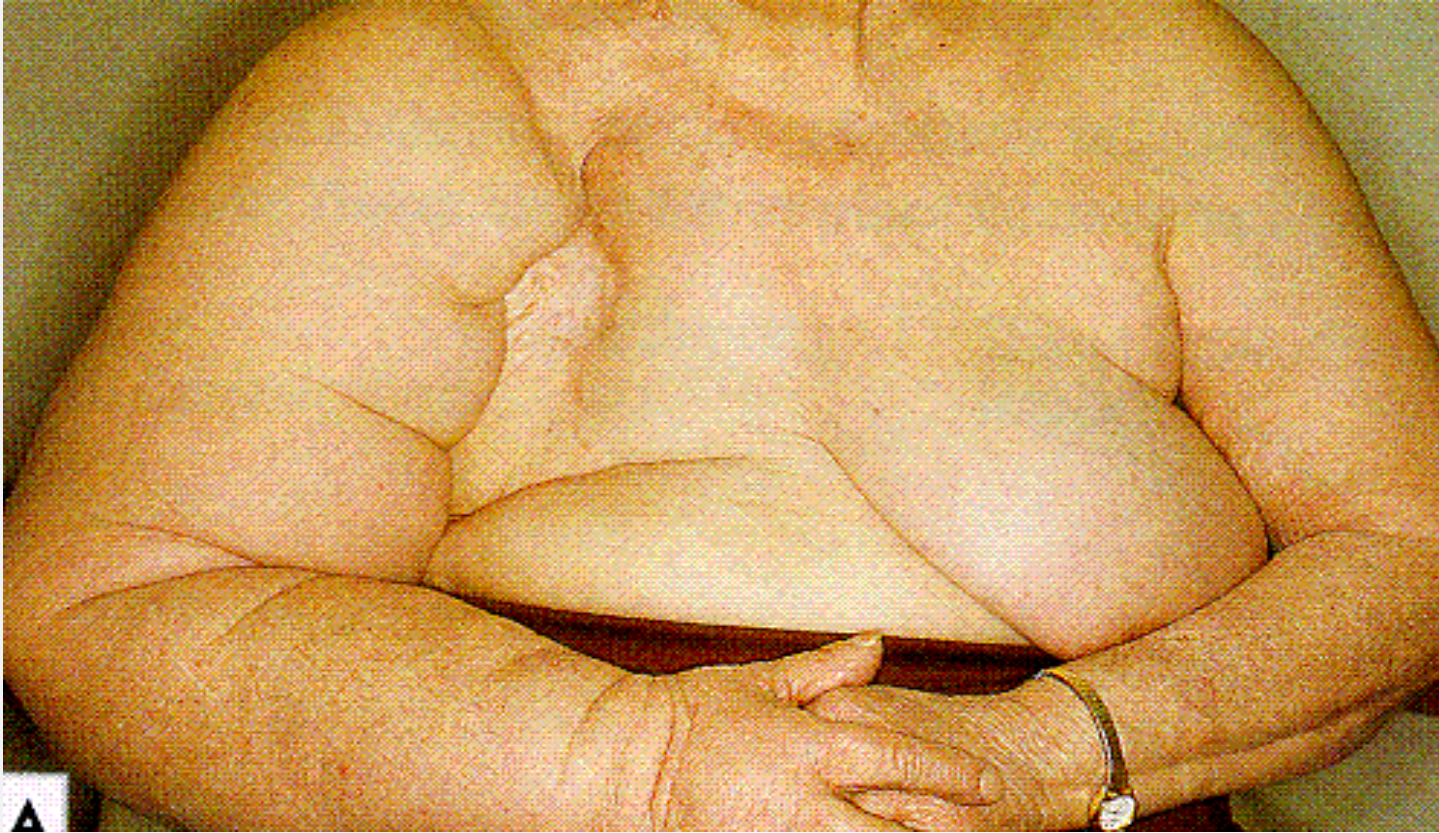


- Maintains dynamic equilibrium between vascular and interstitial space
 - Higher blood pressure in arteries
 - Lower osmotic attraction in tissue spaces
 - Opposed by hydrostatic pressure in spaces
 - Blood pressure drops at venous end
 - Osmotic pressure increases plasma pressure
 - Pulls back fluid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

