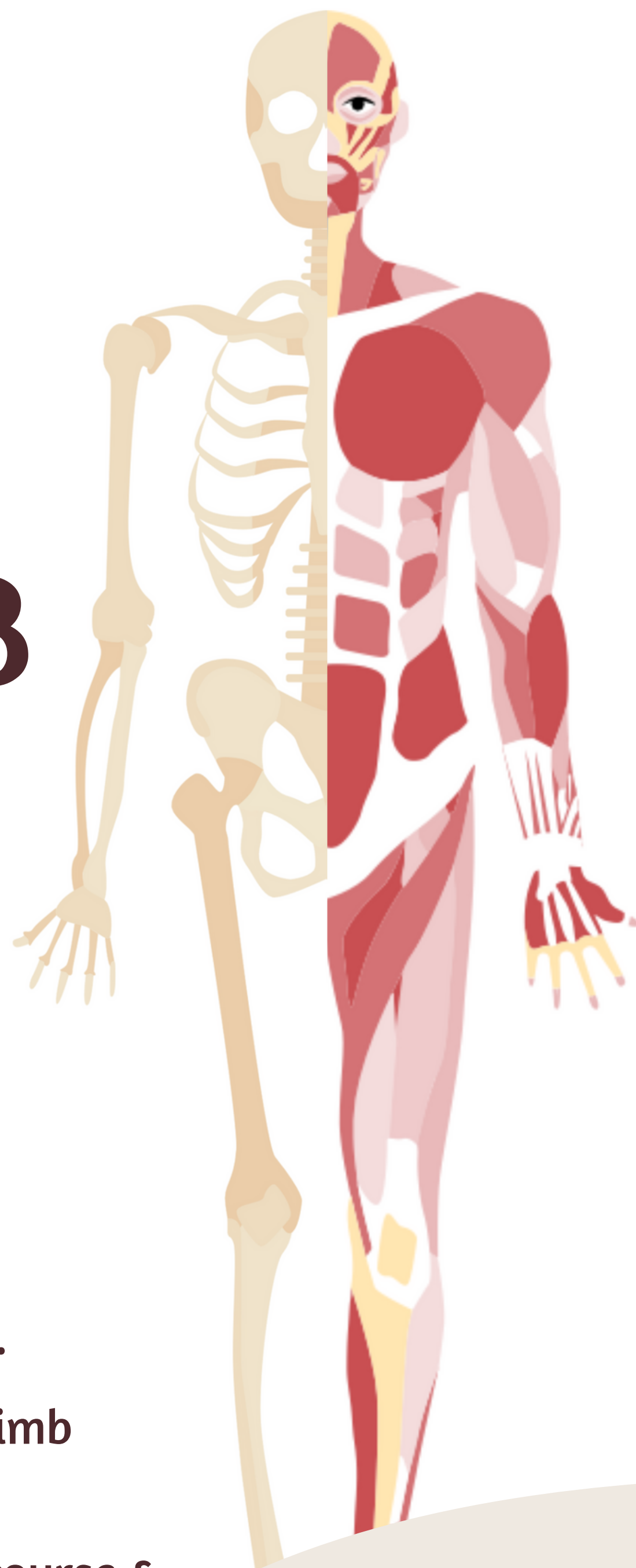


Lecture 19

VASCULAR ANATOMY OF THE LOWER LIMB

OBJECTIVES

- List the main arteries of the lower limb.
- Describe their anatomy regarding: origin, course distribution branches
- List the main arterial anastomosis.
- List the sites to feel the peripheral arterial pulse.
- Describe the anatomy of the veins of the lower limb regarding:
 - 1-differentiation into superficial & deep, origin, course & termination
 - 2-Clinical point of superficial veins (VARICOSE VEIN)



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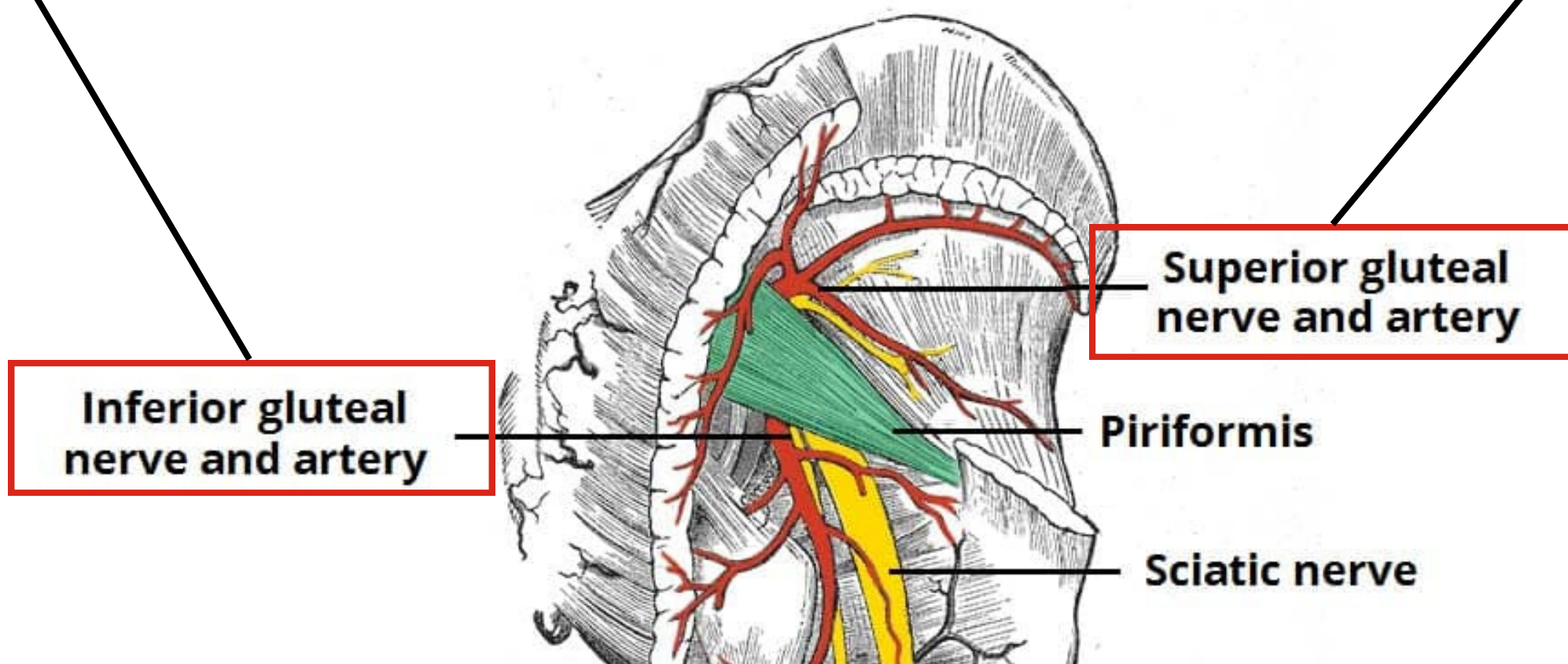
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Arteries of the gluteal region

Inferior gluteal artery: It is a branch of the internal iliac artery; it enters the gluteal region through the greater sciatic foramen **below** the piriformis to supply the gluteal region

Inferior artery = Below piriformis
Superior artery = Above piriformis

Superior gluteal artery: It is a branch of the internal iliac artery; it enters the gluteal region through the greater sciatic foramen **above** the piriformis to supply the gluteal region



Trochanteric+Cruciate anastomosis

Trochanteric

Cruciate

provides connection between the internal iliac and femoral arteries.

Formed by:

superior and inferior gluteal artery

medial and lateral femoral circumflex arteries.

