Vascular Anatomy of Lower Limb

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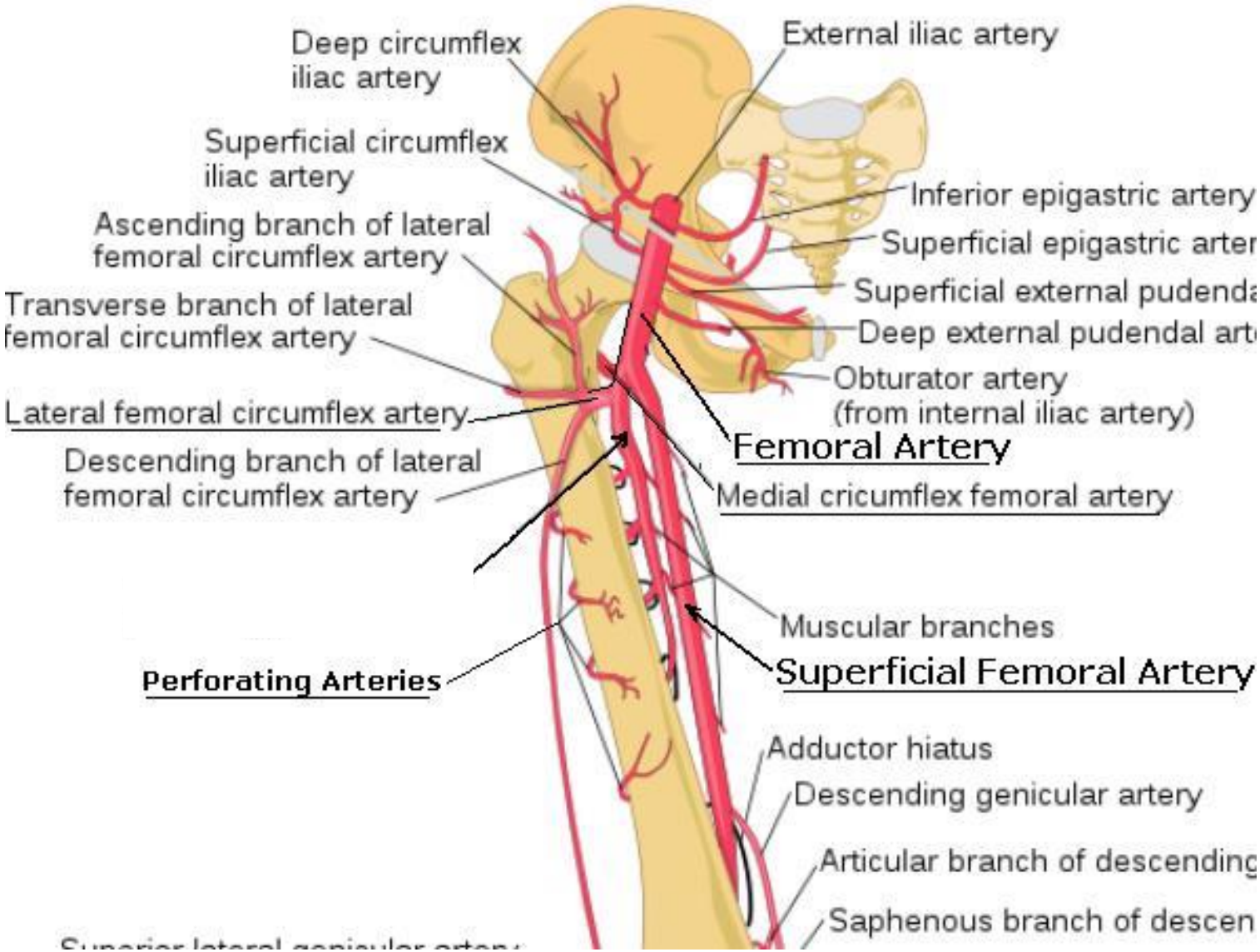
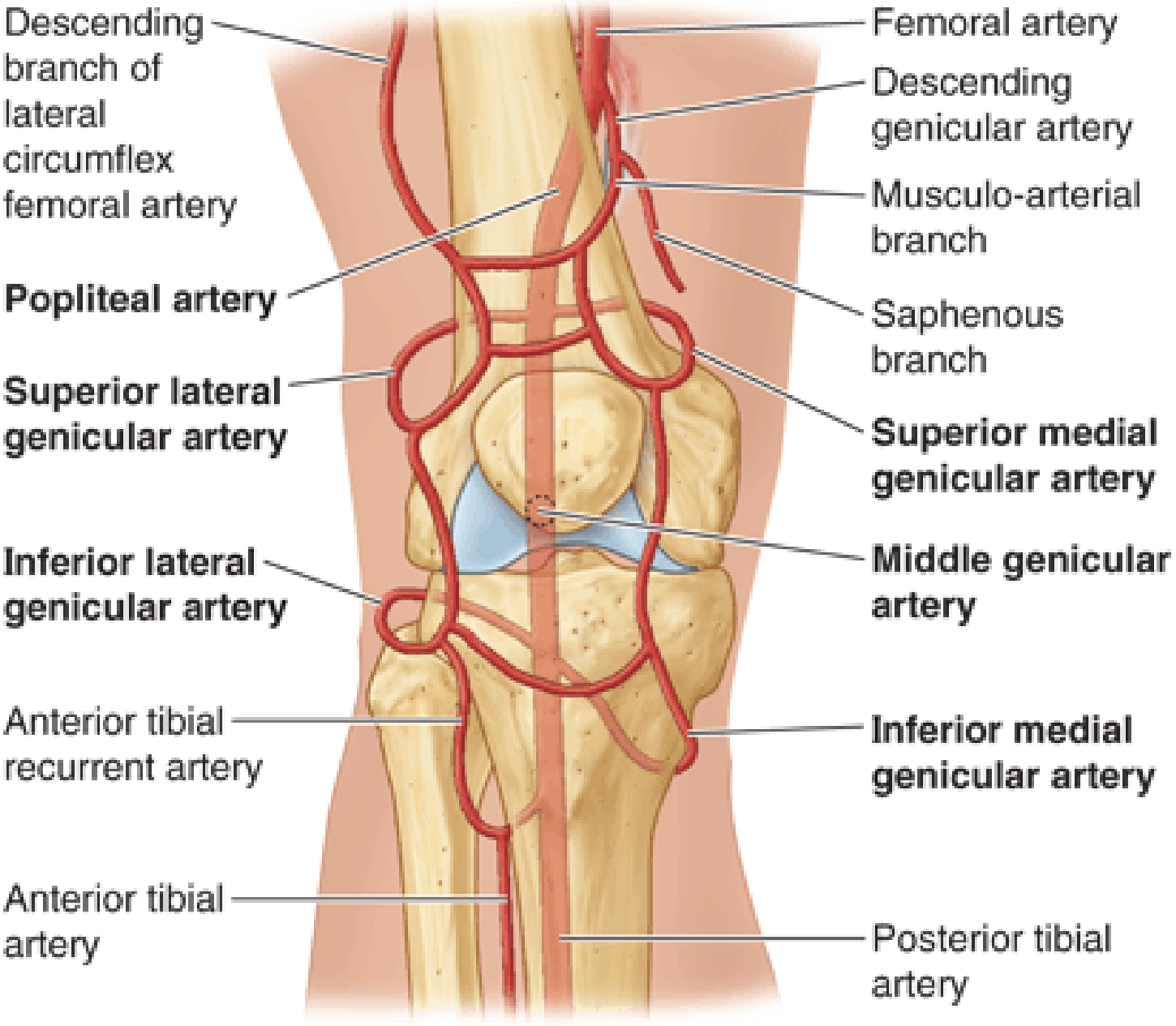
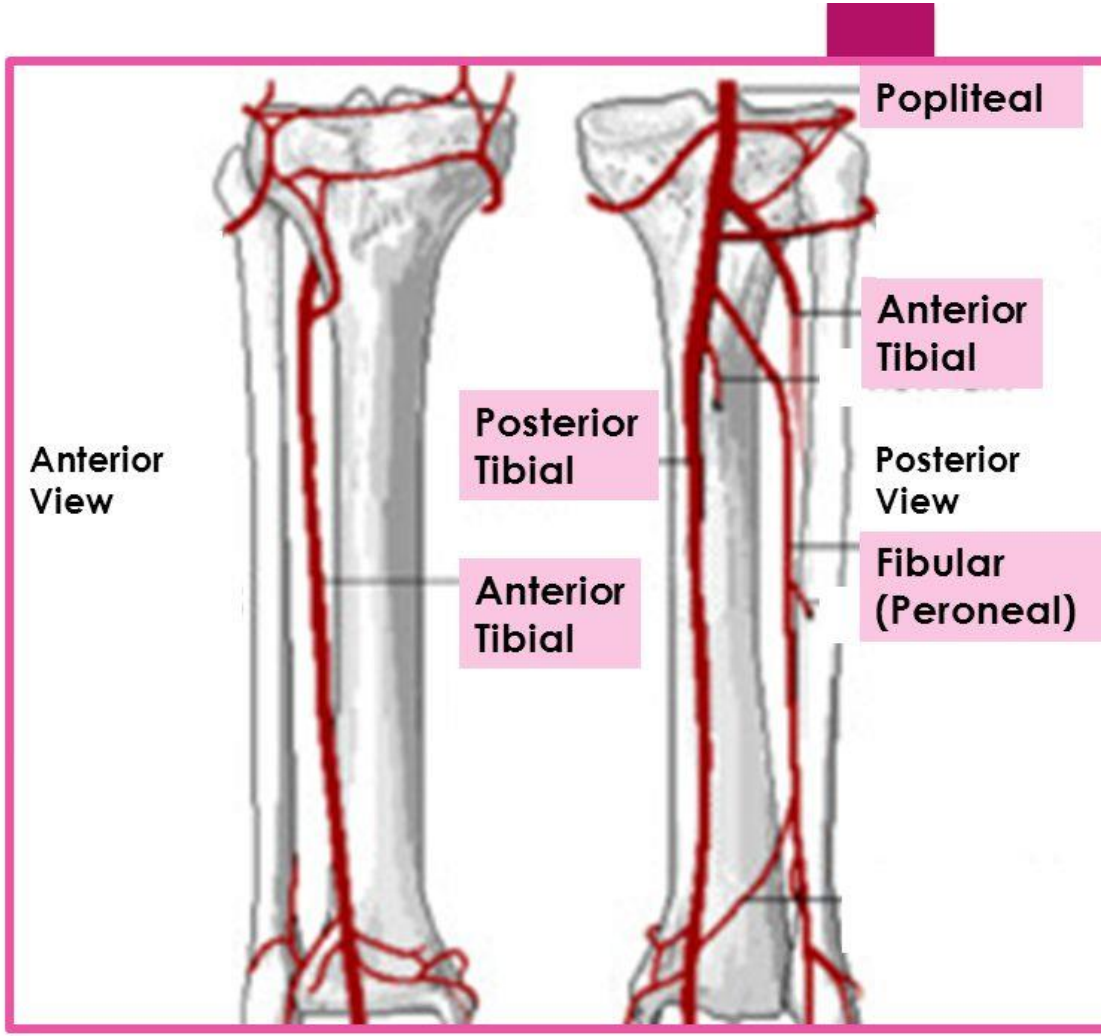
Arteries of Lower Limb