Inspection: Upper Extremity Size and Symmetry



Inspection: Upper Extremity Swelling



Inspection: Upper Extremity Venous Pattern



Inspection: Upper Extremity Color



Inspection: Upper Extremity Texture



Inspection: Upper Extremity Nail beds



Inspection: Lower Extremity Size and Symmetry



Inspection: Lower Extremity Swelling



Inspection: Lower Extremity Venous Enlargement



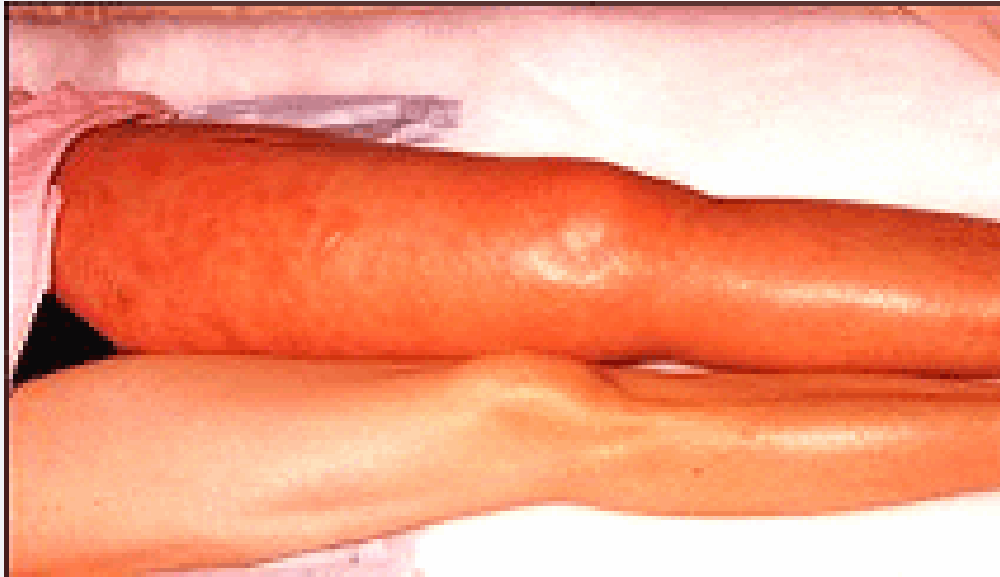
Inspection: Lower Extremity Pigmentation, Scars



Inspection: Lower Extremity Rashes, Ulcerations



Inspection: Lower Extremity Color



Inspection: Lower Extremity Texture



Inspection: Lower Extremity Nail beds



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Inspection: 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