Main function

the main blood supply for the head of the femur

formed by **the union** of:

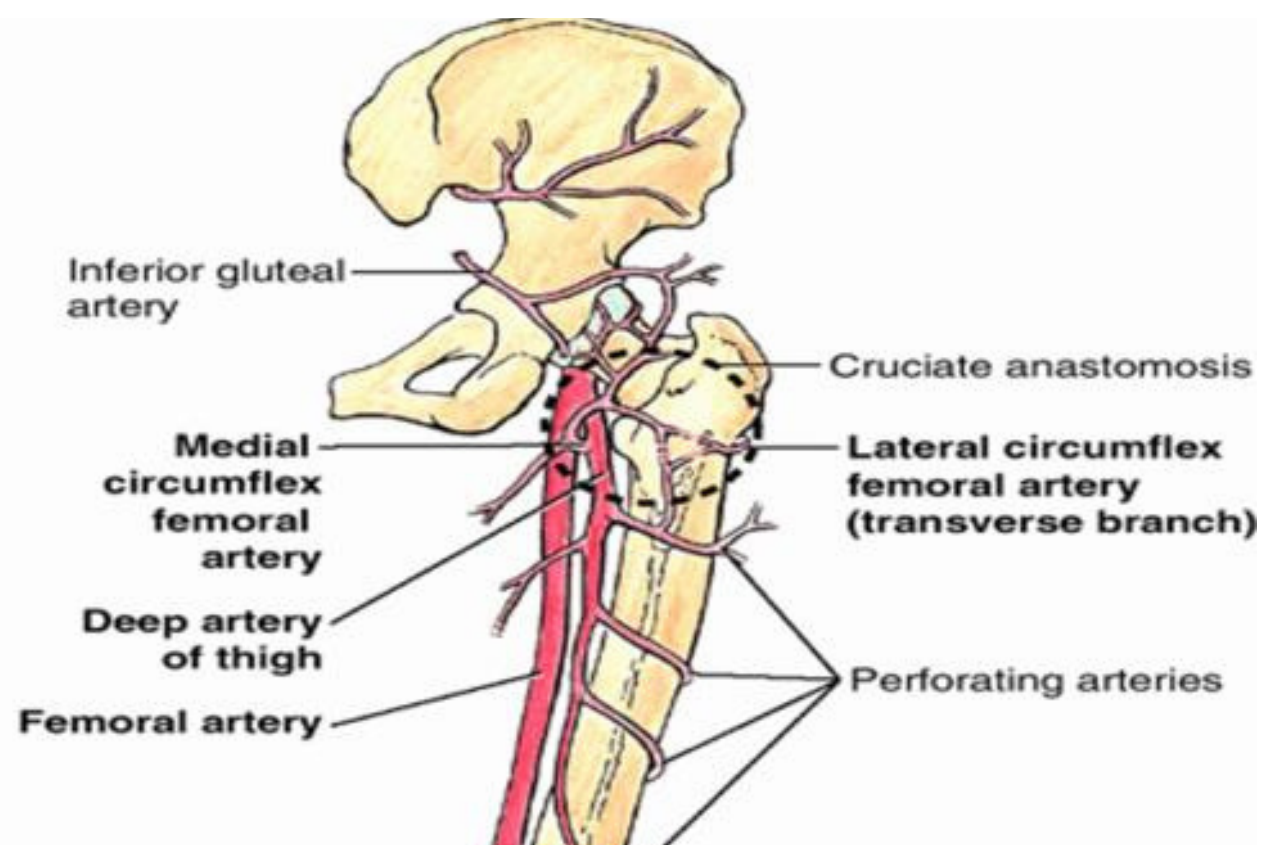
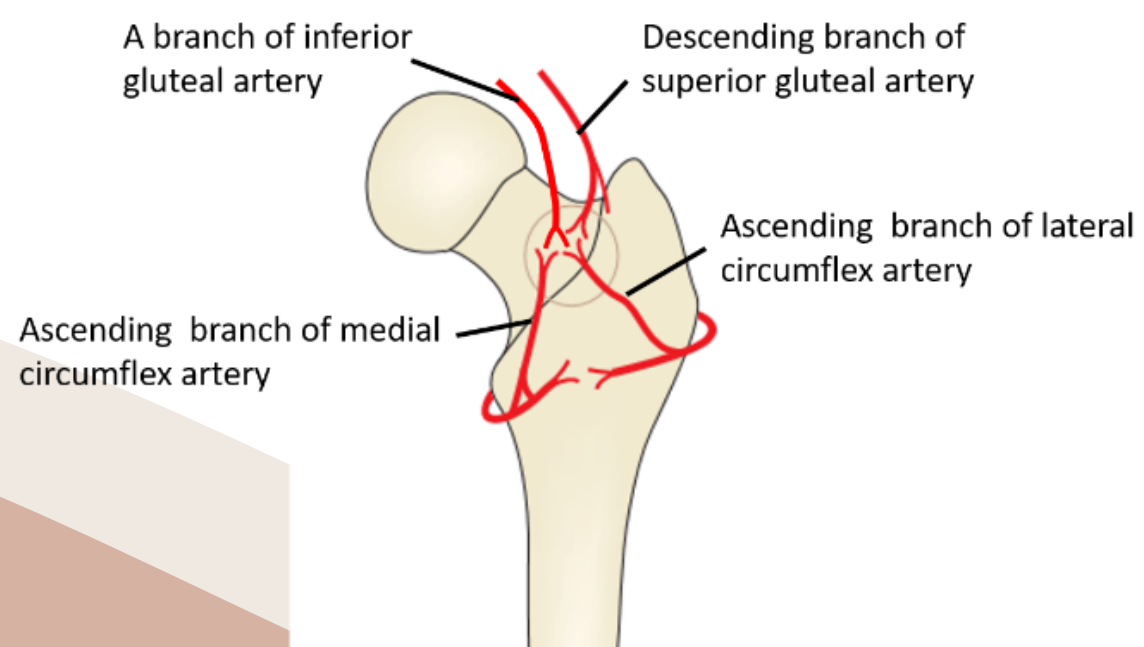
inferior gluteal artery

medial+ lateral circumflex femoral

1st perforator artery

Femoral arteries

Trochanteric Anastomosis

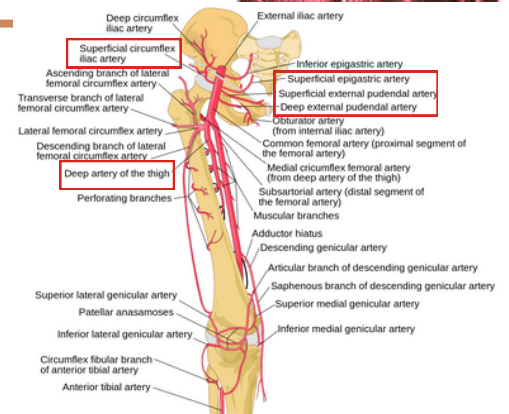
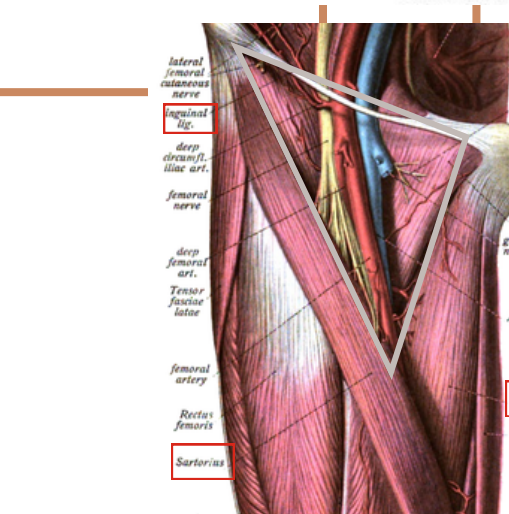
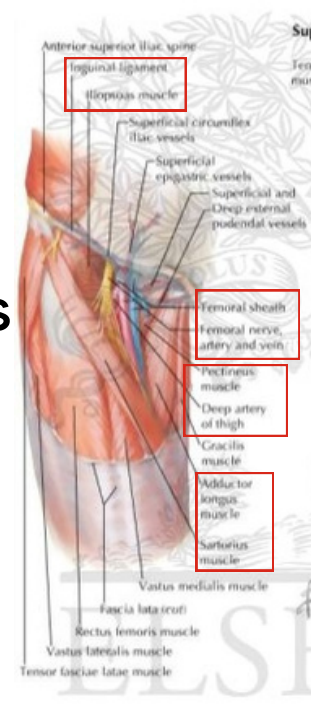
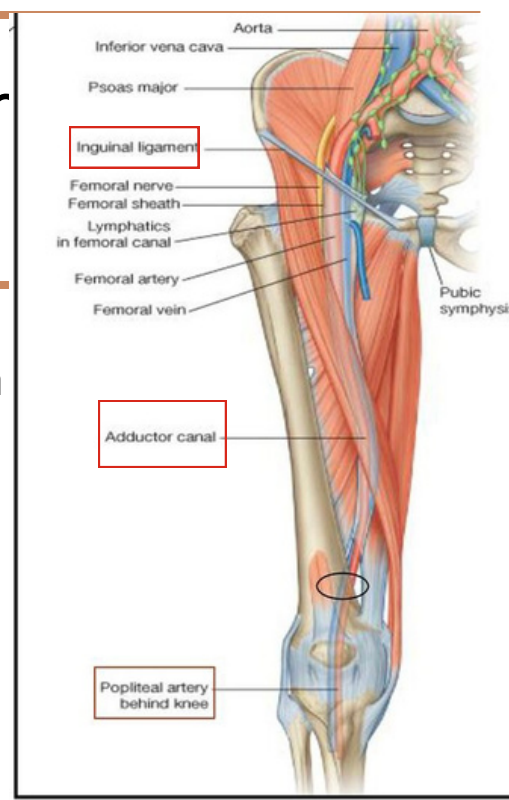


Femoral artery

- main arterial supply to the lower limb
- the continuation of the **External Iliac artery**.