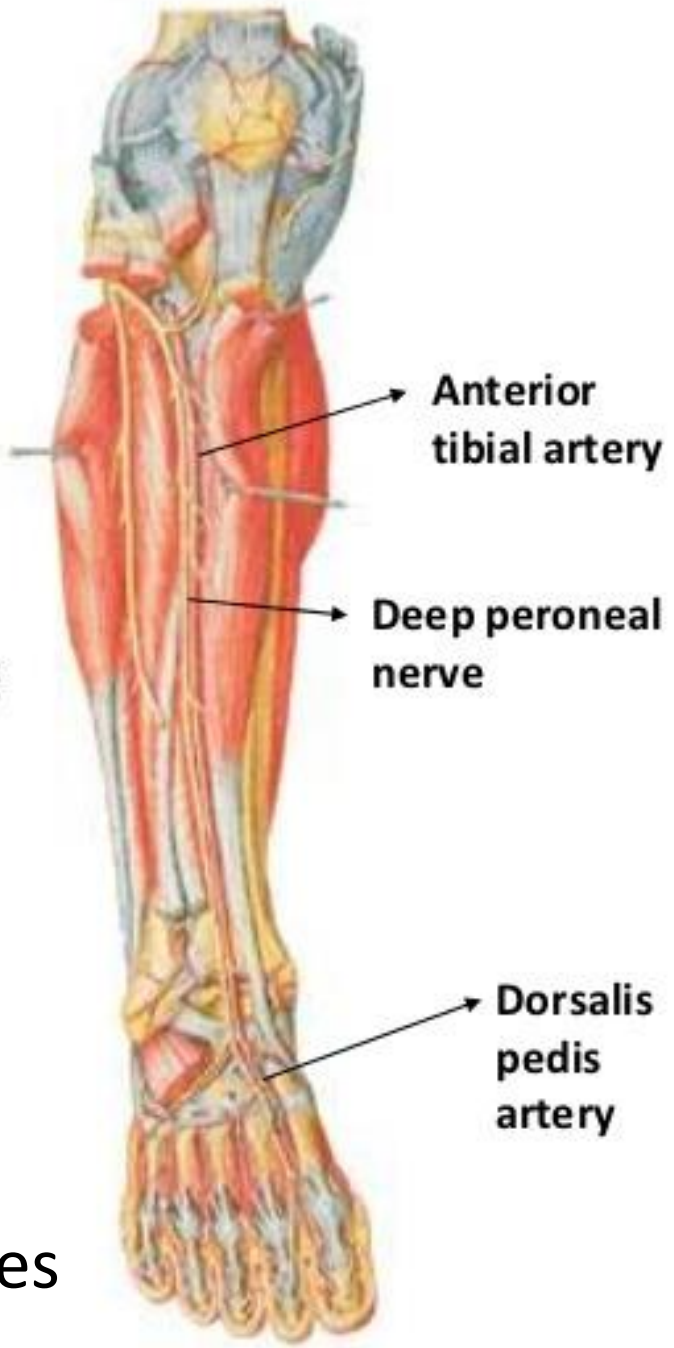
Anterior view

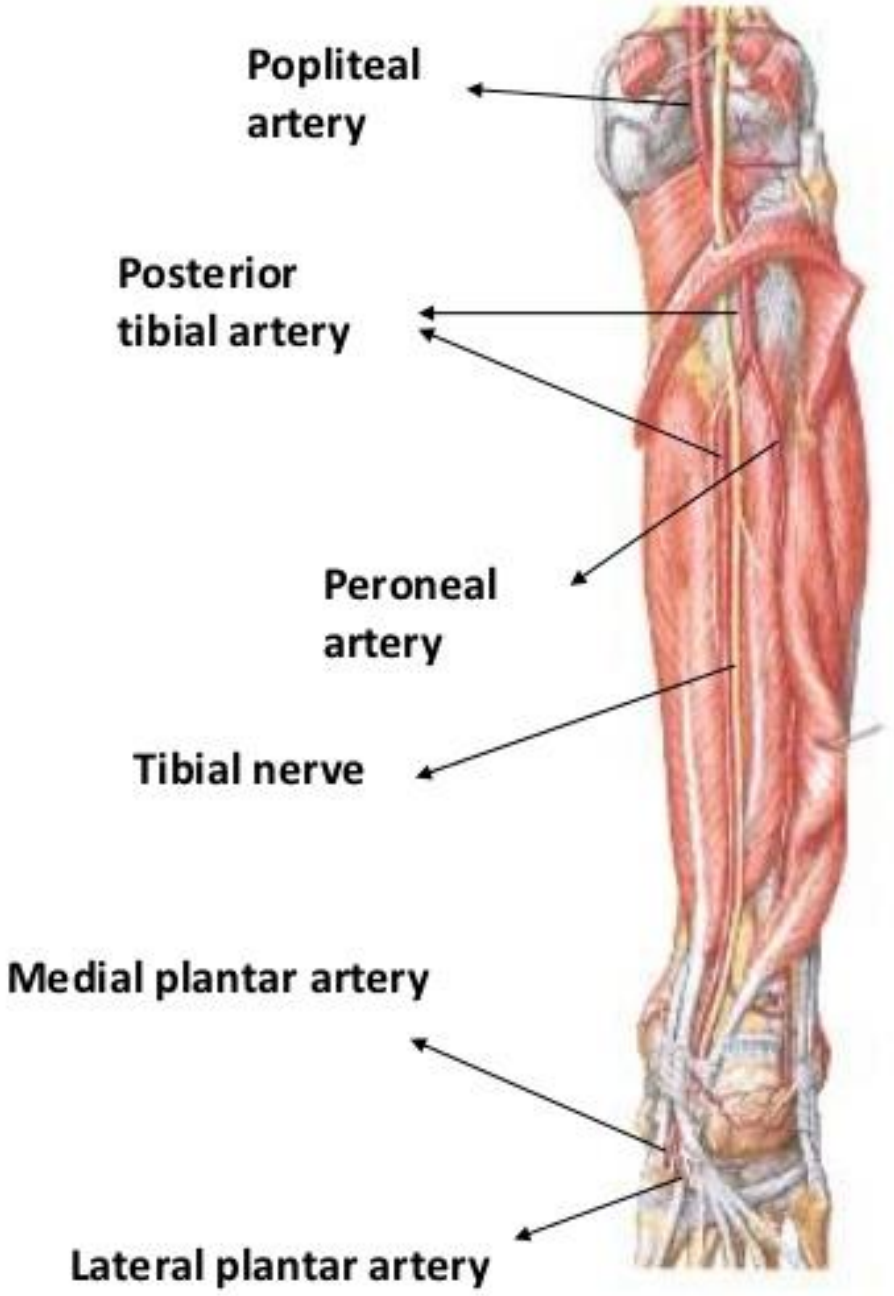
- **Anterior Tibial Artery**
  - Branches from Popliteal Artery
  - Passes anteriorly between Tibia and Fibula
  - Runs down anterior/lateral aspect of Tibia
- **Posterior Tibial Artery**
  - Branches from Popliteal Artery
  - Continues down posterior aspect of lower leg



- **Anterior tibial artery:**
- Artery present in the anterior compartment of leg
- **Origin:** branch of popliteal artery
- **Course:** runs in the anterior compartment of leg – deep peroneal nerve
- **Termination:** Continues as dorsalis pedis artery at the ankle joint
- **Branches:**
- Anterior and posterior tibial recurrent arteries
- Muscular arteries