Pulses



- Described as :
 - Increased
 - Normal
 - Diminished
 - Absent
 - Aneurysmal

Pulses



- 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

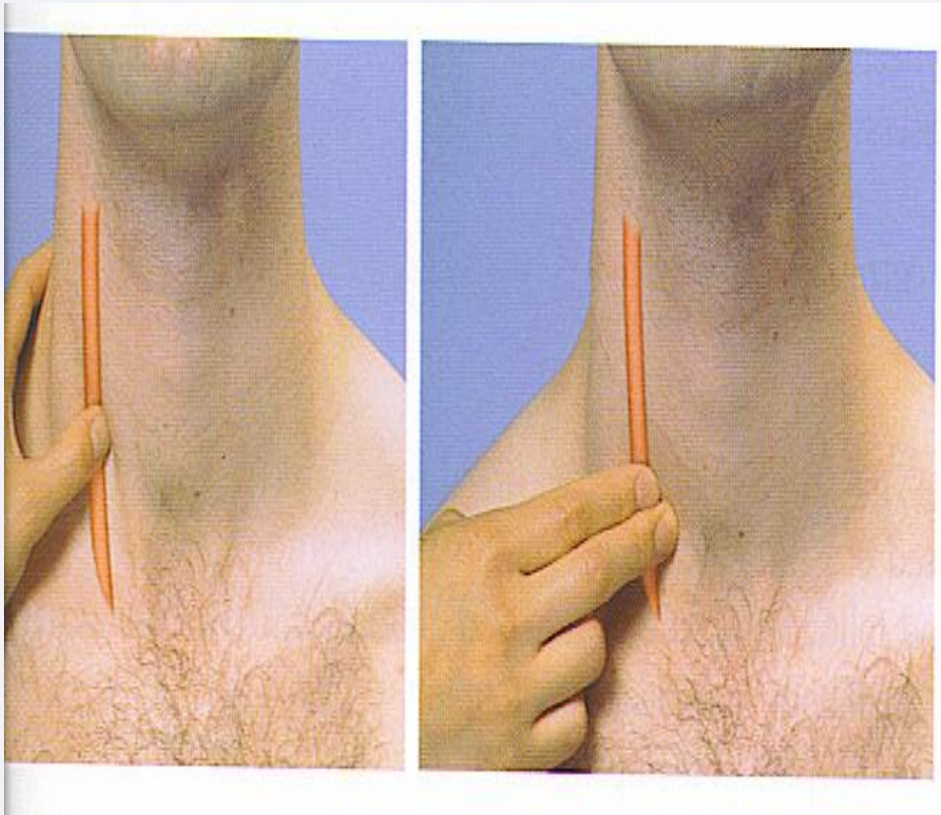


Arterial Occlusion

- 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

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



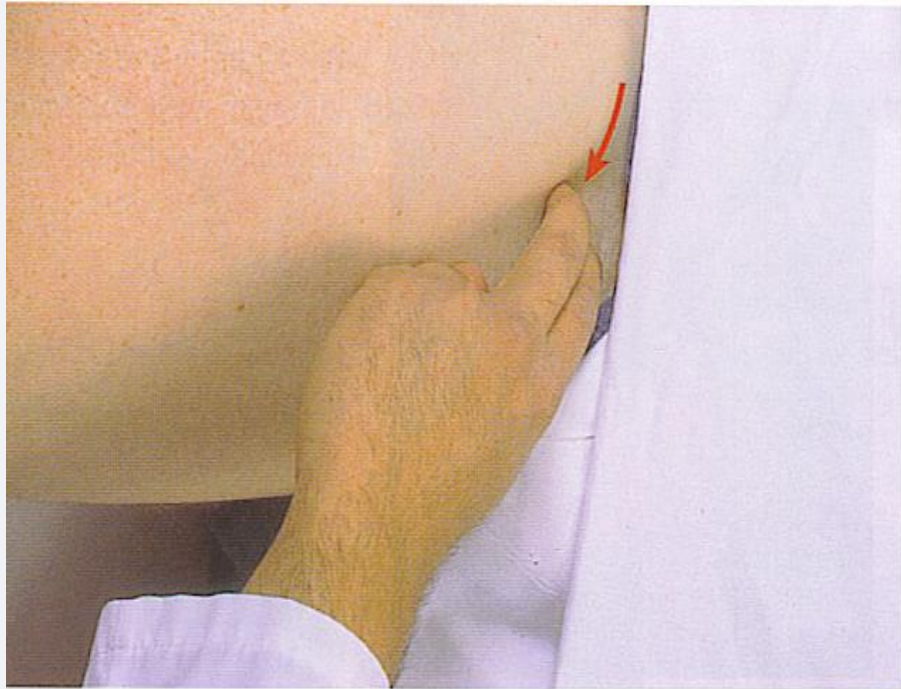
Ulnar Pulse



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



Femoral Pulse

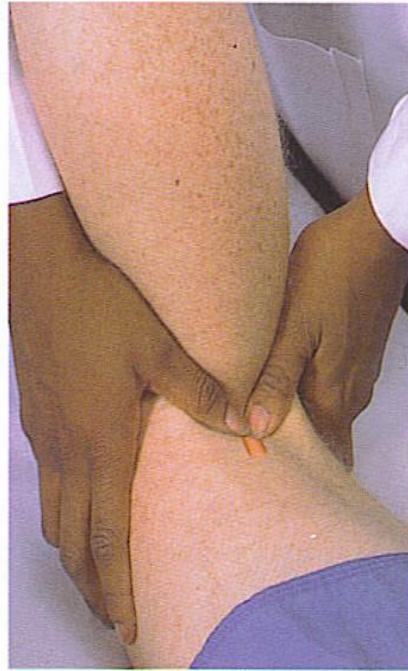


- Press deeply below the inguinal ligament and about midway between the anterior superior iliac spine and the symphysis pubis