Zoom to see picture details

<p>Beginning</p>	<p>it enters the thigh behind the inguinal ligament; midway between the anterior iliac spine and the symphysis pubis.</p>
<p>Termination</p>	<p>It descends vertically towards the of the femur and ends by passing through opening of the Termination adductor magnus hiatus -muscles and continue as popliteal artery.</p>
<p>Relations</p>	<p>-Anterior: upper part covered by skin and fascia lower part passes behind sartorius</p> <p>-Posterior :Hip joint, separated from it by Psoas muscle, pectineus,adductor longus</p> <p>-Medial: femoral vein,</p> <p>-Lateral:Femoral nerve and its branches.</p>
<p>Relation of femoral vein to femoral artery</p>	<p>-At the inguinal ligament: The vein lies medial to the artery.</p> <p>-At the apex of the femoral triangle: The vein lies posterior to the artery</p> <p>-At the opening in the adductor magnus:The vein lies lateral to the artery.</p>
<p>Branches</p>	<p>Superficial branches: 1- Superficial Epigastric. 2- Superficial Circumflex iliac. 3-Superficial External Pudendal.</p> <p>Deep branches: 1- Deep External Pudendal. 2- Profunda femoris.(Deep Artery of Thigh)</p>



Obturator artery

Where?

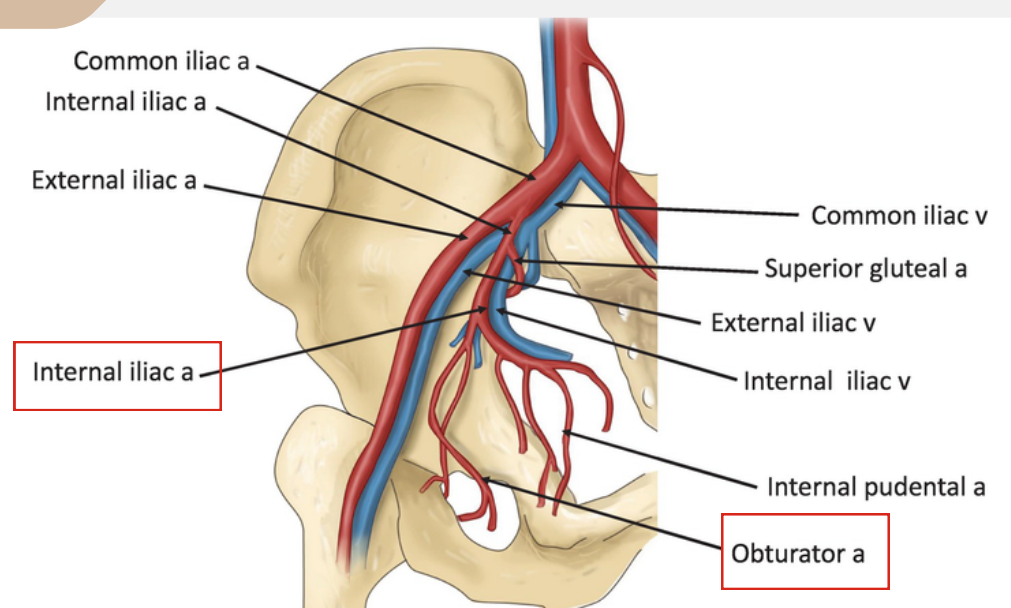
It is a branch of the **internal iliac artery**, accompanies the obturator nerve through the obturator canal

Where does it go

It enters the medial fascial compartment dividing into medial and lateral branches

Branches

muscular branches and articular to the hip joint



Profunda femoris

- It is important large artery
- main blood supply of thigh

where does it arise from

from the Lateral side of the Femoral Artery (4cm below the inguinal ligament).

where does it pass

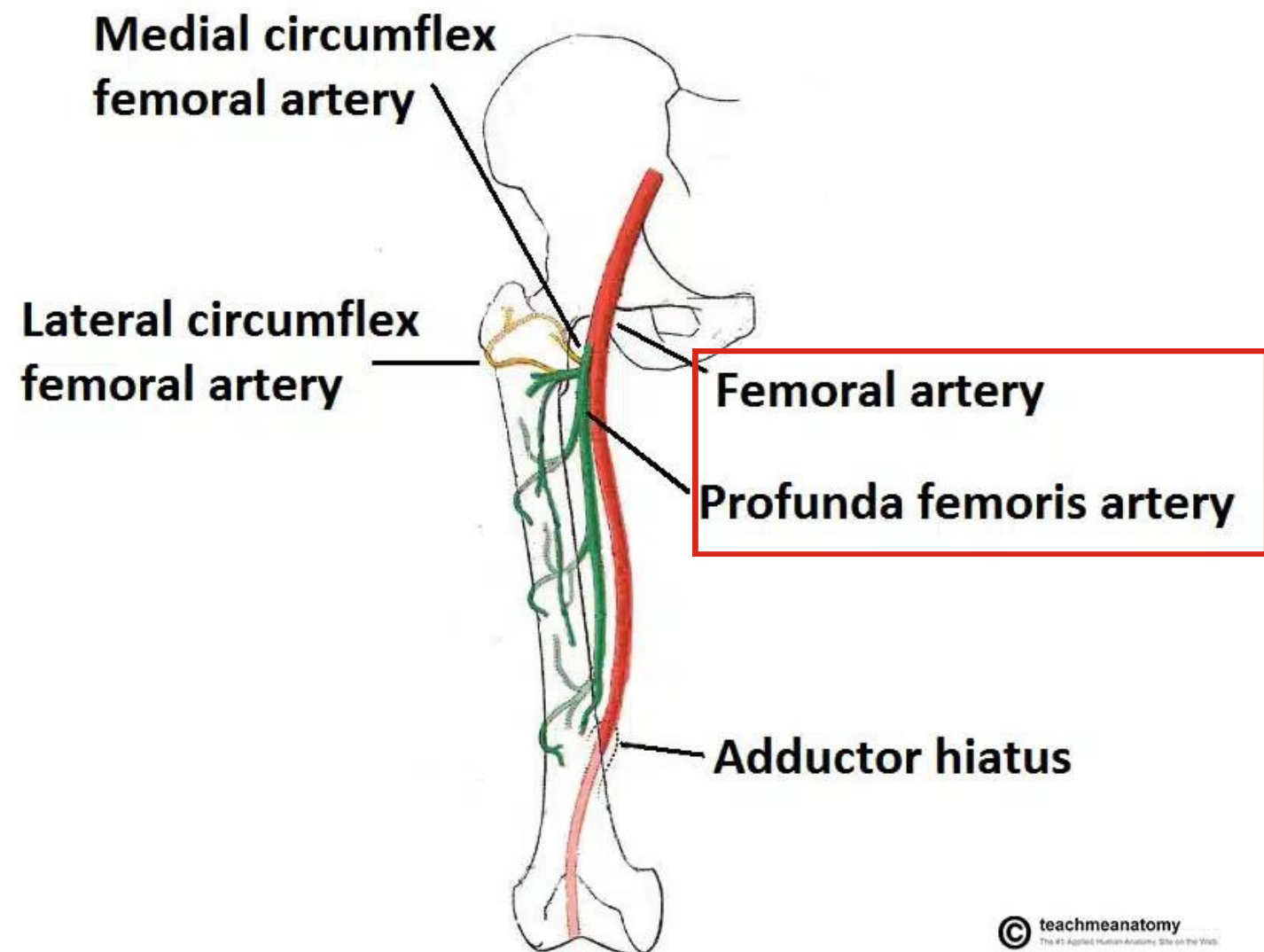
Passes medially behind the femoral vessels, lies above the adductor magnus muscle.

its branches

- Medial & Lateral Circumflex Femoral Arteries
- Three Perforating Arteries

Where does it end

By becoming the 4th Perforating Artery



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Popliteal artery

What and where is it

the continuation of Femoral artery, that enters the popliteal fossa through an opening in the Adductor magnus.

