BLOOD SUPPLY AND VENOUS DRAINAGE OF LOWER LIMB

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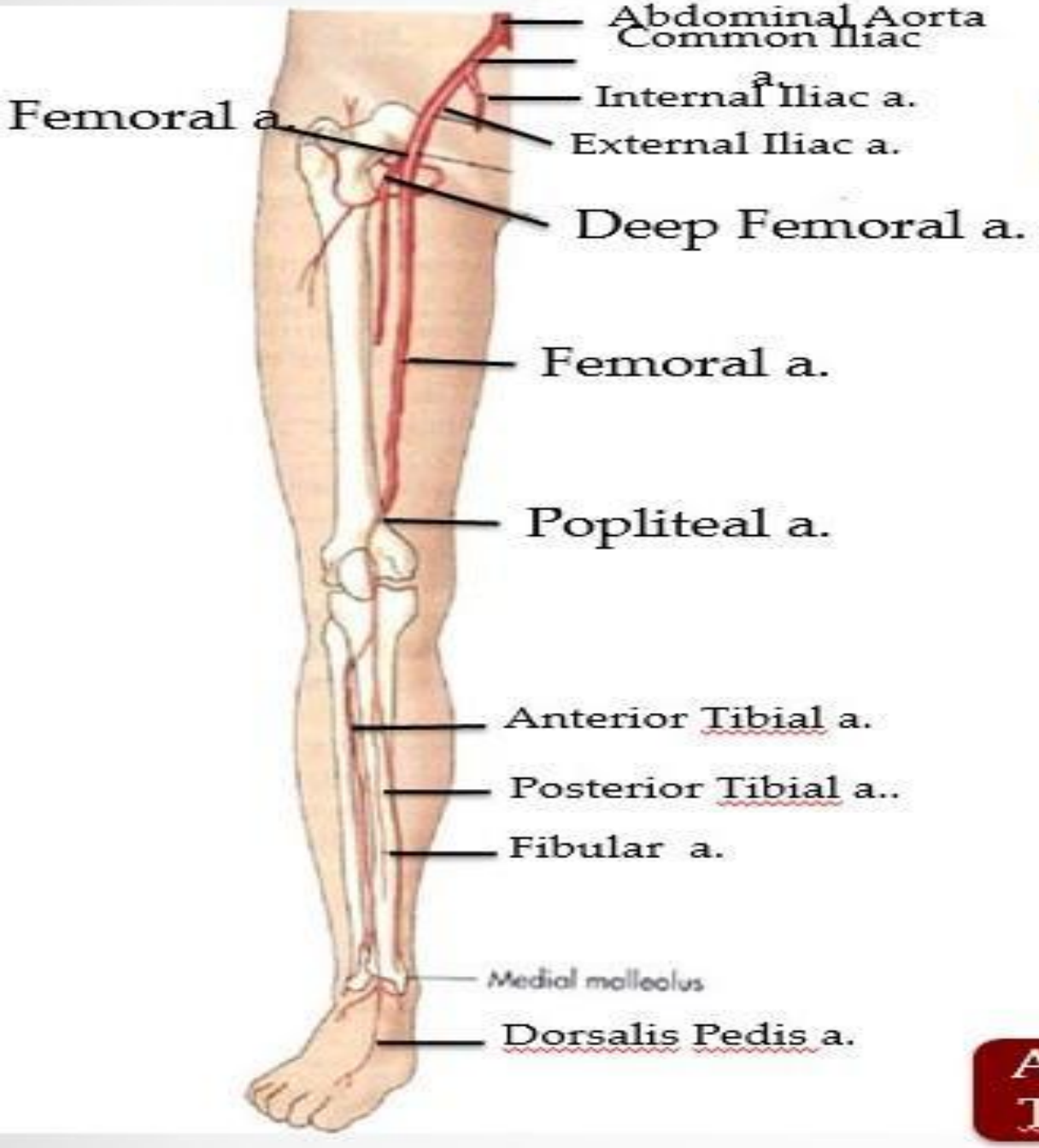
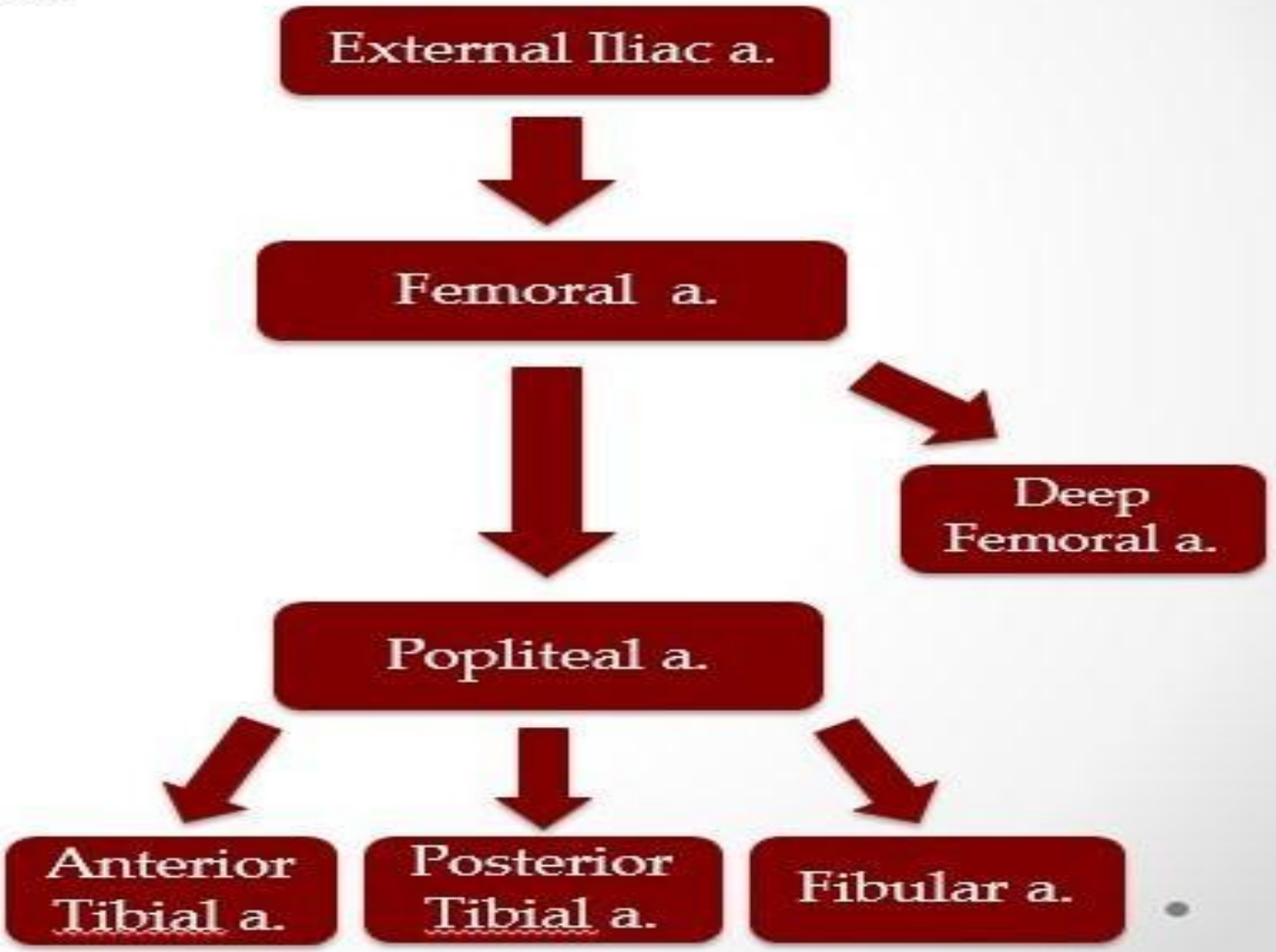