Medial and Lateral malleolar arteries

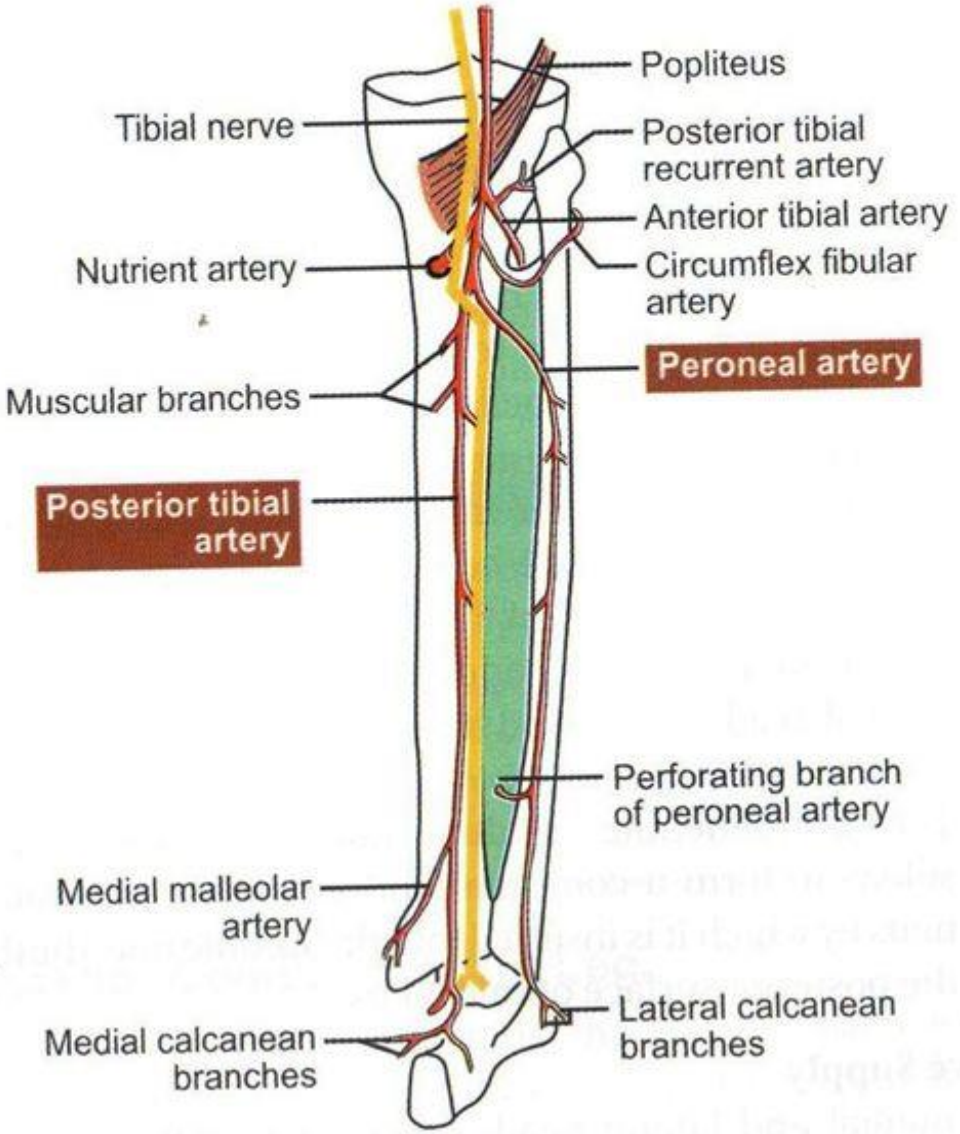




- **Posterior tibial artery:**
- Situated in the posterior compartment of leg
- **Origin:**
- Branch of popliteal artery
- **Course:**
- Runs down in the posterior compartment of leg between superficial and deep muscles
- Accompanied by tibial nerve

POSTERIOR TIBIAL ARTERY

- **Branches:**
- ***Peroneal artery***
- **Muscular**
- **Nutrient**
- **Cicumflex fibular**
- **Communicating**
- **Malleolar**
- **Calcaneal**
- **Terminal-medial & lateral planter artery**



Lower Limb Venous Drainage

Superficial veins : Great Saphenous Vein
and
Short Saphenous Vein

Deep veins: Tibial, Peroneal, Popliteal, Femoral veins

Perforators:

Blood flow

deep veins in the sole

↓

superficial veins in the dorsum

But

In leg and thigh from superficial to

↓

deep veins.

Factors helping venous return

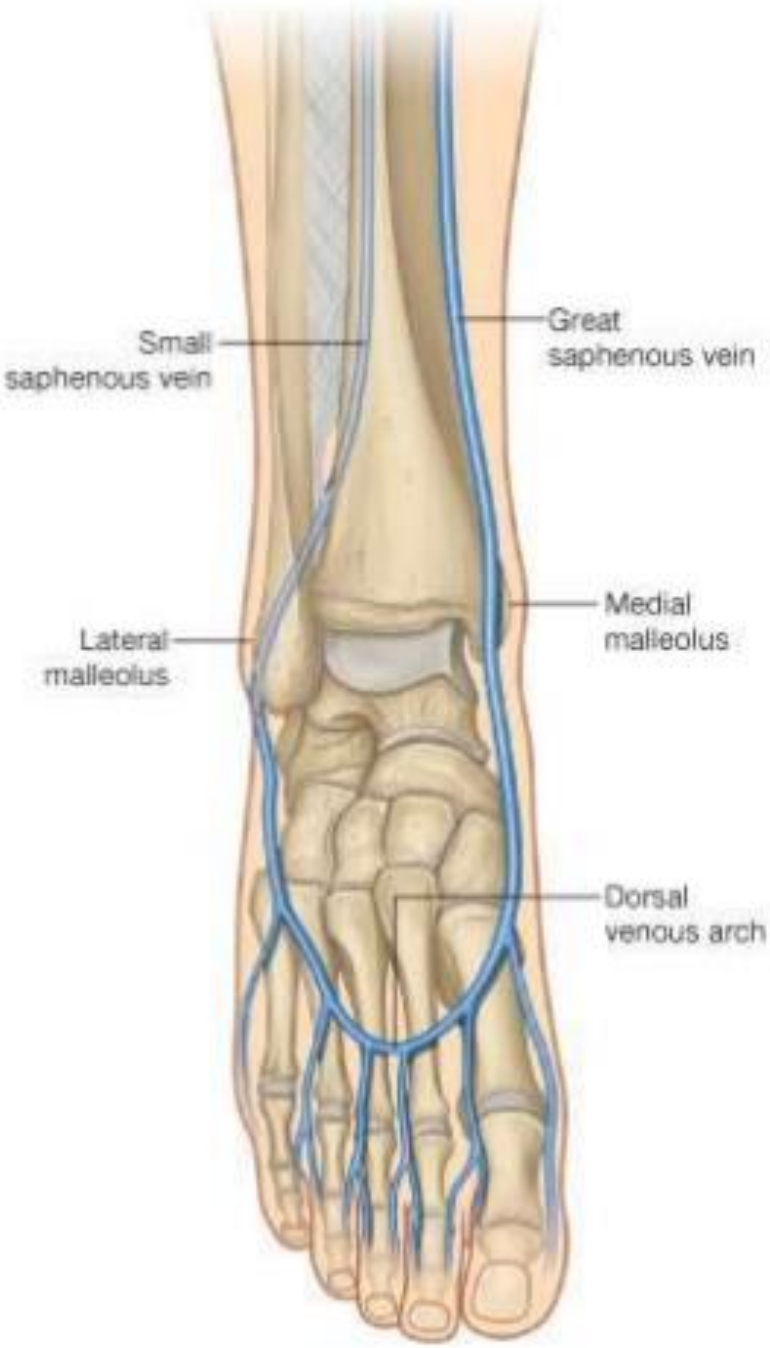
- Negative intra-thoracic pressure.
- Transmitted pulsations from adjacent arteries.
- Valves maintain uni-directional flow.
- Valves in perforating veins prevent reflux into low pressure superficial veins.
- Calf Pump—Peripheral Heart.
- Vis-a –tergo produced by contraction of heart.
- Suction action of diaphragm during inspiration.

Dorsal venous arch of Foot

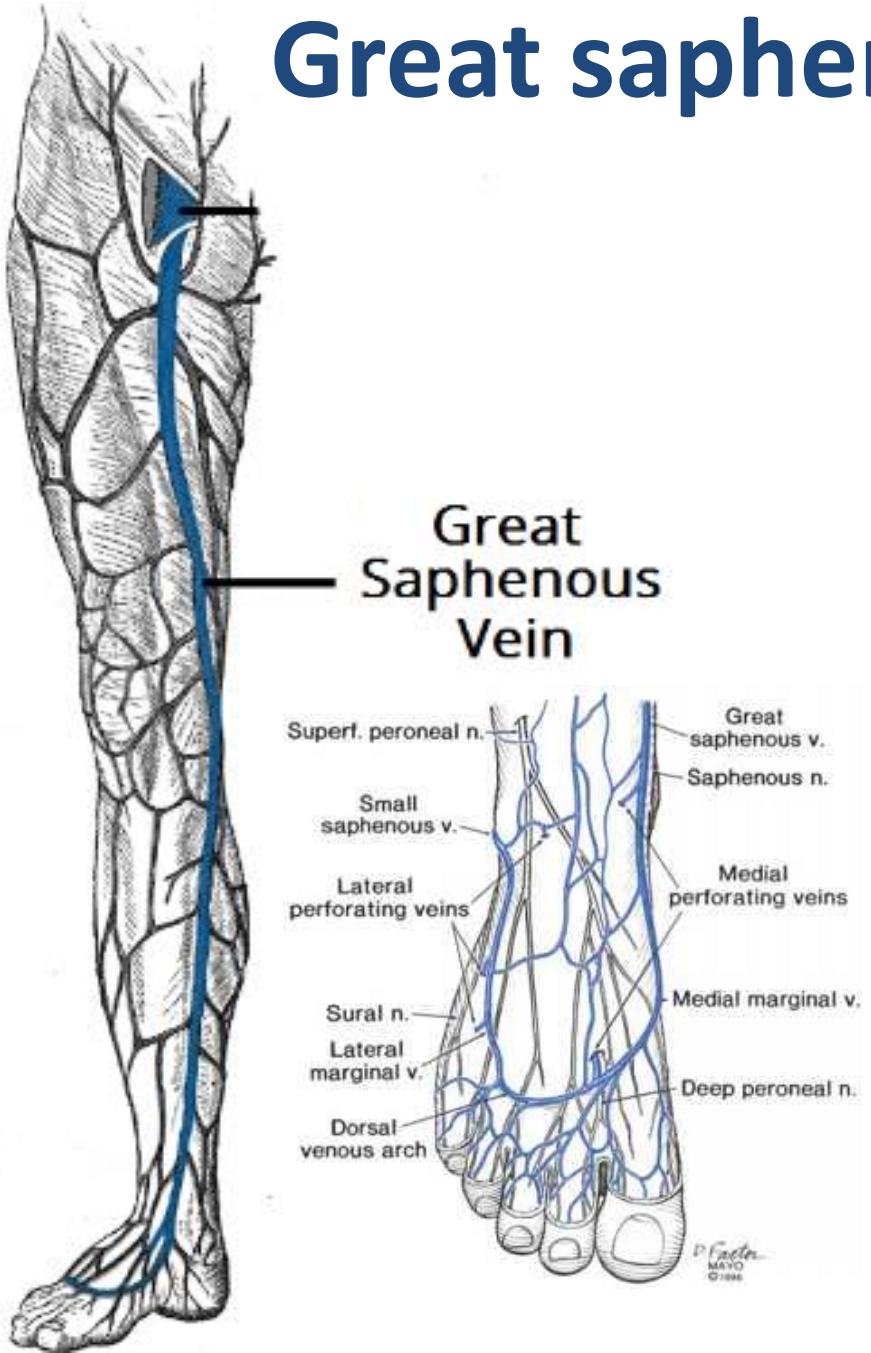
- It lies in the subcutaneous tissue over the heads of metatarsals with convexity directed distally.
- It is formed by union of 4 dorsal metatarsal veins.