Relations

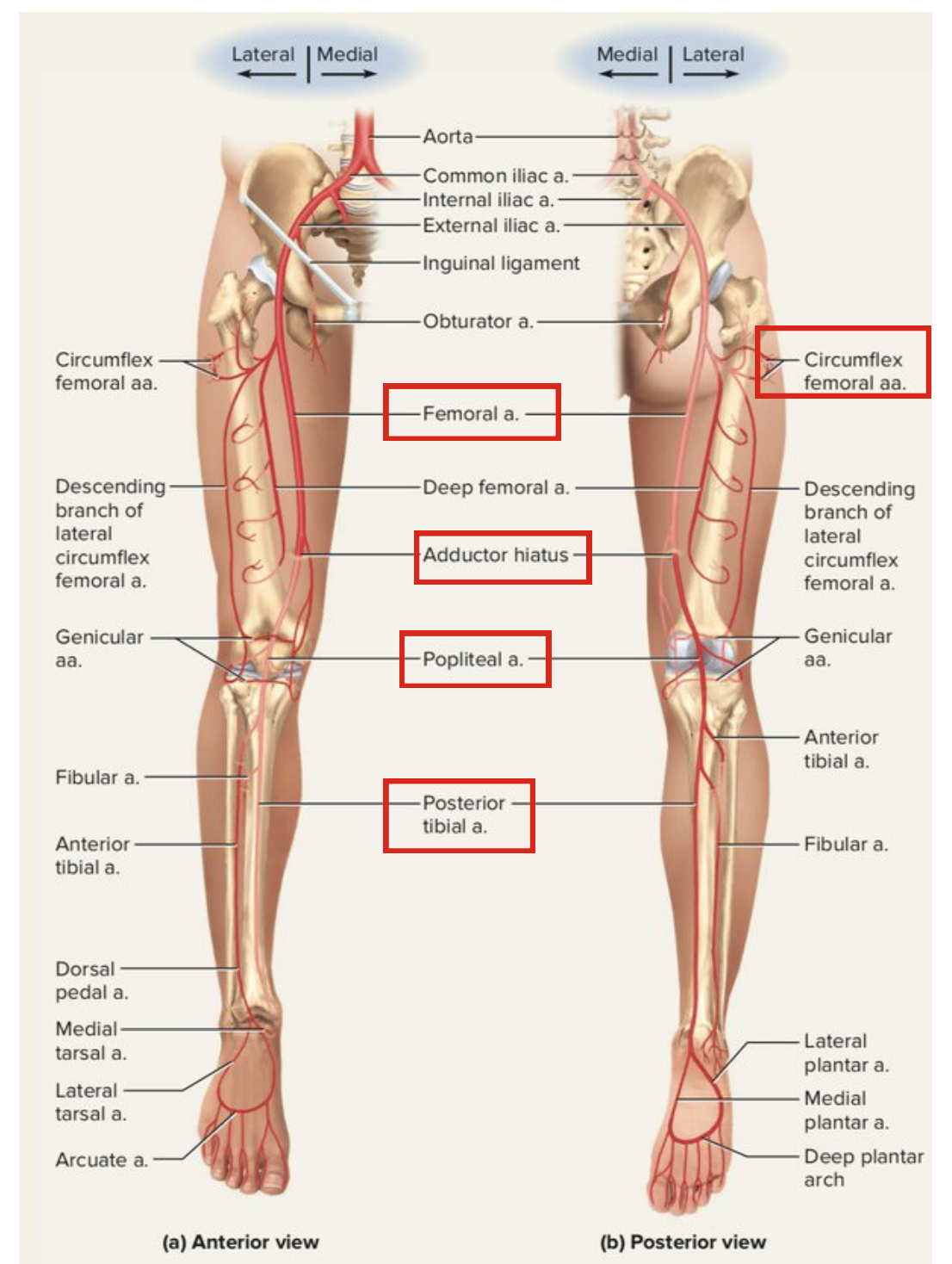
- | | |
|--|---|
| <p>Anterior:</p> <ul style="list-style-type: none"> -Popliteal surface of the femur -knee joint -popliteus muscle | <p>Posterior :</p> <ul style="list-style-type: none"> -Popliteal vein -Tibial nerve -skin and fascia |
|--|---|

Where does it end

at the lower border of popliteus muscle by **dividing** into anterior and posterior tibial arteries.

Branches

Muscular and Articular to the knee.



Anterior Tibial Artery

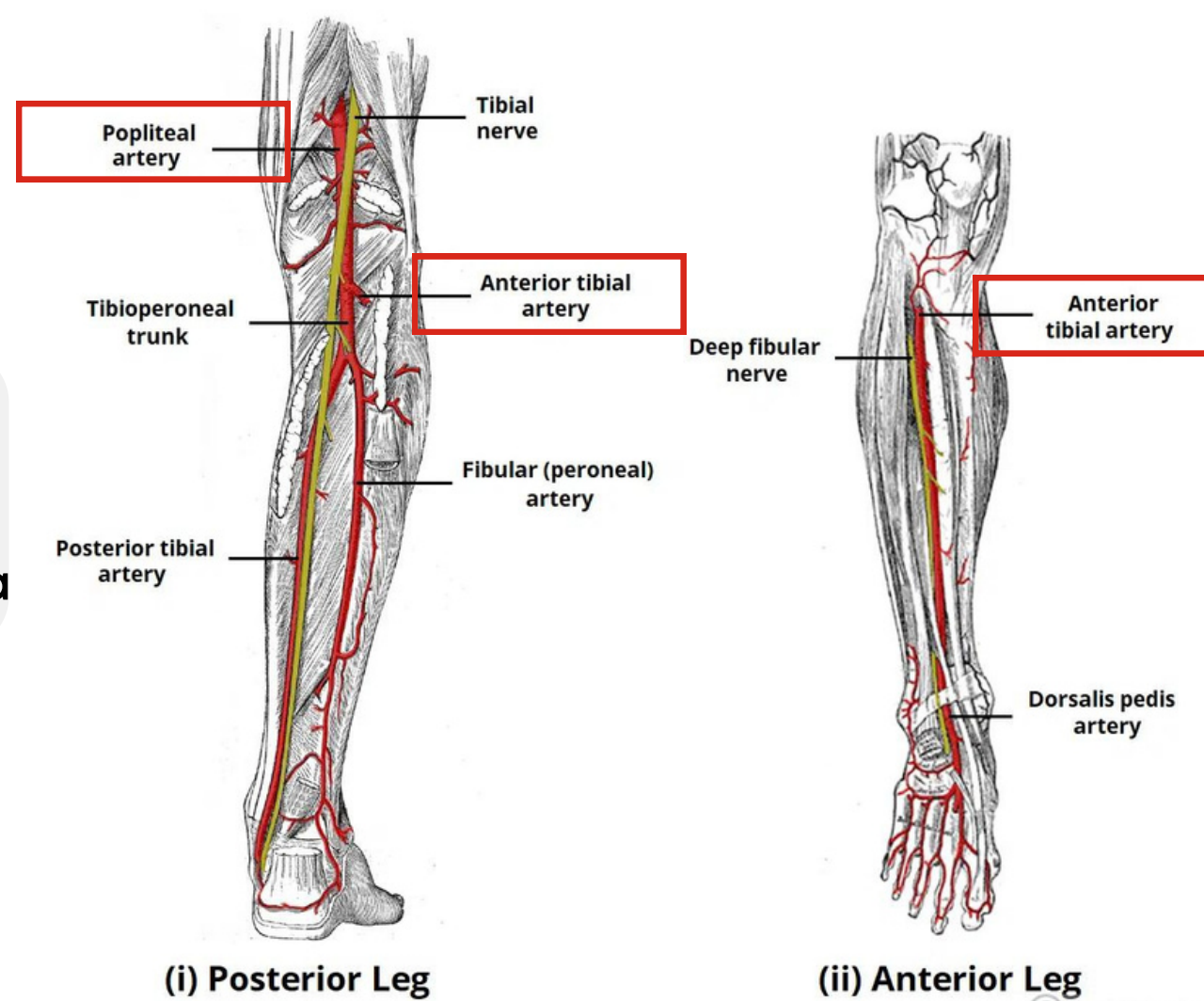
- It is the smaller of the two terminal branches of the popliteal artery

Where is it the anterior compartment of the leg with deep peroneal nerve

Upper & Lower part
Up: it lies deep to the muscles of the anterior compartment
Low: it lies superficial in front of the lower end of the tibia

Branches Muscular & Anastomotic to branches of other arteries around knee and ankle joints

Where does it pass? Through the opening in the upper part of the interosseous membrane



Dorsalis Pedis Artery

Where is it and what's its position Begins in front of ankle joint as a continuation of the Anterior Tibial artery, it is superficial in position.

Crossed by?