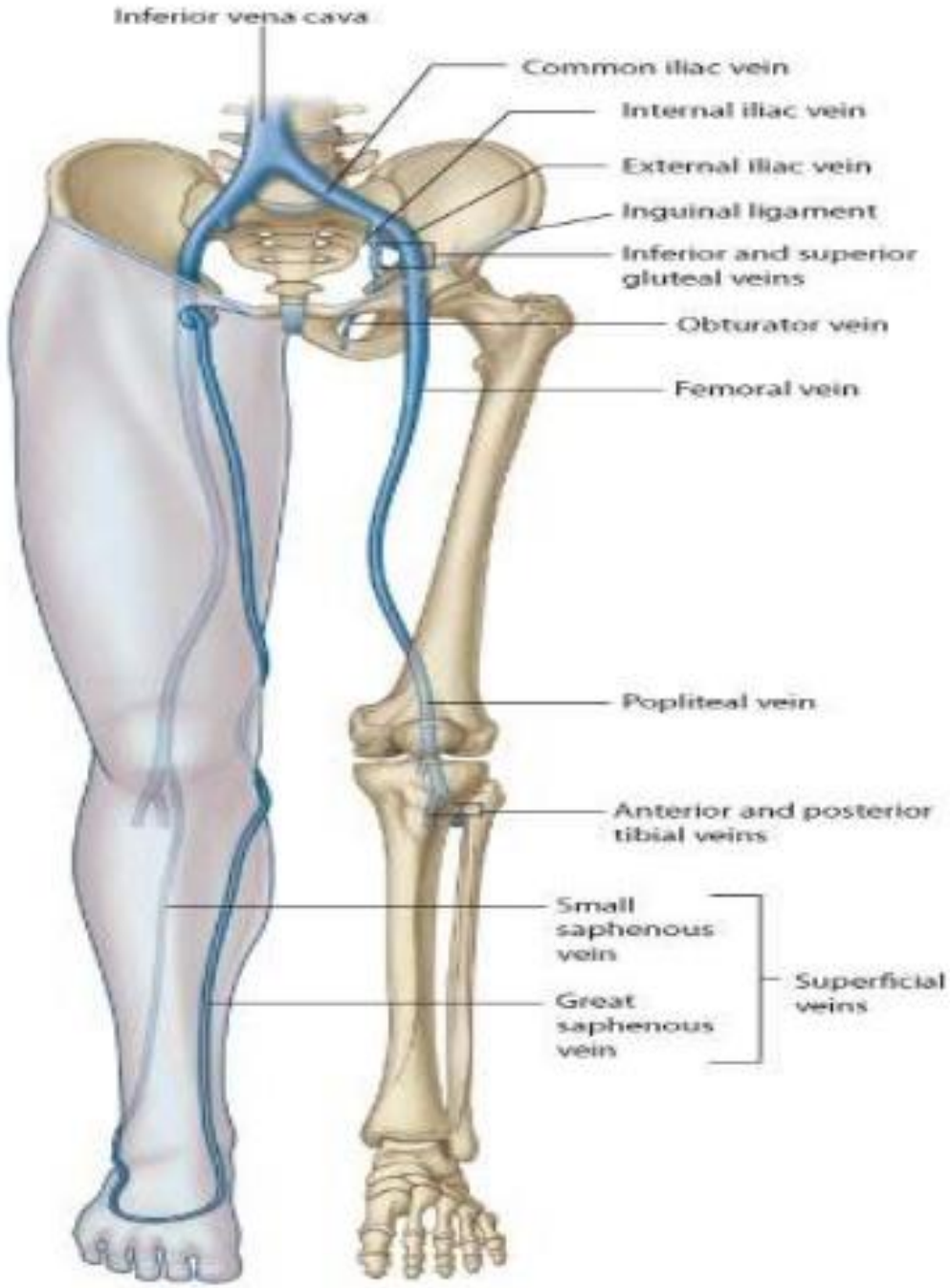
Lower Limb Blood Supply