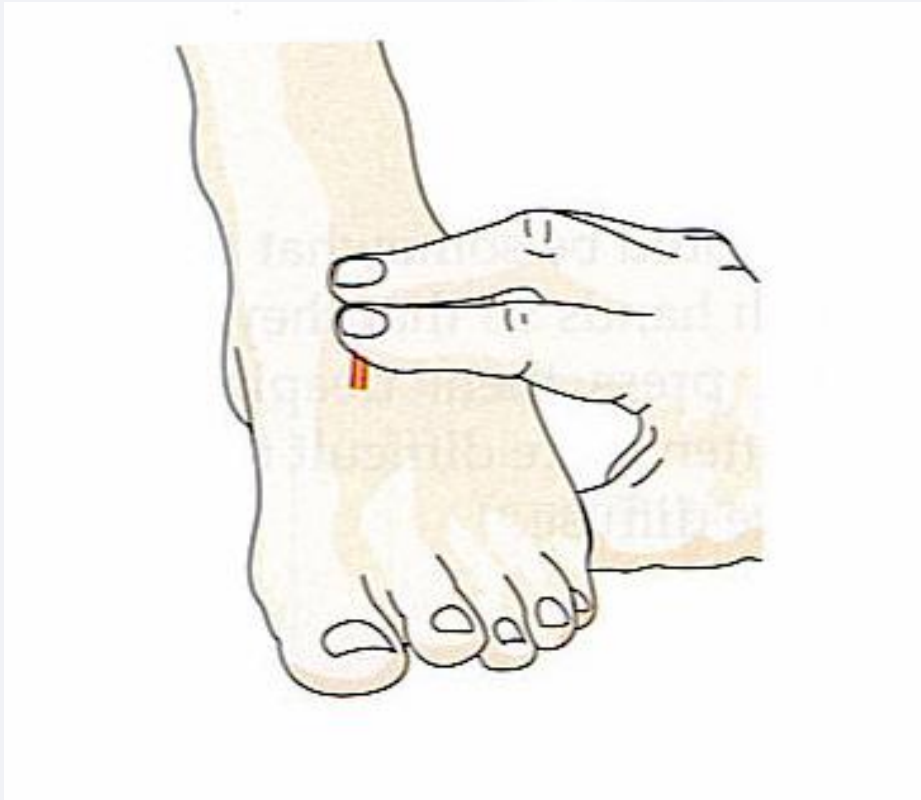
Popliteal Pulse



- 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

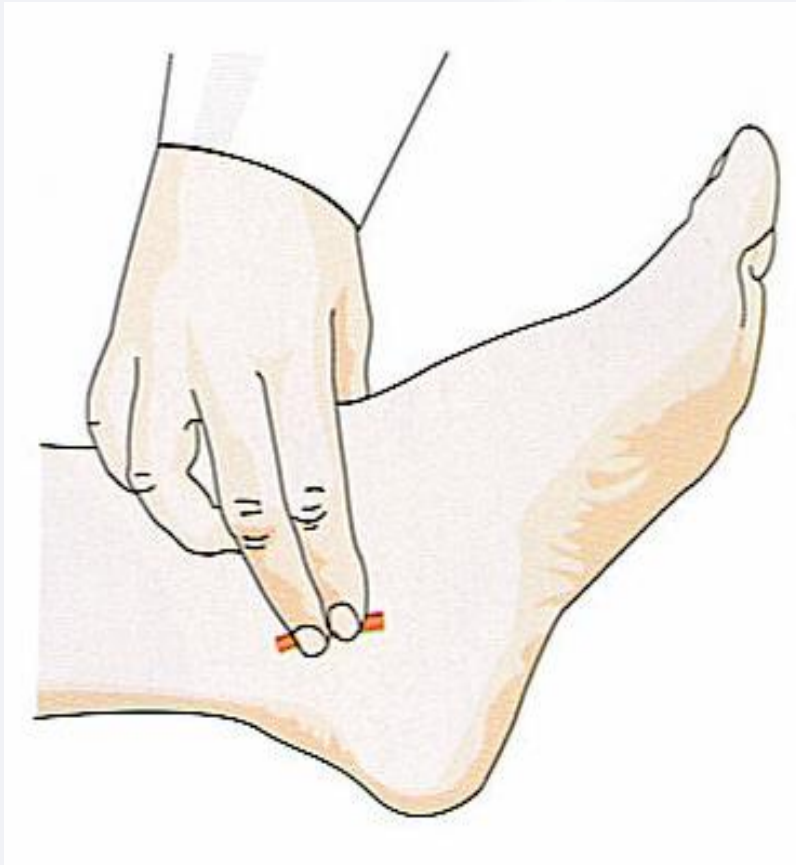


Dorsalis Pedis Pulse



- 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



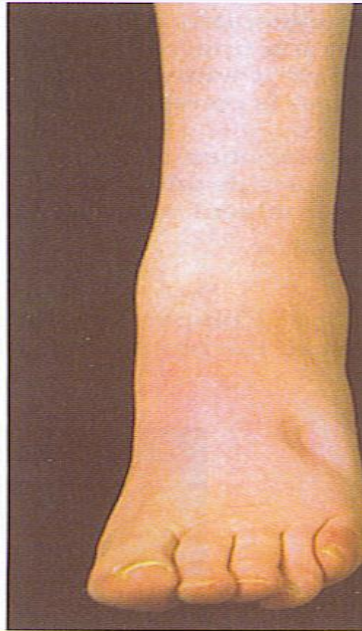
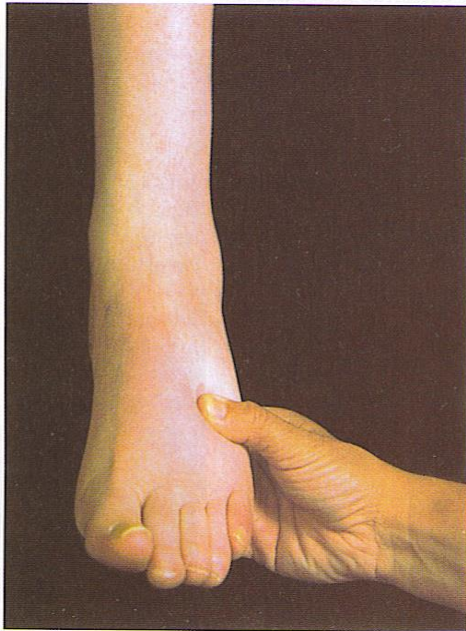
- Curve your fingers behind and slightly below the medial malleolus of the ankle

Grading Amplitude of Arterial Pulses



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