Each dorsal metatarsal vein recieves blood in the clefts from

- dorsal digital veins.
- and proximal and distal perforating veins conveying blood from plantar surface of sole.



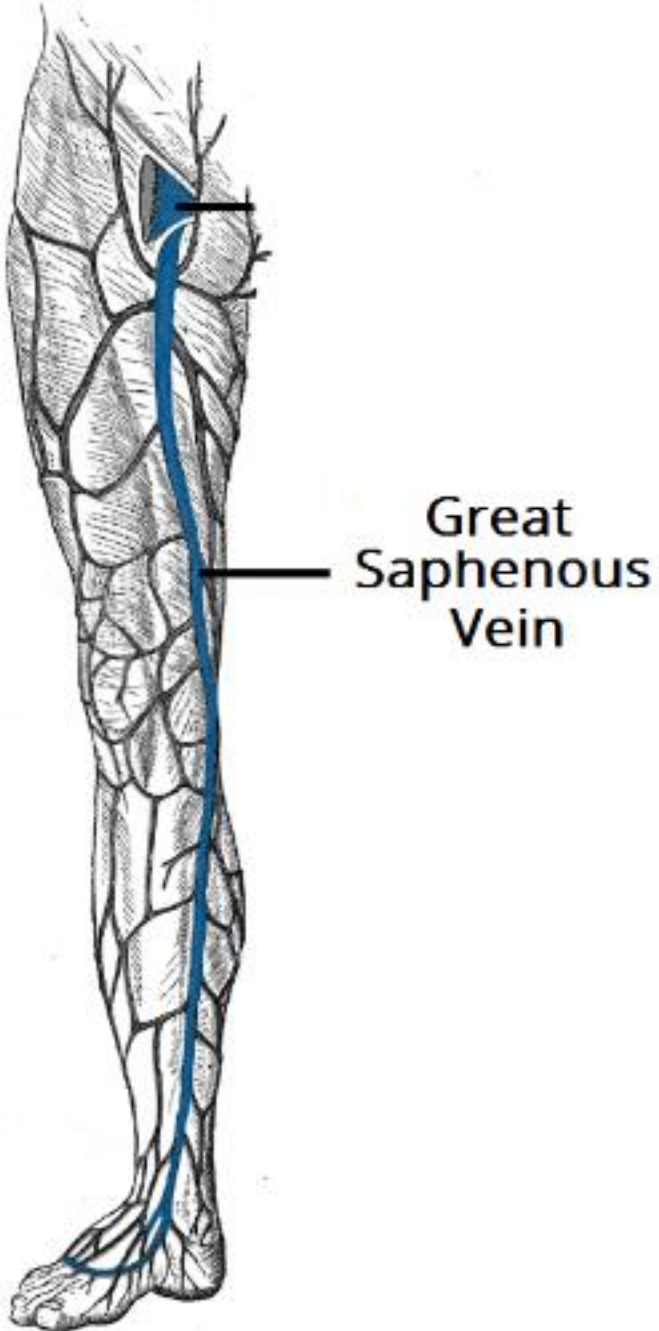
Great saphenous Vein



Begins from the medial side of dorsal venous arch.
Supplemented by medial marginal vein

Ascends 2.5 cm anterior to medial malleolus.

Passes posterior to medial border of patella.



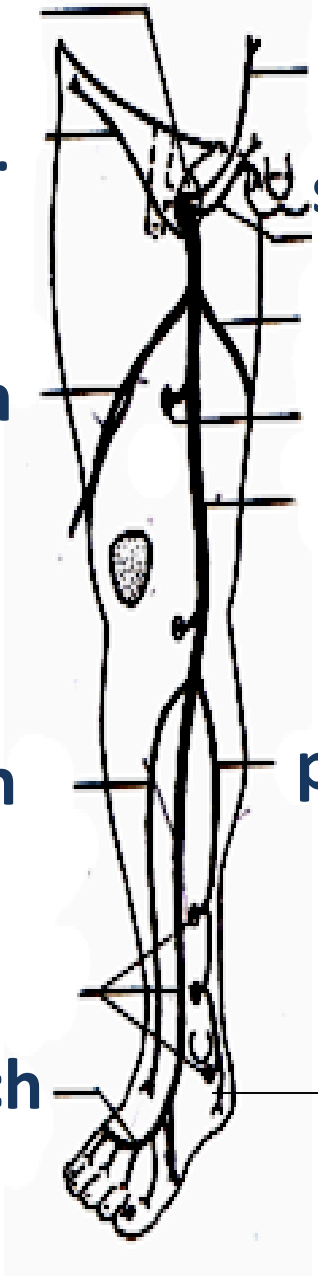
Ascends along medial thigh.

Penetrates deep fascia of femoral triangle:

Pierces the Cribriform fascia.

Saphenous opening.

Drains into femoral vein.



superficial epigastric v.

superficial circumflex iliac v.

superficial ext. pudendal v.

posteromedial vein

anterolateral vein

GREAT SAPHENOUS VEIN

anterior leg vein

posterior arch vein

dorsal venous arch

medial marginal vein

Thoraco-epigastric vein

Deep external pudendal v.

Tributaries of Great Saphenous vein

Tributaries of Great Saphenous vein

saphenous opening

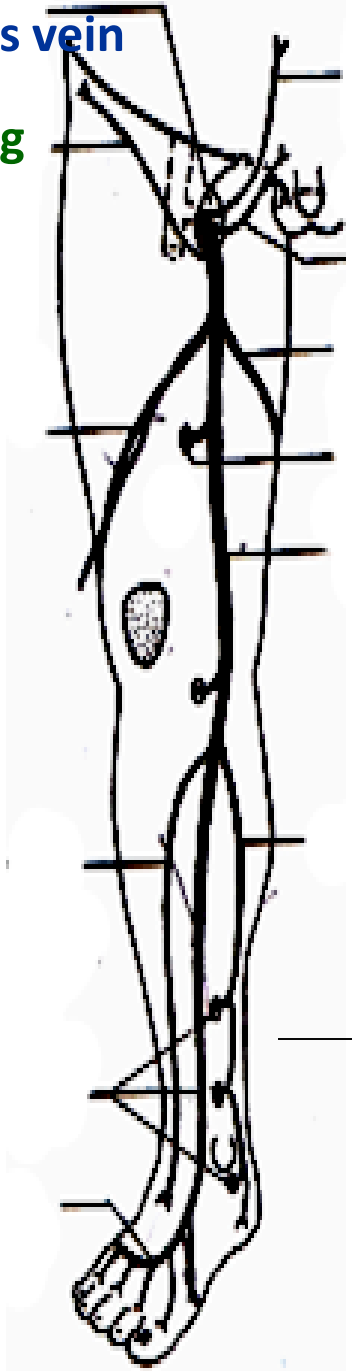
superficial circumflex iliac

anterolateral vein

anterior leg vein

medial perforators

dorsal venous arch



superficial epigastric

superficial external pudendal

posteromedial vein

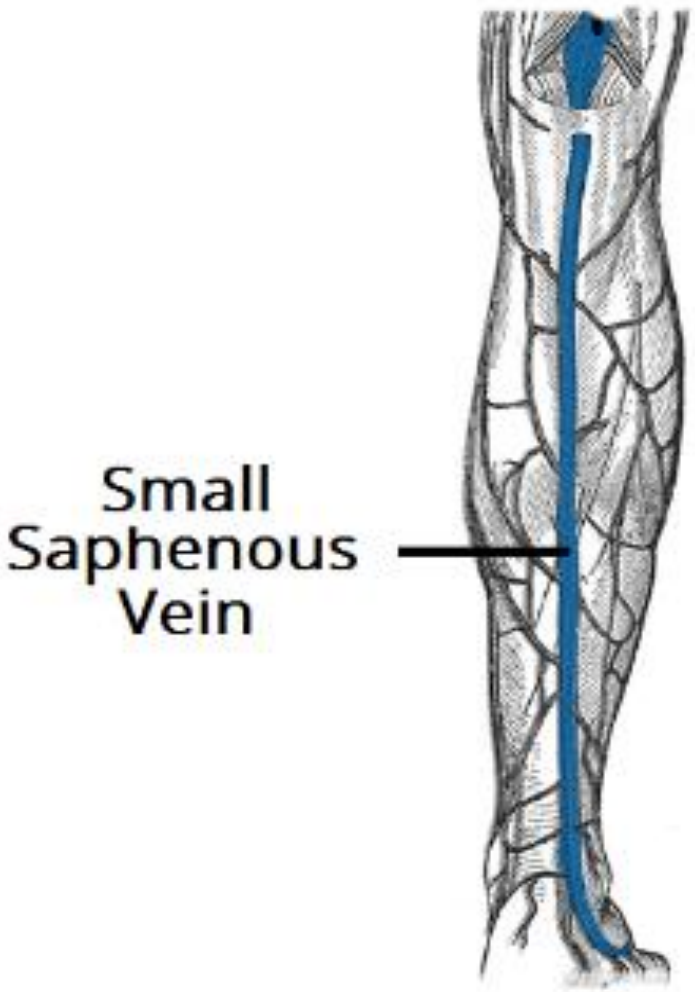
adductor c. perforator

great saphenous vein

posterior arch vein

medial marginal vein

Short/ Lesser saphenous Vein:



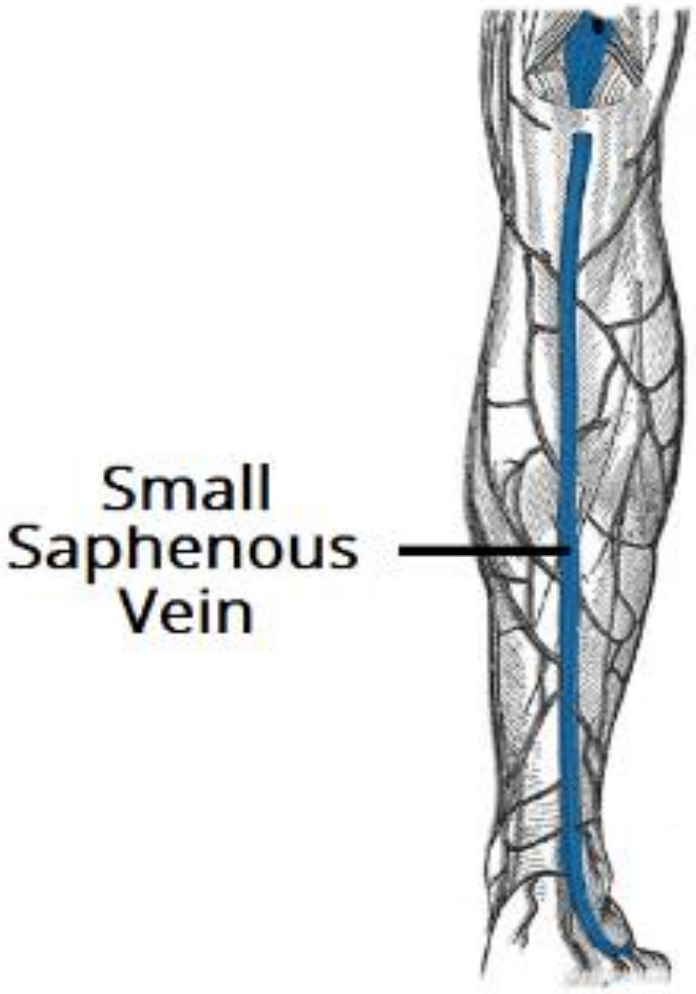
Drains lateral side of dorsal venous arch.

Passes posterior to lateral malleolus.

Accompanies sural nerve. Ascends along midline of calf.

Empties into popliteal vein in popliteal fossa.

Short/ Lesser saphenous Vein:



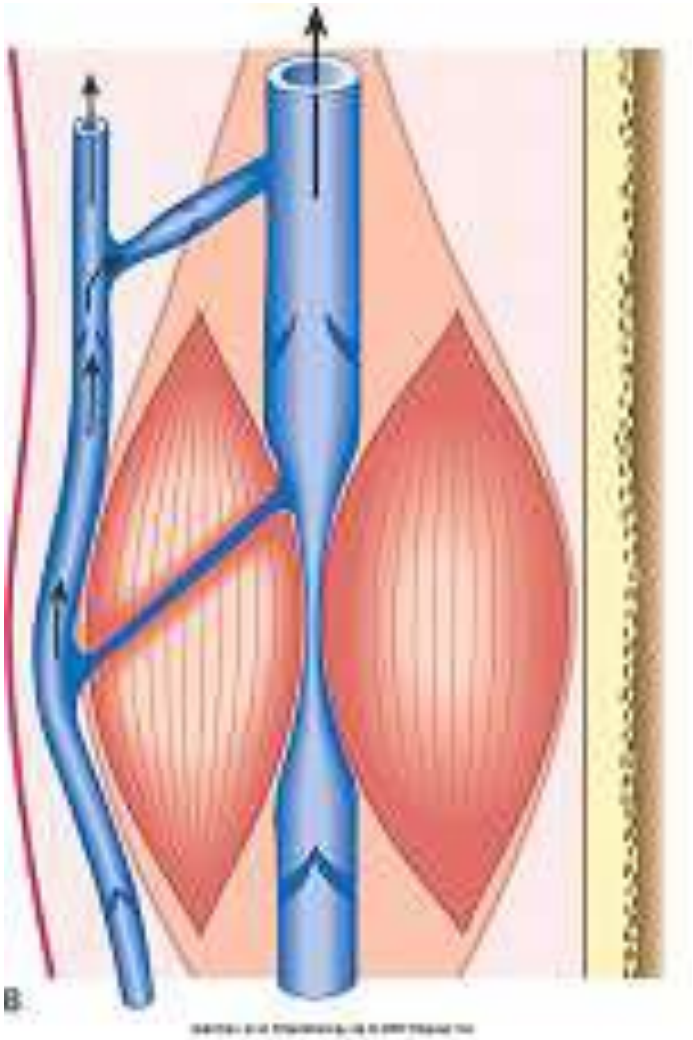
Variable termination

a) It may join GSV in upper third of thigh either directly or through accesory saphenous vein.

b) May bifurcate : join GSV and other in popliteal vein.

c) May end in GSV in leg or deep vein of leg

Deep veins

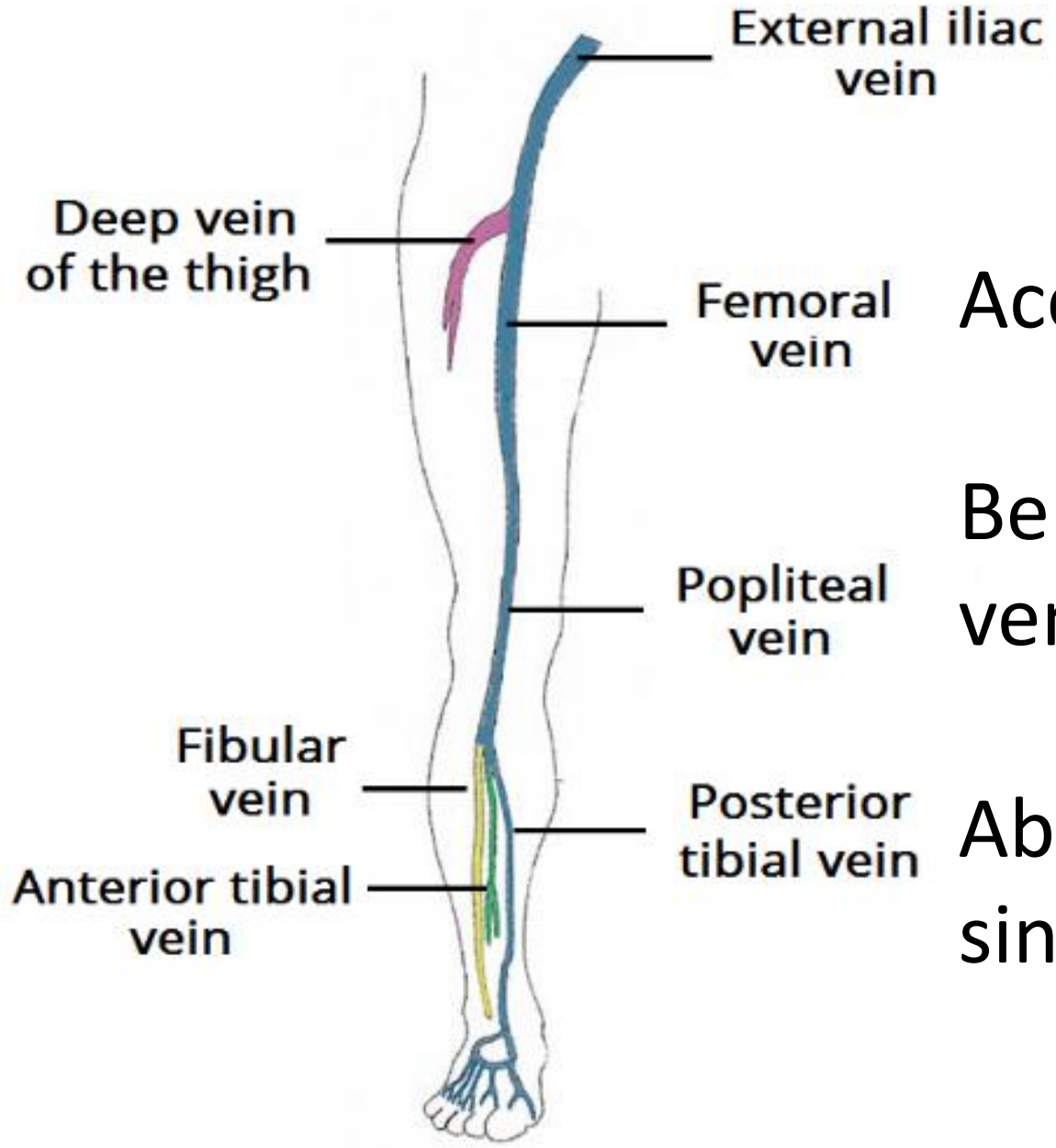


Present within the deep fascia surrounded by powerful muscles.

Blood flow in greater pressure and volume.

Accounts for 80 -90% venous return.

Deep veins

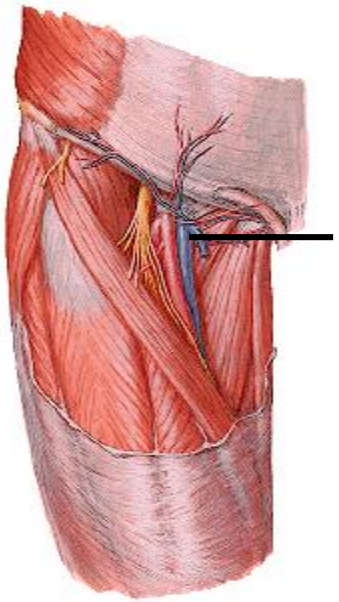


Accompany arteries

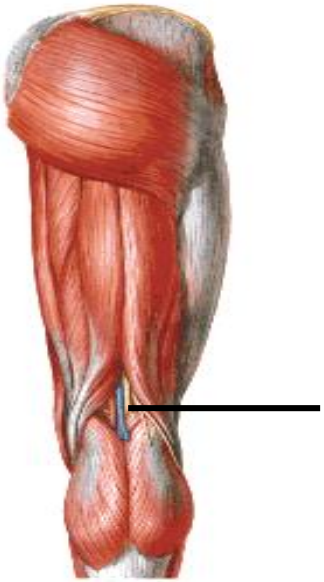
Below the knee- venae comitantes.