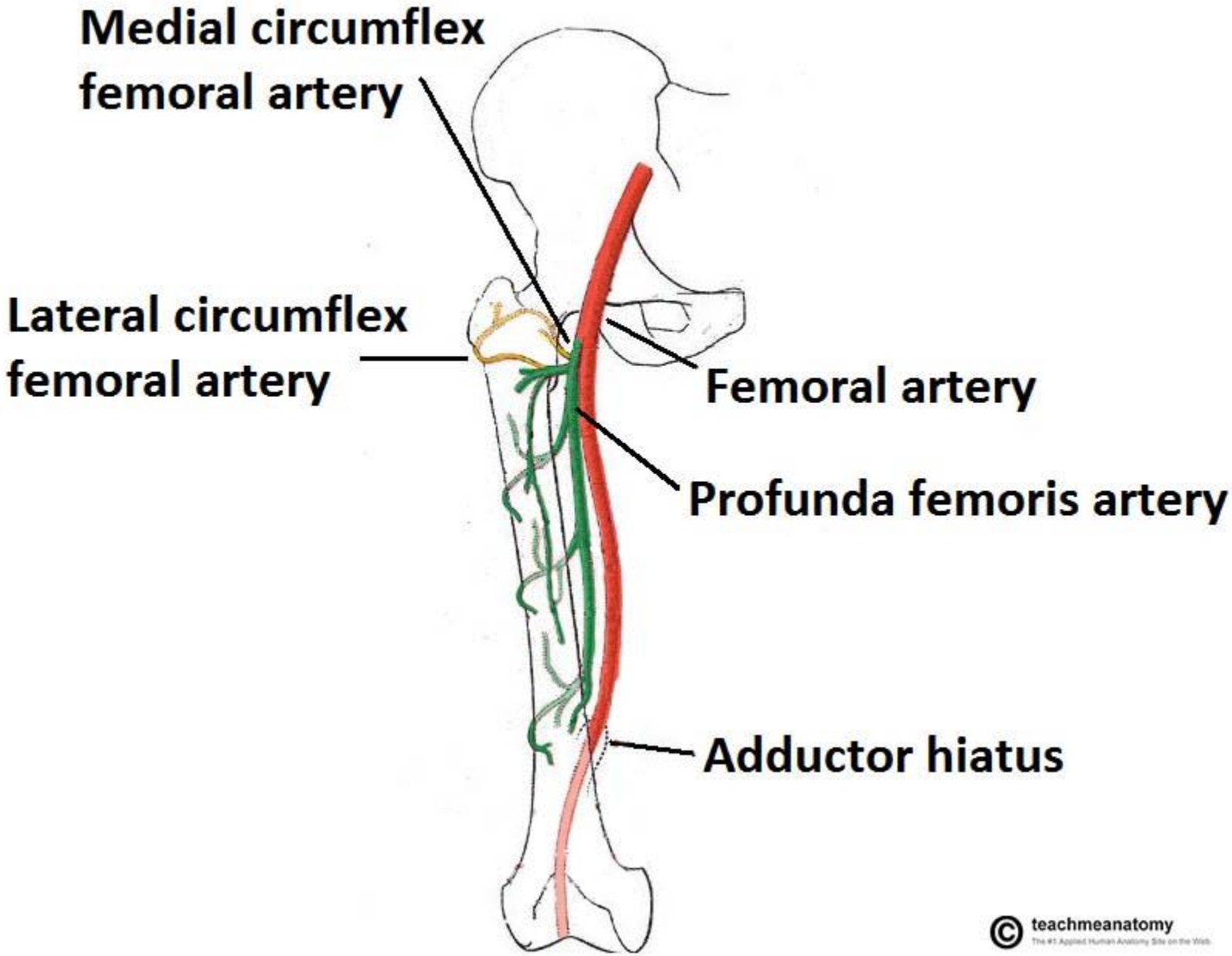





Inferior vena cava
Common iliac vein
Internal iliac vein
External iliac vein
Inguinal ligament
Inferior and superior gluteal veins
Obturator vein
Femoral vein
Popliteal vein
Anterior and posterior tibial veins
Small saphenous vein
Great saphenous vein
Superficial veins

In the Thigh and Gluteal Region

- **Femoral Artery**
- The main artery of the lower limb is the **femoral artery**. It is a continuation of the external iliac artery (terminal branch of the abdominal aorta). The external iliac becomes the femoral artery when it crosses under the **inguinal ligament** and enters the femoral triangle.
- In the femoral triangle, the **profunda femoris artery** arises from the posterolateral aspect of the femoral artery. It travels posteriorly and distally, giving off three main branches:
- **Perforating branches** – Consists of three or four arteries that perforate the adductor magnus, contributing to the supply of the muscles in the medial and posterior thigh.
- **Lateral femoral circumflex artery** – Wraps round the anterior, lateral side of the femur, supplying some of the muscles on the lateral aspect of the thigh.
- **Medial femoral circumflex artery** – Wraps round the posterior side of the femur, supplying its neck and head. In a fracture of the femoral neck this artery can easily be damaged, and avascular necrosis of the femur head can occur.