Edema



- Press firmly but gently for 5 seconds over:
 - Dorsum of each foot
 - Behind medial malleolus of each ankle
 - Over each shin

Edema

- Pitting is a depression caused by the pressure of your fingers
- Edema is graded on a 5 point scale from trace to +4



Edema

- Trace: minimal edema of foot
- +1: edema of foot
- +2: edema to ankle
- +3: edema halfway up shin
- +4: edema to knees

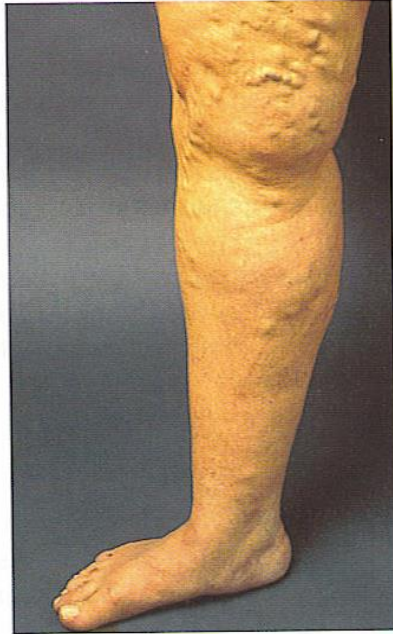
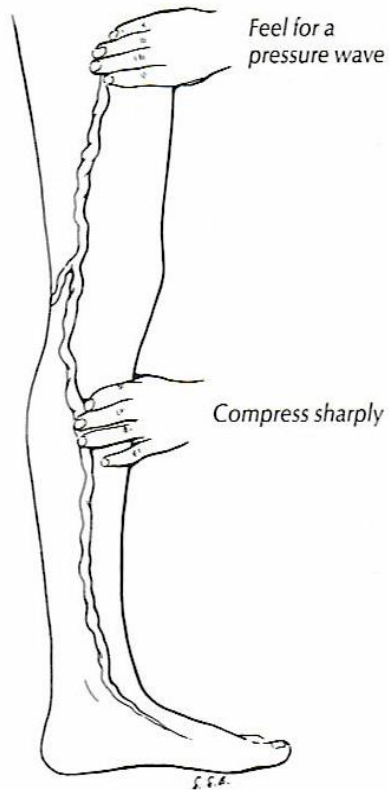