Above the knee- single major vein

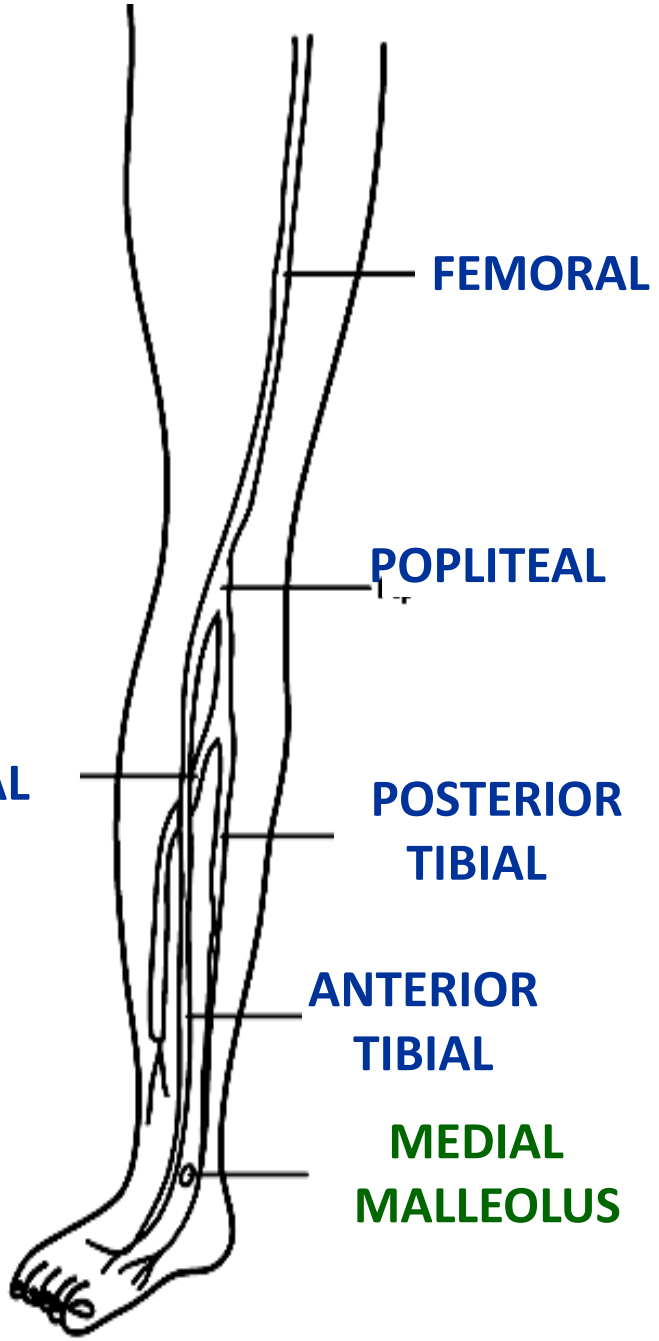
Deep veins of lower limb



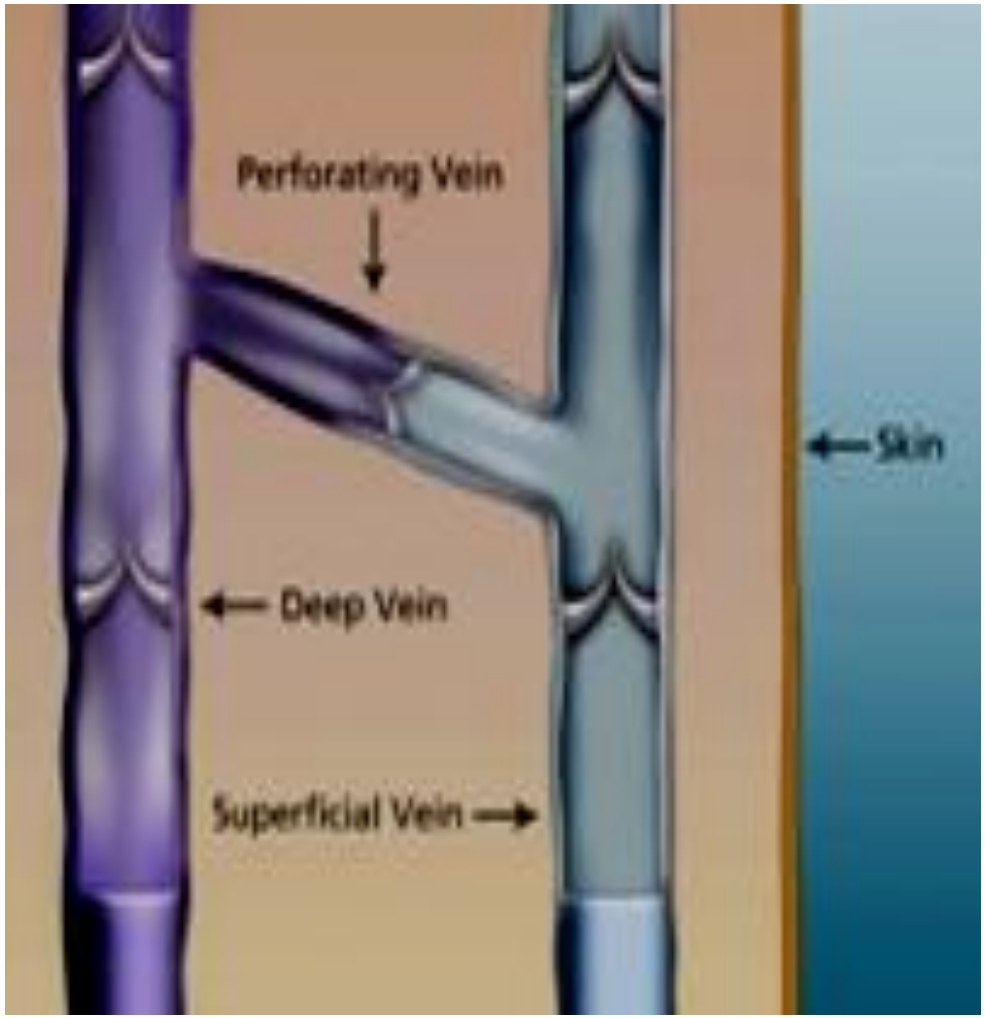
Femoral vein



Popliteal vein



PERFORATORS



Communicate superficial veins to deep veins

Have role in varicose veins.

All veins in lower limb have valves

Fairly constant in position:

1 lateral ankle perforators

3 Medial ankle perforators

a)Postero inferior to medial malleolus

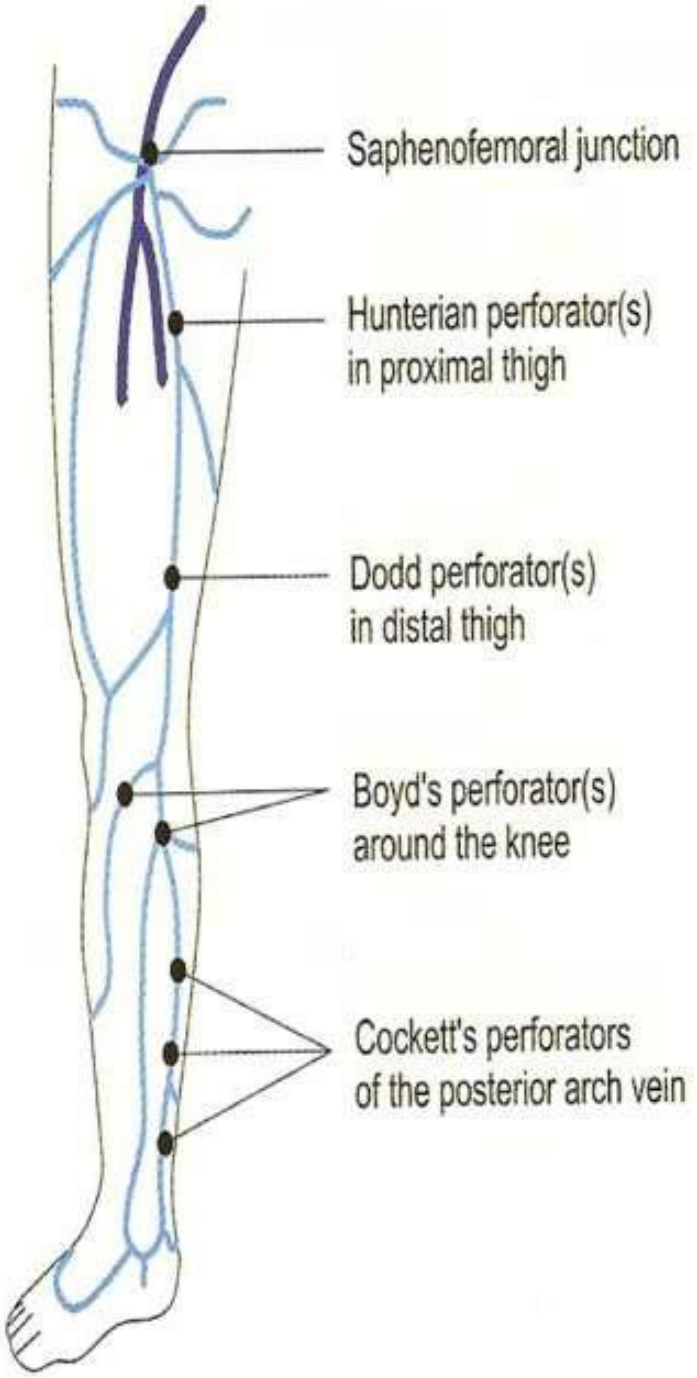
b)10 cm above med.malleolus

c)15 cm above med.malleolus

3. Gastrocnemius perforators of Boyd around knee

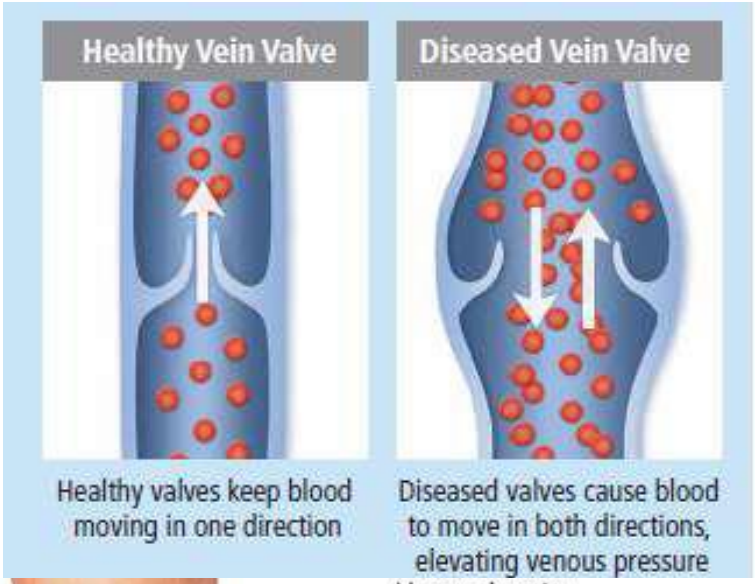
4. Mid thigh perforators of Dodd

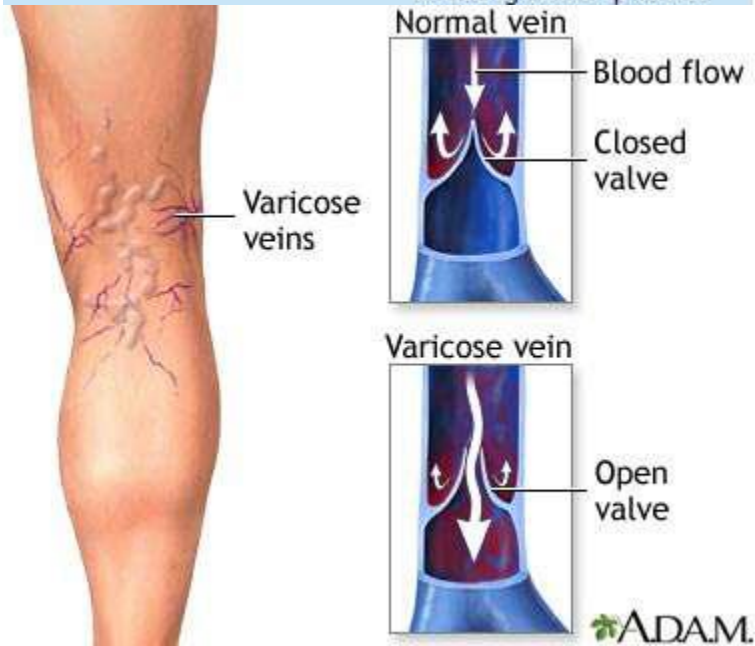
5. Hunter’s perforator in thigh



Valves in Great Saphenous Vein

- 10-20 valves
- 1 valve just before GSV pierces Cribriform fascia
- valve at Sapheno-femoral junction
- In 80% of people, a valve is present in external iliac vein which protects Sapheno-femoral junction.





Varicose veins

Dilated,tortuous and elongated vein with reversal of blood flow mainly due to **valvular incompetence**

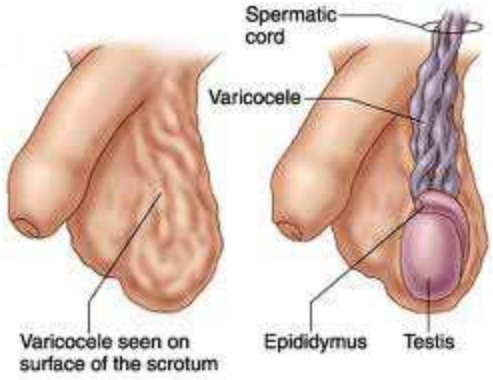
Includes

varicose veins in legs

Hemorrhoids

Varicocele

Oesophageal varices



Risk factors

- Age
- Gender
- Height
- left>right
- Heredity
- Pregnancy
- Obesity and overweight
- Elevate intra abdominal pressure
- Deep vein thrombophlebitis
- Posture
- Incompetency of valves

Saphena varix

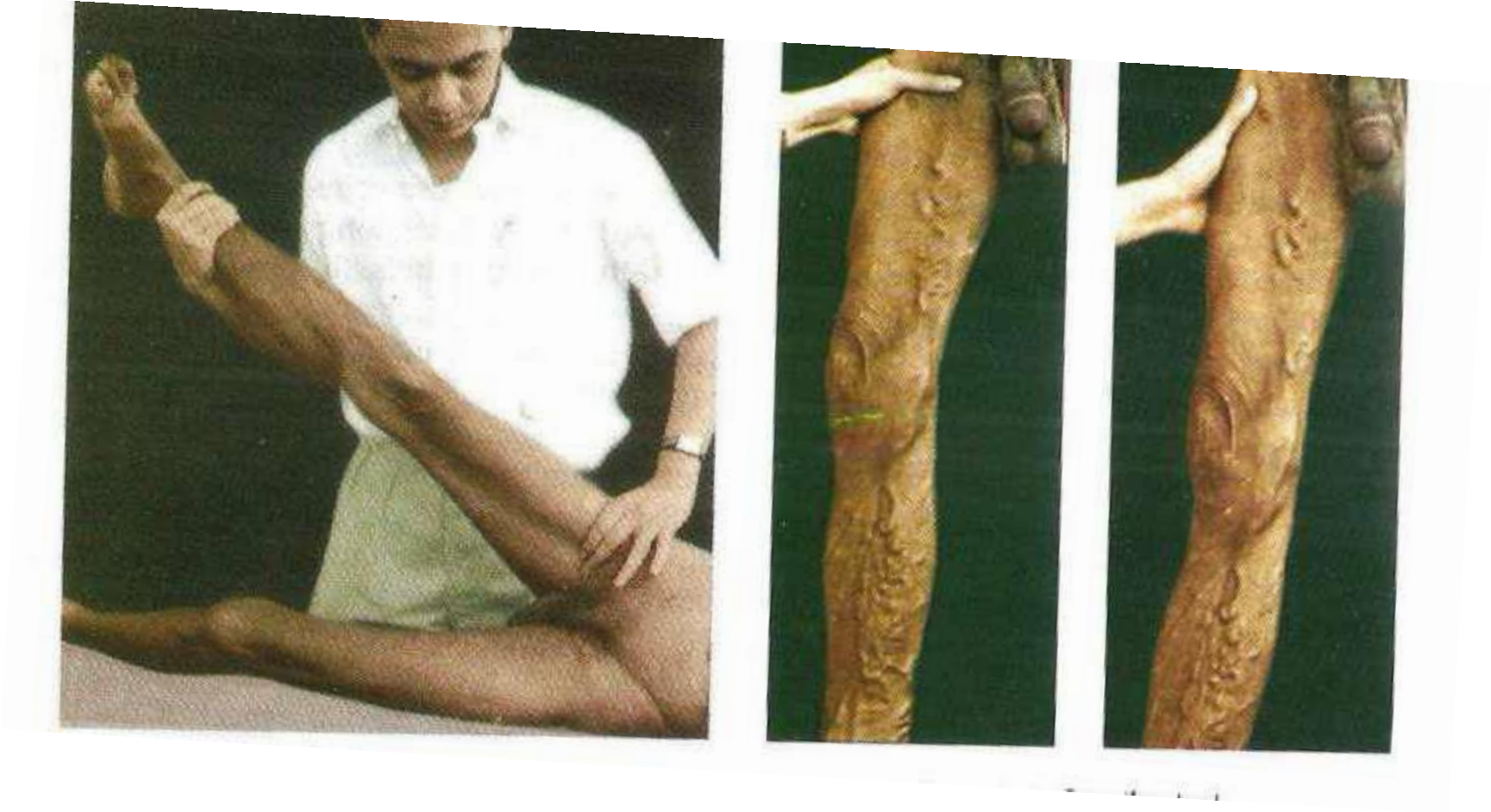
A saphena varix is a dilatation at the top of the Great saphenous vein due to valvular incompetence.

The varix is:

- soft and compressible
- disappears immediately on lying down
- exhibits an expansile cough impulse

Trendelenburg test

- Used to assess the competence of SFJ
- Patient lies flat.
- Elevate the leg and gently empty the veins
- Palpate the SFJ and ask the patient to stand whilst maintaining pressure.



- Rapid filling after thumb released→ SFJ is incompetent
- Filling from below upwards without releasing thumb →presence of distal incompetent perforators

Patient in the supine position

↓

The lower limb raised above the level of heart

↓

Tourniquet is then applied around the saphenofemoral junction to compress the superficial veins (but not too tight as to occlude the deeper veins)

↓

Then the patient asked to stand

↓

Normally, the superficial vein will fill from below within 30-35 seconds

↓

If the superficial veins fill more rapidly with the tourniquet in place there is valvular incompetence below the level of the tourniquet in the "deep veins or perforators.

If there has been no rapid filling even after 20 seconds the tourniquet is released.

If rapid filling from above then it indicates that the deep and perforating veins are competent

&

superficial veins are incompetent

The test is reported in 2 parts

a) Standing up of the patient with tourniquet on

based on rapid filling + or – deep veins/perforators incompetent

b) When Tourniquet is removed

based upon rapid filling + or - superficial vein incompetent

The test can be repeated with the tourniquet at different levels to further pinpoint the level of valvular incompetence

Perthes Test

Empty the vein as above, place a tourniquet around the thigh, stand the patient up.

↓

Ask them to rapidly stand up and down on their toes

↓

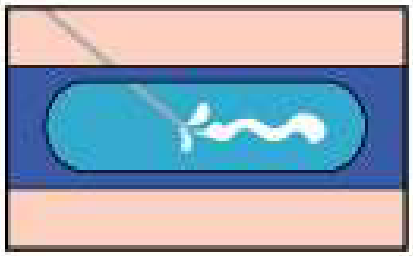
filling of the veins indicated deep venous incompetence.

This is a painful and rarely used test.

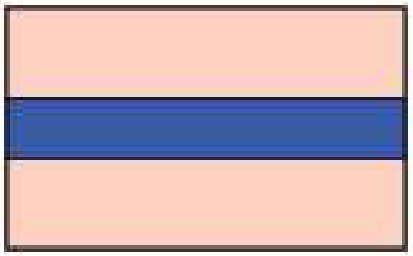
Fig. 7.5.— Shows how to perform Perthes' test.