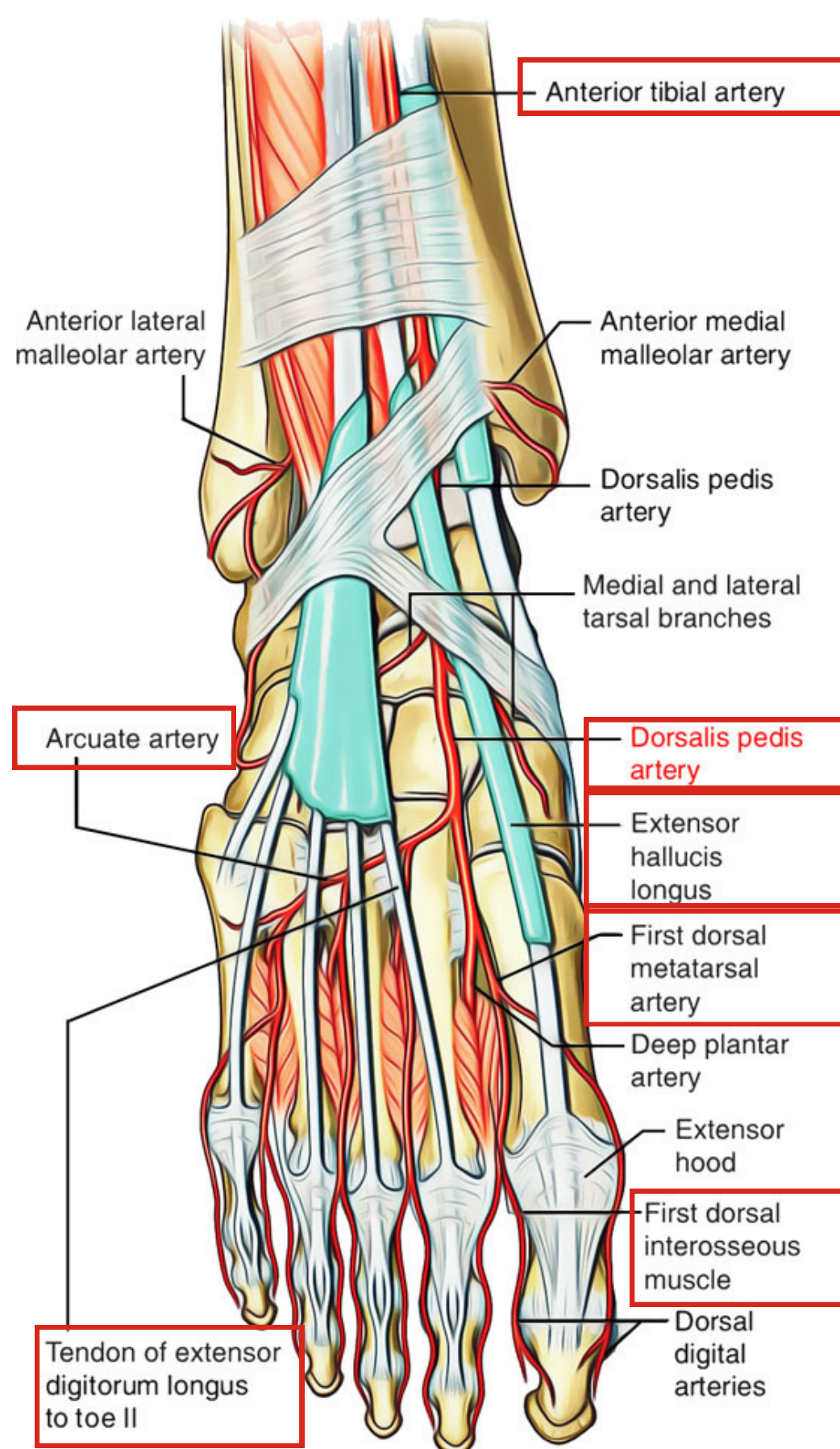
- the inferior extensor retinaculum
- the first tendon of extensor digitorum brevis.

Relations
Medially: Tendon of extensor hallucis longus.
Laterally : Deep peroneal nerve & extensor digitorum longus

Branches

- Lateral tarsal artery
- Arcuate artery
- 1st dorsal metatarsal artery

Termination + what happens by passing between the two heads of the 1st dorsal interosseous muscle + It joins the Lateral plantar artery to complete the Plantar Arch



POSTERIOR TIBIAL ARTERY

What is it? It is one of the two terminal branches of the popliteal artery, at the level of the lower border of popliteus.

Where is it? It descends deep to soleus & gastrocnemius, and deep transverse fascia of the leg. It lies on the posterior surface of tibialis posterior muscle above, and on the posterior surface of tibia below. Its lower part is covered by skin & fascia only.

Where does it pass? It passes behind the medial malleolus, deep to flexor retinaculum.

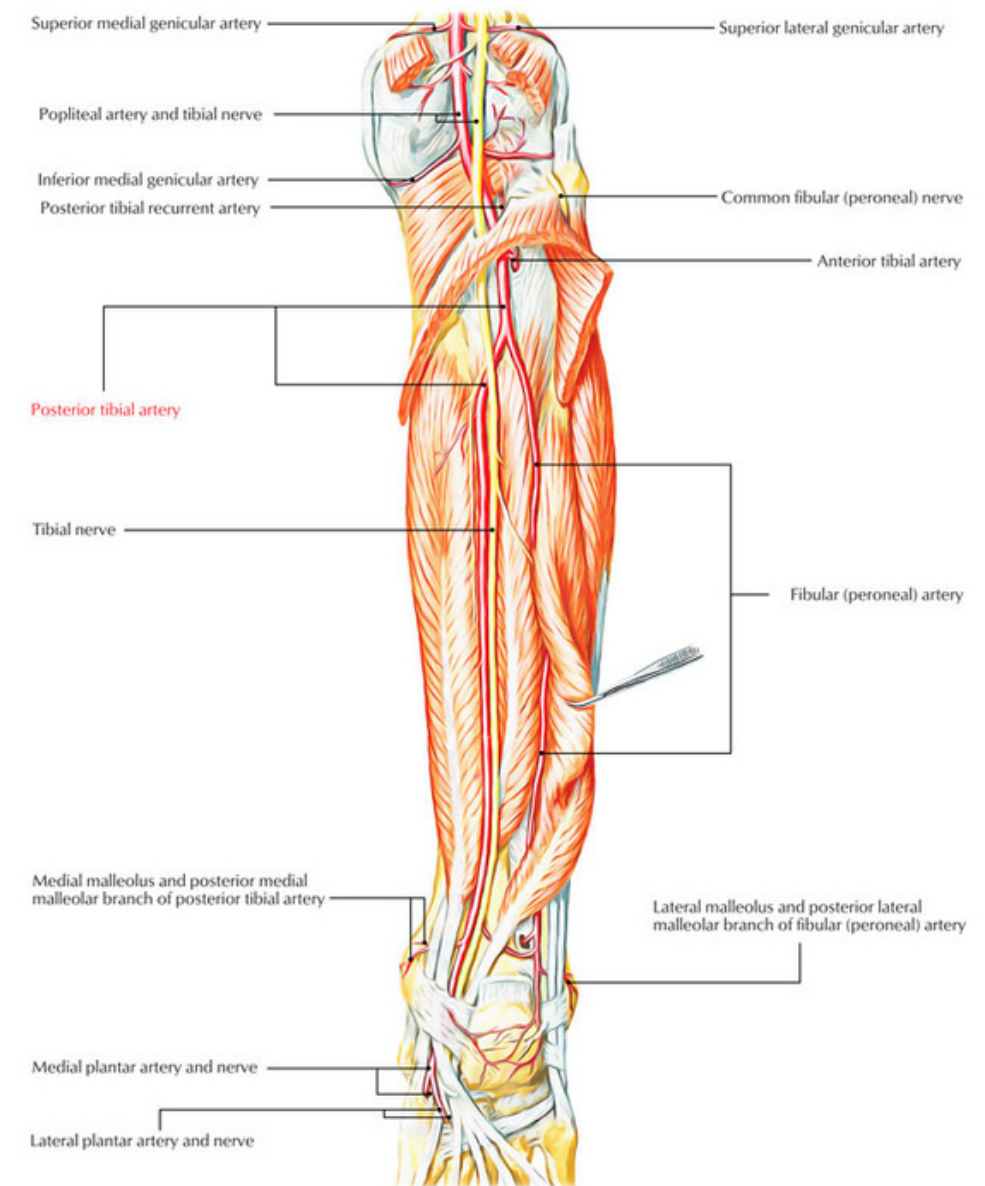
Where does it end? It terminates by dividing into: **Medial & Lateral plantar arteries.**

Branches

1. Anastomotic branches to anastomosis around ankle joint.
2. Nutrient artery to the tibia.
3. Medial & Lateral plantar arteries.