Edema



- 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

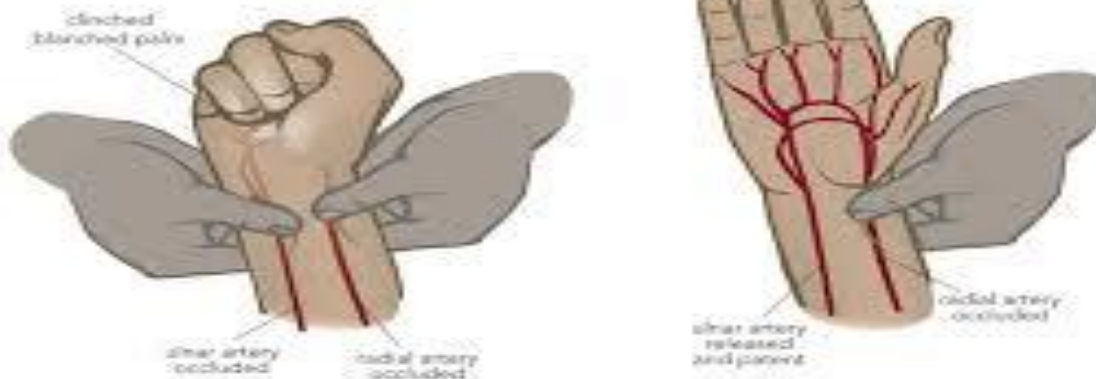
Lower Extremity: Pathology



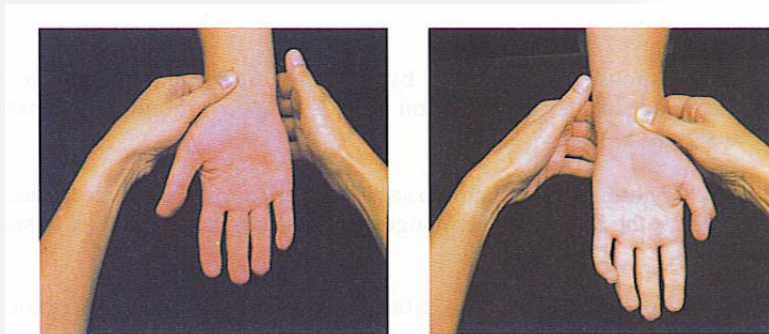
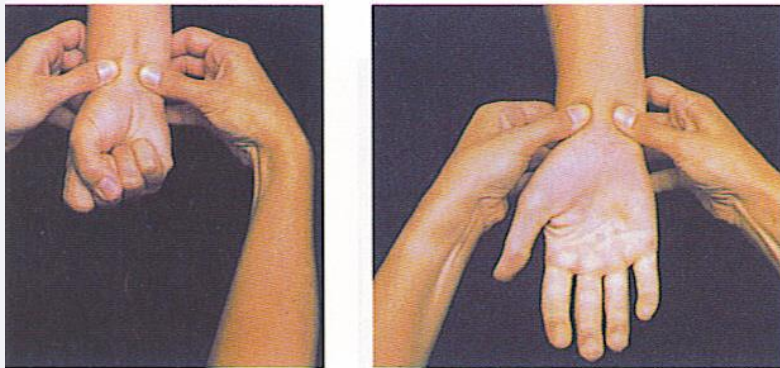
- Local swelling, redness, warmth and a palpable cord suggest superficial thrombophlebitis
- Brownish color or ulcers just above the ankle suggest chronic venous insufficiency
- Thickened skin occurs in lymphedema

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
- Performing a Modified Allen Test



Allen Test



- 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
- Capillary Refill

Capillary Refill



Figure 25-12 Assessing capillary refill. (Copyright B. Proud.)

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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

Special Techniques



- 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



Question



- A patient you are seeing complains of a sore on his lower leg that does not seem to get better. Based on examination findings, you suspect venous insufficiency. Which of the following clinical findings would suggest venous insufficiency as the cause of his problems?
 - a) Leg discomfort is exacerbated by using
 - b) Hyperpigmentation is present around the lower calf
 - c) Ulcers are present on the medial ankle
 - d) Affected leg feel warm to the touch



All are correct



- Your patient complains of severe pain in her right foot. Based upon your examination findings, you suspect arterial insufficiency. Which of the following clinical findings would suggest your diagnosis?
 - a) Brisk posterior tibial and dorsalis pedis pulses
 - b) Pallor of the foot with elevation
 - c) Pitting edema of the lower leg
 - d) Warmth of the right foot

- a) The pulses would be decreased
- b) **Pallor of the foot on elevation**
- c) There would be no pitting edema
- d) Right foot would be cool, not warm





- Examination of Peripheral Vascular System