VARICOSE ULCER

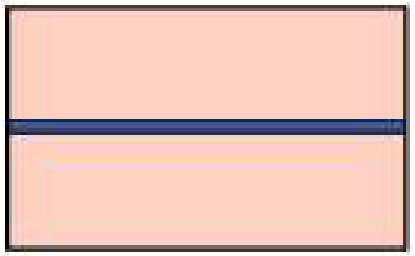
Sclerotherapy



1. Painless injection of sclerosant medication into varicose veins or spider veins.

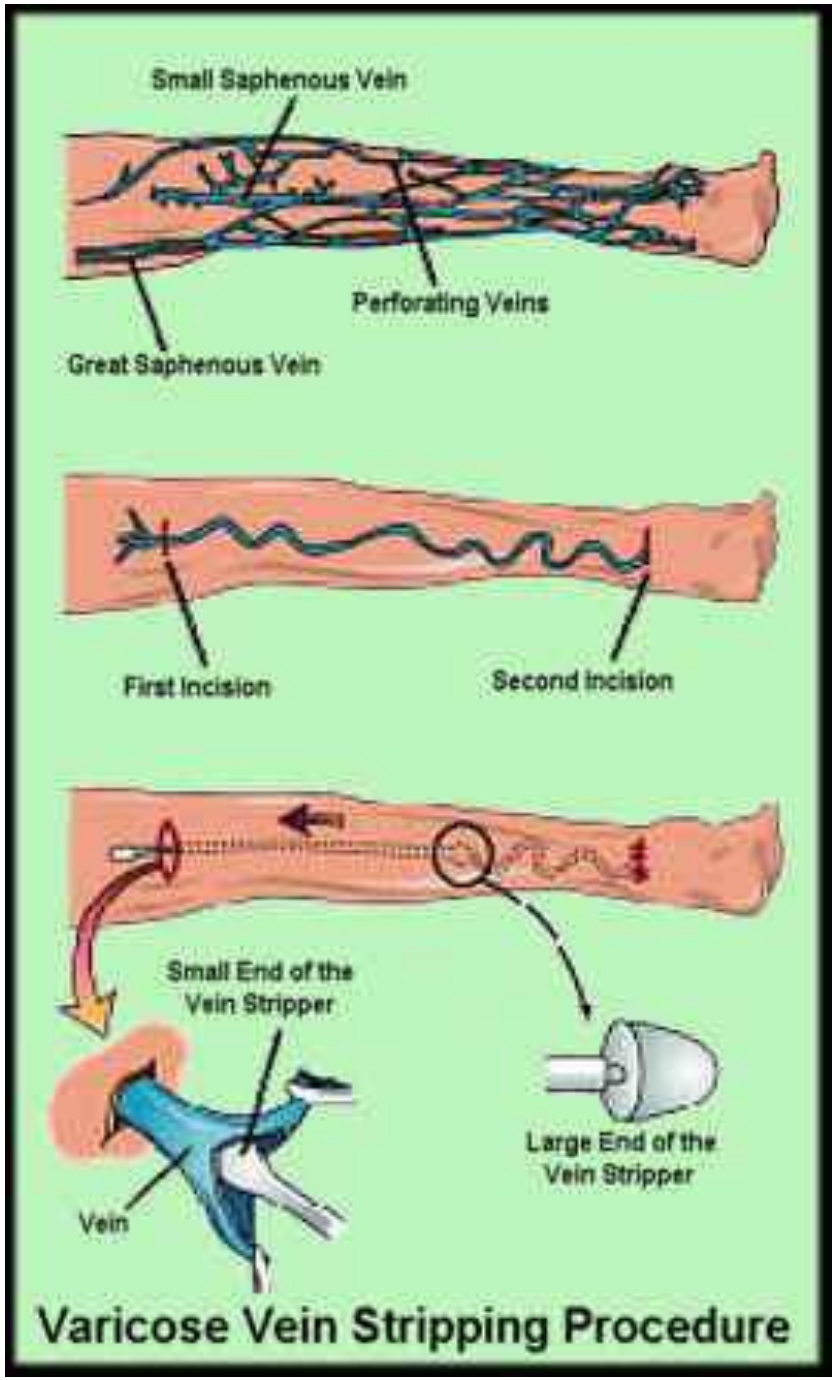


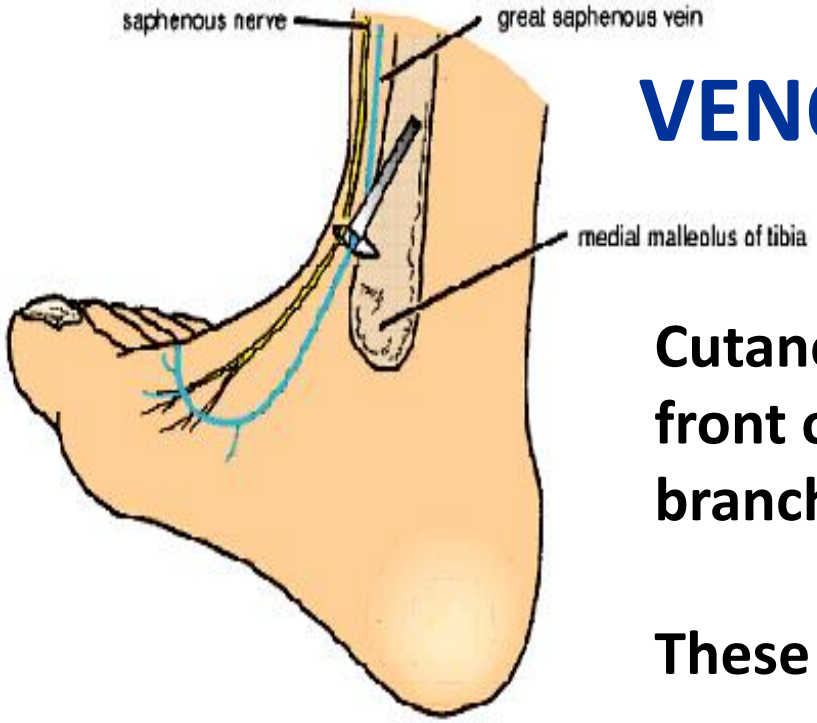
2. Veins dry out and shrink.



3. Veins slowly disappear as they are gradually absorbed by the body.

Trendelenburg's Operation





VENOUS CUT DOWN

Cutaneous supply of skin immediately in front of the medial malleolus is from branches of saphenous nerve

↓

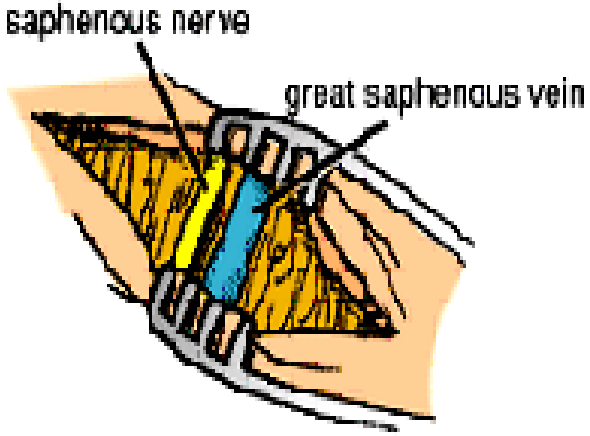
These branches are blocked with LA

↓

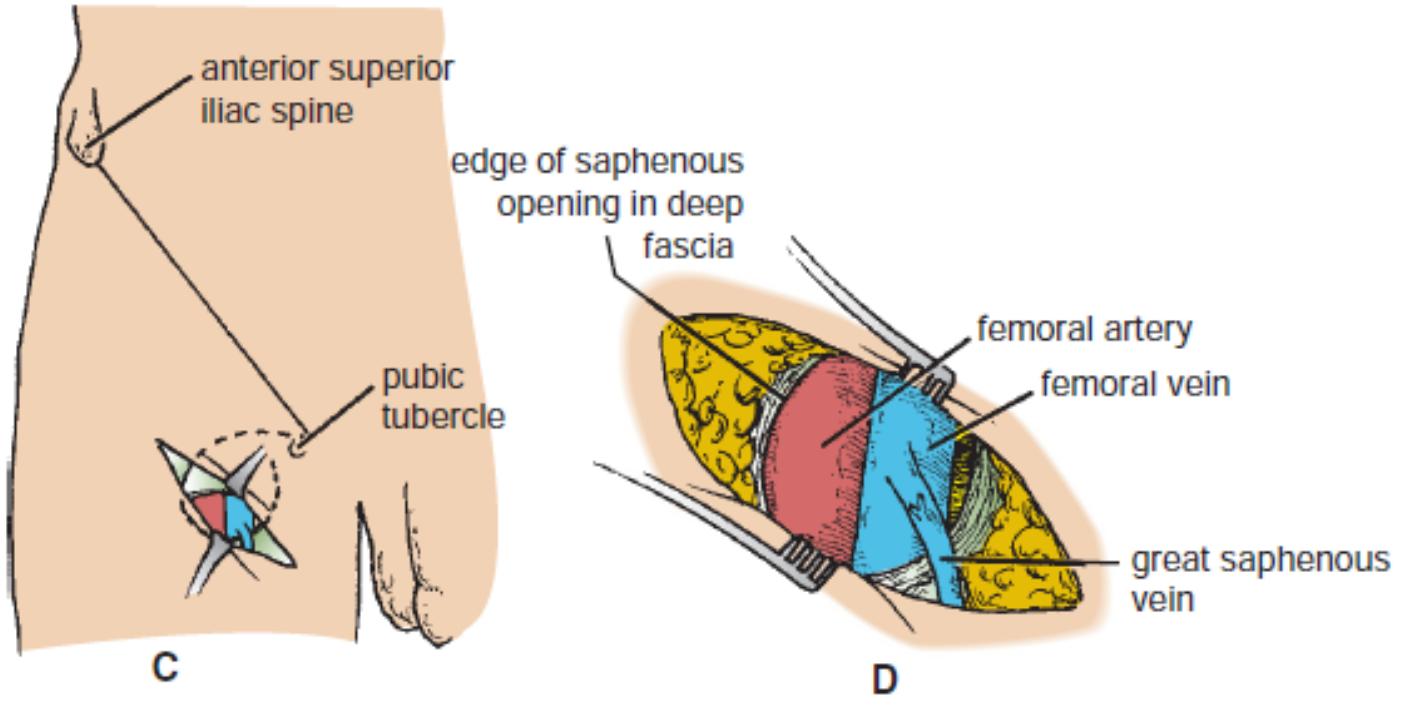
A transverse incision is made through the skin and subcutaneous tissue across

↓

the long axis of the vein just anterio-superior to the medial malleolus.



Femoral Vein Catheterization



Coronary artery bypass