4. (Fibular) **Peroneal artery**: a large artery, arises close to it's origin, descends behind the fibula (the artery of the lateral compartment of the leg). Gives:

- Nutrient artery to the fibula.
- Muscular branches.
- Perforating branch to lower part of front of leg.
- Shares in the Anastomosis around the ankle joint



PLANTAR ARTERIES

Medial Plantar

→The smaller of the two terminal branches of the posterior tibial artery.

→ Arises beneath the Flexor Retinaculum, passes forwards deep to abductor hallucis muscle, ends by supplying medial side of the big toe.

→ Gives: Muscular, Articular and Cutaneous branches.

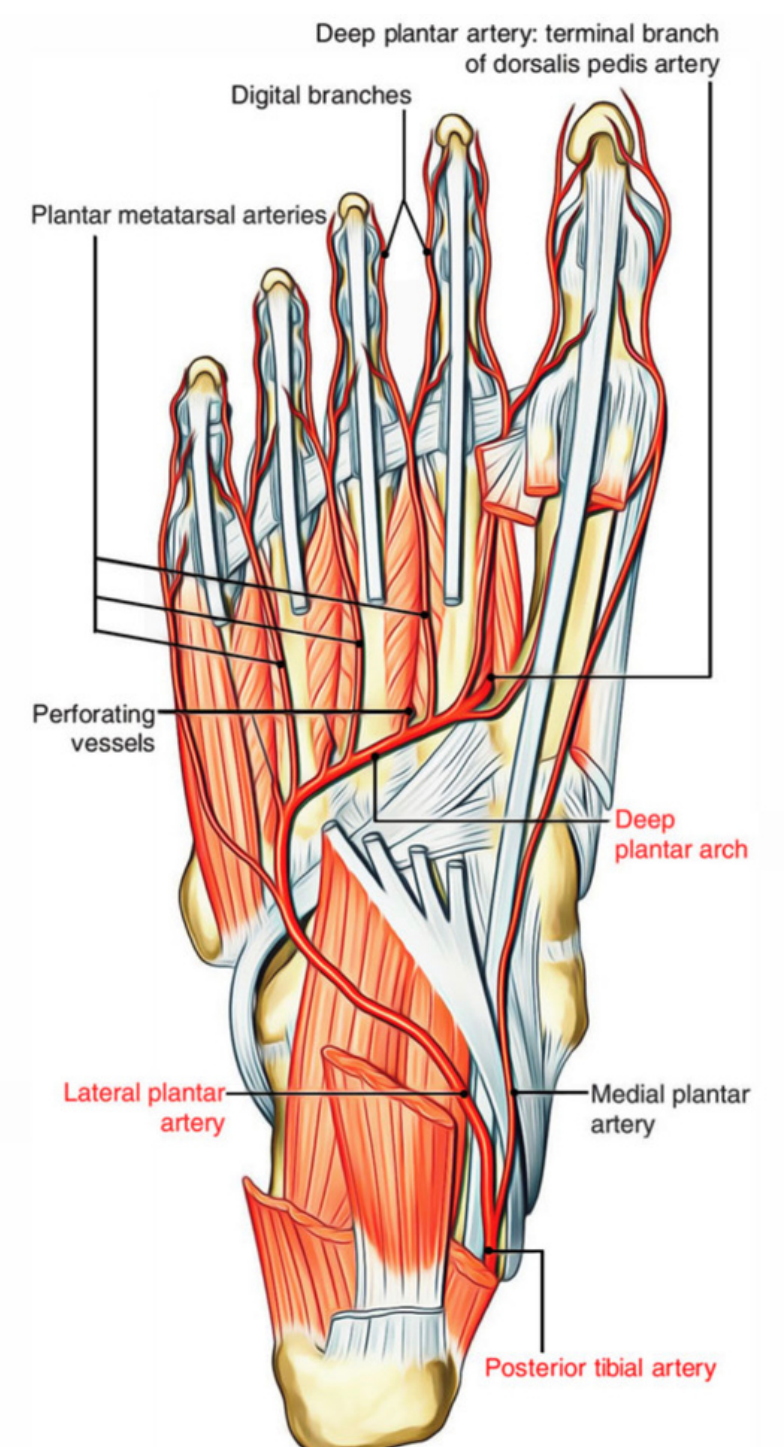
Lateral Plantar

→The larger of the two terminal branches of the posterior tibial artery, arises beneath the Flexor Retinaculum, passes forwards deep to abductor hallucis muscle, and flexor digitorum brevis.

→At the base of the 5th metatarsal bone, it curves medially to form the plantar arch.

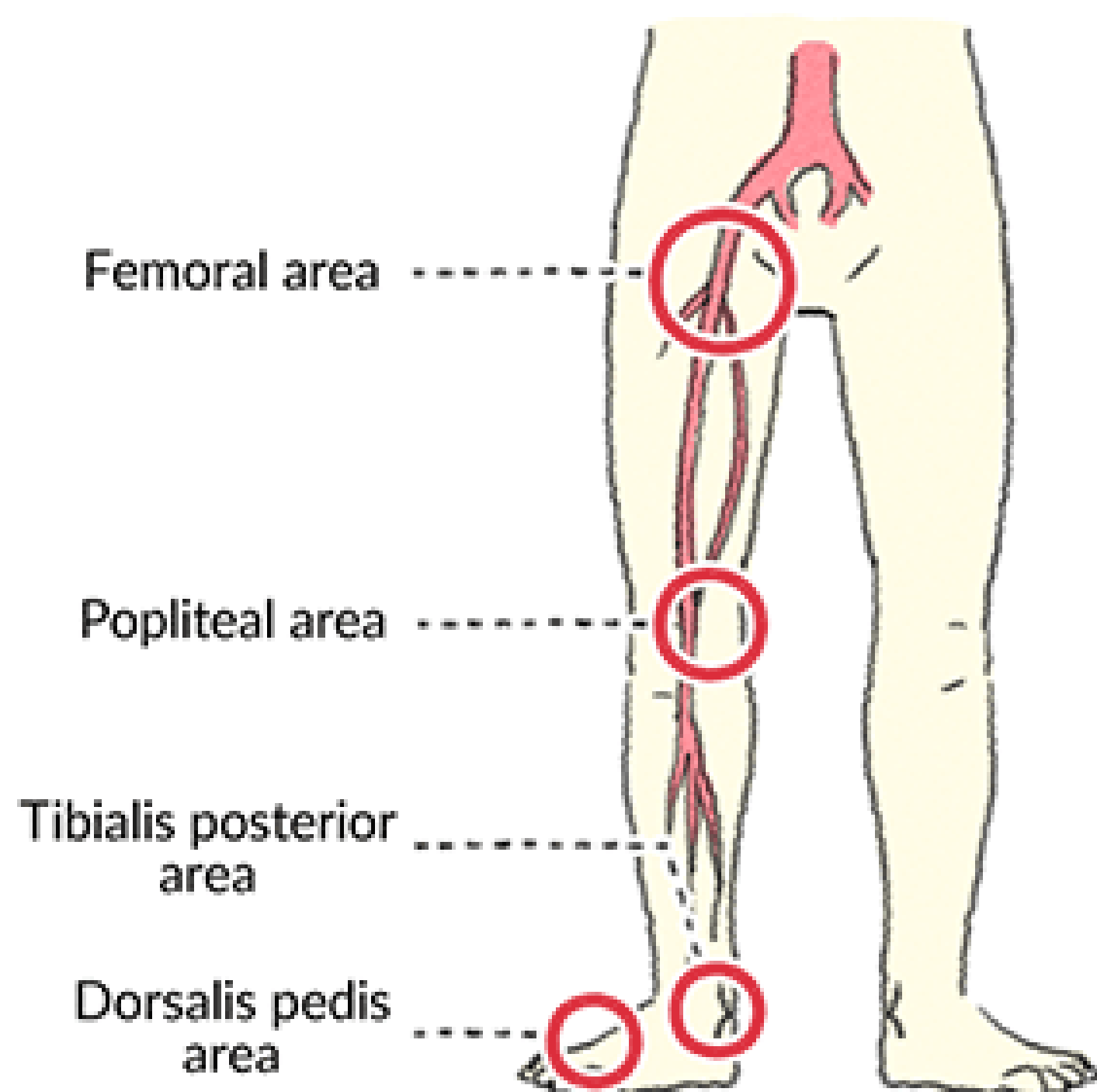
→Joins the Dorsalis pedis artery at the proximal end of the 1st intermetatarsal space.

→Gives: muscular, articular & cutaneous branches. The plantar arch gives plantar digital arteries to the toes.



Where to feel peripheral arterial pulse?

Femoral Pulse	Inferior to the inguinal ligament and midway between the anterior superior iliac spine and symphysis pubis.
Popliteal Pulse	Deep in the popliteal fossa medial to the midline.
Posterior Tibial Pulse	Posterior to the medial malleolus in the groove between the malleolus and the heel.
Dorsalis Pedis Pulse	Over the tarsal bones between the tendons of extensor hallucis longus and extensor digitorum.



Veins of the lower limb

Superficial set

They are immediately under the skin in the subcutaneous tissue.

Dorsal Venous arch (network):

Drains most of the blood of the foot through Digital and Communicating veins.

It is Drained on: Medial side by the Great Saphenous vein. Lateral side by the Small saphenous vein.

Deep set

Femoral vein

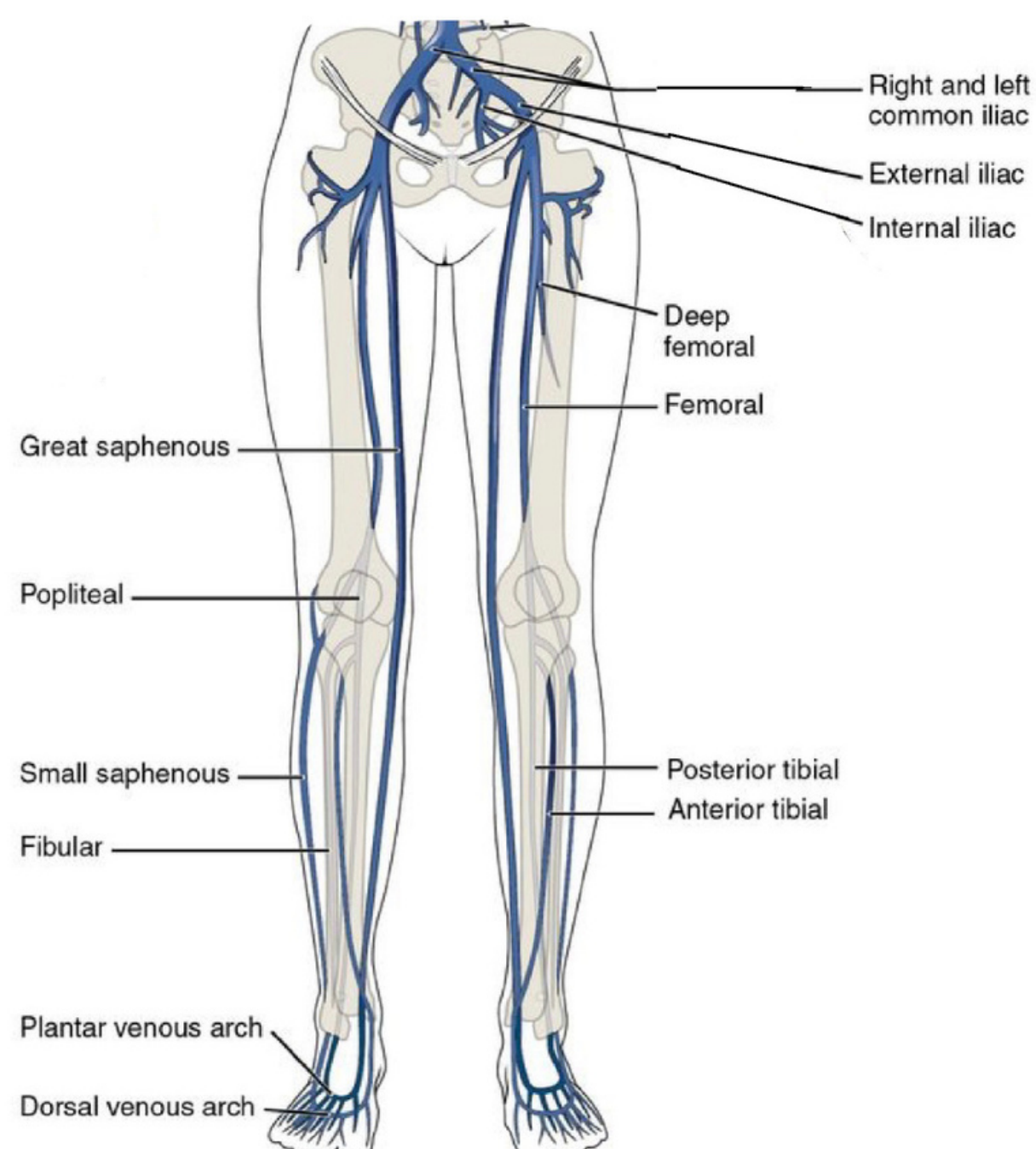
-It enters the thigh by passing through the opening in the adductor magnus.

-It leaves the thigh in the intermediate compartment of the femoral sheath.

-Passes behind the inguinal ligament to become the **External iliac vein**.

Popliteal vein

Formed by the union of venae comitantes around the anterior & posterior tibial arteries. lies posterior to popliteal artery.



Superficial veins

Every superficial vein must end in a deep vein

	Origin	Course
<p>Great saphenous vein</p> <p>(it's contains the largest number of valves)</p>	<p>-Begins from the medial end of the dorsal venous arch (as the medial marginal vein)</p> <p>-It is the longest superficial vein of the body.</p>	<p>*Ascends:</p> <p>1- in front of the Medial Malleolus accompanied by the saphenous nerve.</p> <p>2- posterior the Medial Condyle of the femur.</p> <p>3- passes through the Saphenous Opening (2.5-3.25)cm below and lateral to the public tubercle.</p> <p>*Terminates in: Femoral Vein.</p>
<p>Small saphenous vein</p>	<p>From the lateral end of the dorsal venous arch.</p>	<p>*Ascends Behind the lateral Malleolus in company with the Sural nerve along the middle of the back leg.</p> <p>*Terminates in:</p> <p>1- May join Great Saphenous Vein.</p> <p>2- Or Bifurcates: one branch joins the Great Saphenous and the other joins Popliteal vein.</p>

Varicose Veins

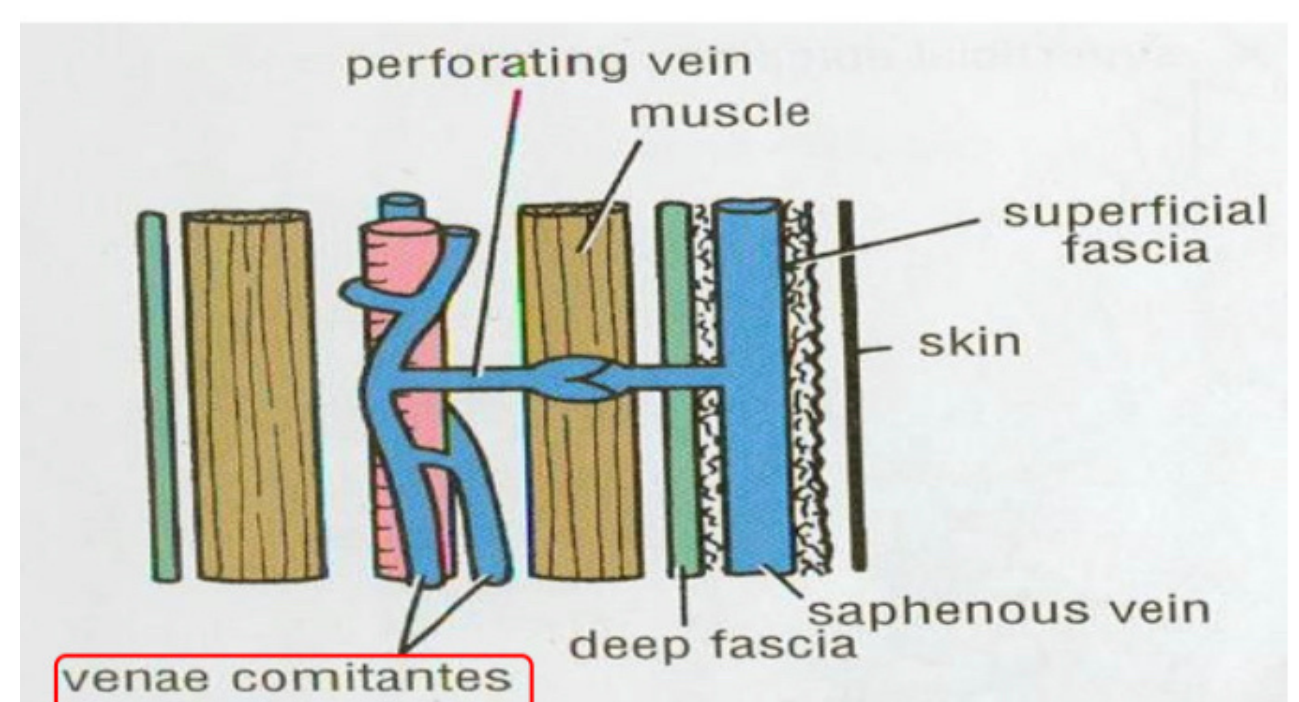
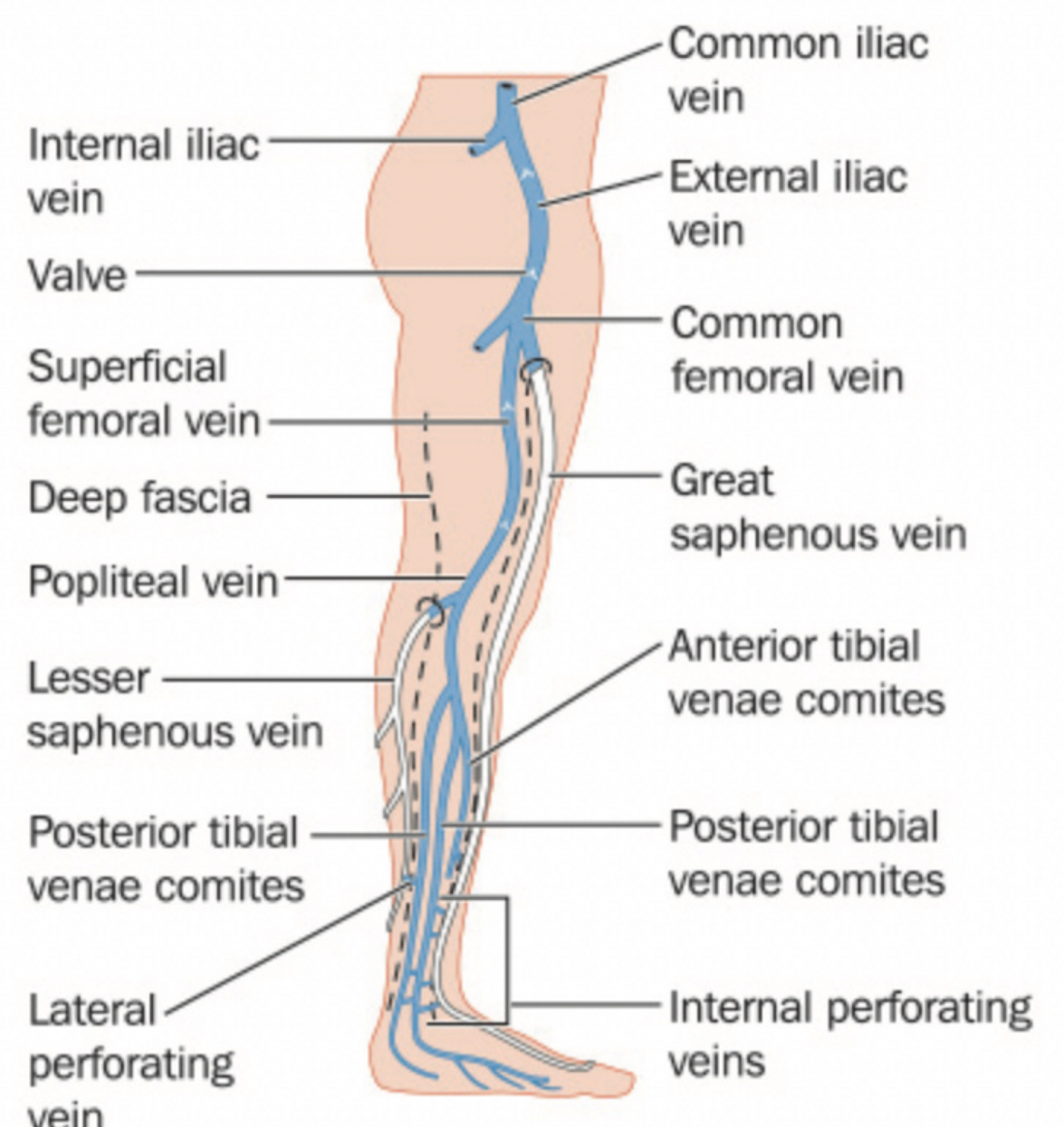
- It is a vein that has **large diameter**, than normal, elongated and tortuous.
- It is commonly occurred in the superficial veins of the lower limb. (**Posterior medial part of lower limb**)
- It may result from incompetence of the valves in the perforating veins.
- This **allows the passage of high-pressure blood from the deep to the superficial veins**



Perforating veins Connect the Great Saphenous vein with the deep veins along the medial side of the calf. Their valves only allow blood to flow from the superficial to the deep veins.

DEEP VEINS (VENAE COMITANTES)

Accompany all the major arteries and their branches. **Usually paired.** They are contained within the vascular sheath of the artery, whose pulsations help to compress and move blood in the veins.



MCQs

1

In the femoral triangle which of the following describe the location of the femoral artery?

- | | | | |
|--------------------------------|---|---------------------------------|------------------------|
| A. Medial to the femoral nerve | B. between the femoral nerve and femoral vein | C. lateral to the femoral nerve | D. Behind psoas muscle |
|--------------------------------|---|---------------------------------|------------------------|

2

What areas of the skin on the dorsum of the foot would lose sensation because of a lesion of the deep peroneal nerve?

- | | | | |
|---------------------------|-------------------------------|---|--|
| A. Medial side of big toe | B. Lateral side of little toe | C. Adjacent side of big toe and 2nd toe | D. Adjacent sides of 4th and little toes |
|---------------------------|-------------------------------|---|--|

3

A 41 year old had his femoral nerve damaged. What is the movement that he lost?

- | | | | |
|-----------------|-------------------|------------------|------------------|
| A. Knee flexion | B. Knee extension | C. Hip adduction | D. Hip extension |
|-----------------|-------------------|------------------|------------------|

4

What lies to the medial side of the anterior tibial vessels deep to extensor retinaculum?

- | | | | |
|------------------------|---------------------|----------------------|------------------------------|
| A. Deep peroneal nerve | B. Peroneus tertius | C. Tibialis anterior | D. Extensor digitorum longus |
|------------------------|---------------------|----------------------|------------------------------|

5

Where is the site of varicose vein?

- | | | | |
|--|----------------------------------|-----------------------------------|---|
| A-Posteromedial part of the lower limb | B-Lateral part of the lower limb | C-Anterior part of the lower limb | D-Posterolateral part of the lower limb |
|--|----------------------------------|-----------------------------------|---|



1-A 2-C 3-B 4-C 5-A

MCQs

6

Femoral artery has a medial relation with?

A-Femoral vein

B-Femoral artery

C-Femoral nerve

D-None

7

Which of the following is not one of the main arteries of the lower limb?

A-femoral

B-popliteal

C-planter

D-subclavian

8

Which artery is the continuation of the external iliac artery?

A-popliteal

B-femoral

C-planter

D-aortic

9

Where does the profunda femoris artery end?

A-4th perforating artery

B-5th perforating artery

C-6th perforating artery

D-7th perforating artery



6-A 7-B 8-D 9-B 10-A

MCQs

11

The deepest structure in the popliteal fossa?

A-planter

B-femoral

C-popliteal

D-aortic

12

Calcaneal arteries supply the?

A-Heel

B-knee

C-elbow

D-wrist

13

The anterior tibial artery supplies which of these structures?

A-Posterior side of the leg

B-Anterior side of the thigh

C-Anterior side of the leg

D-Posterior side of the thigh

14

Loss of the popliteal artery pulse is a sign of which of the following?

A-Popliteal A obstruction

B-Vascular insufficiency

C-Femoral A obstruction

D-Tibial A obstruction



11-C 12-A 13-C 14-C

SAQs


1

On evaluation of the foot function, the physician asked the patient for dorsiflexion of his foot. What is the innervation of these muscles that produces these actions?

 Anterior tibial (deep peroneal) nerve

2

List The two types of Arterial Anastomoses found in the lower limb and what they mainly supply?

 1-the Cruciate anastomosis, It Provides blood supply to the lower limb in case of ligation of the femoral artery.

2-the Trochanteric anastomosis, supply the head & neck of femur

3

What are the terminal branches of the popliteal artery?

 anterior and posterior tibial arteries



LECTURE DONE BY

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