Medial circumflex femoral artery
Lateral circumflex femoral artery
Femoral artery
Profunda femoris artery
Adductor hiatus
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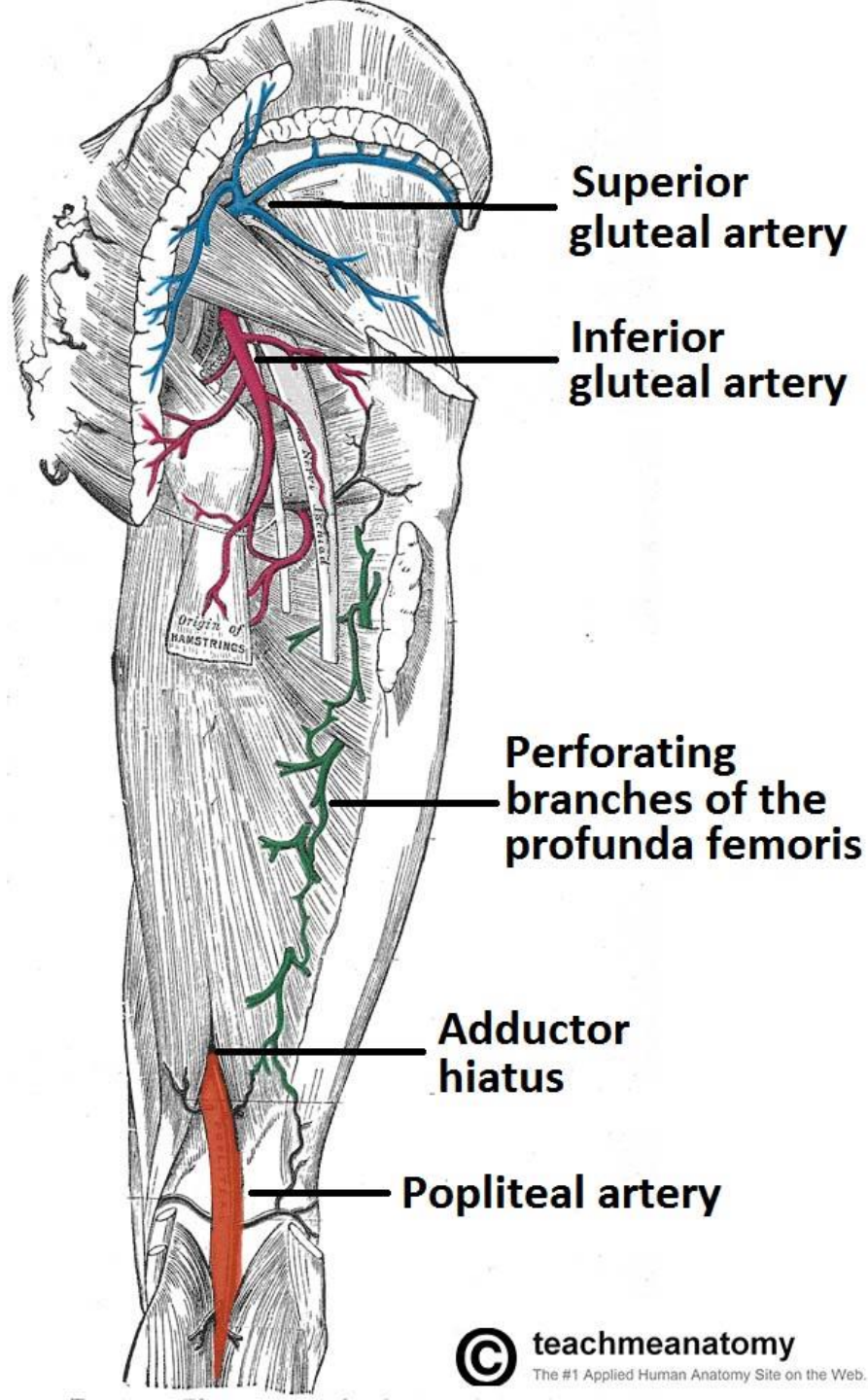
- After exiting the femoral triangle, the femoral artery continues down the anterior surface of the thigh, via a tunnel known as the **adductor canal**. During its descent the artery supplies the anterior thigh muscles.
- The adductor canal ends at an opening in the adductor magnus, called the **adductor hiatus**. The femoral artery moves through this opening, and enters the posterior compartment of the thigh, proximal to the knee. The femoral artery is now known as the **popliteal artery**.

Other Arteries of the Thigh

- In addition to the femoral artery, there are other vessels supplying the lower limb.
- The **obturator artery** arises from the internal iliac artery in the pelvic region. It descends via the obturator canal to enter the medial thigh, bifurcating into two branches:
- **Anterior branch –** This supplies the pectineus, obturator externus, adductor muscles and gracilis.
- **Posterior branch –** This supplies some of the deep gluteal muscles.
- The gluteal region is largely supplied by the superior and inferior **gluteal arteries**. These arteries also arise from the internal iliac artery, entering the gluteal region via the **greater sciatic foramen**.
- The superior gluteal artery leaves the foramen above the **piriformis** muscle, the inferior below the muscle. In addition to the gluteal muscles, the inferior gluteal artery also contributes towards the vasculature of the posterior thigh.



In the Leg

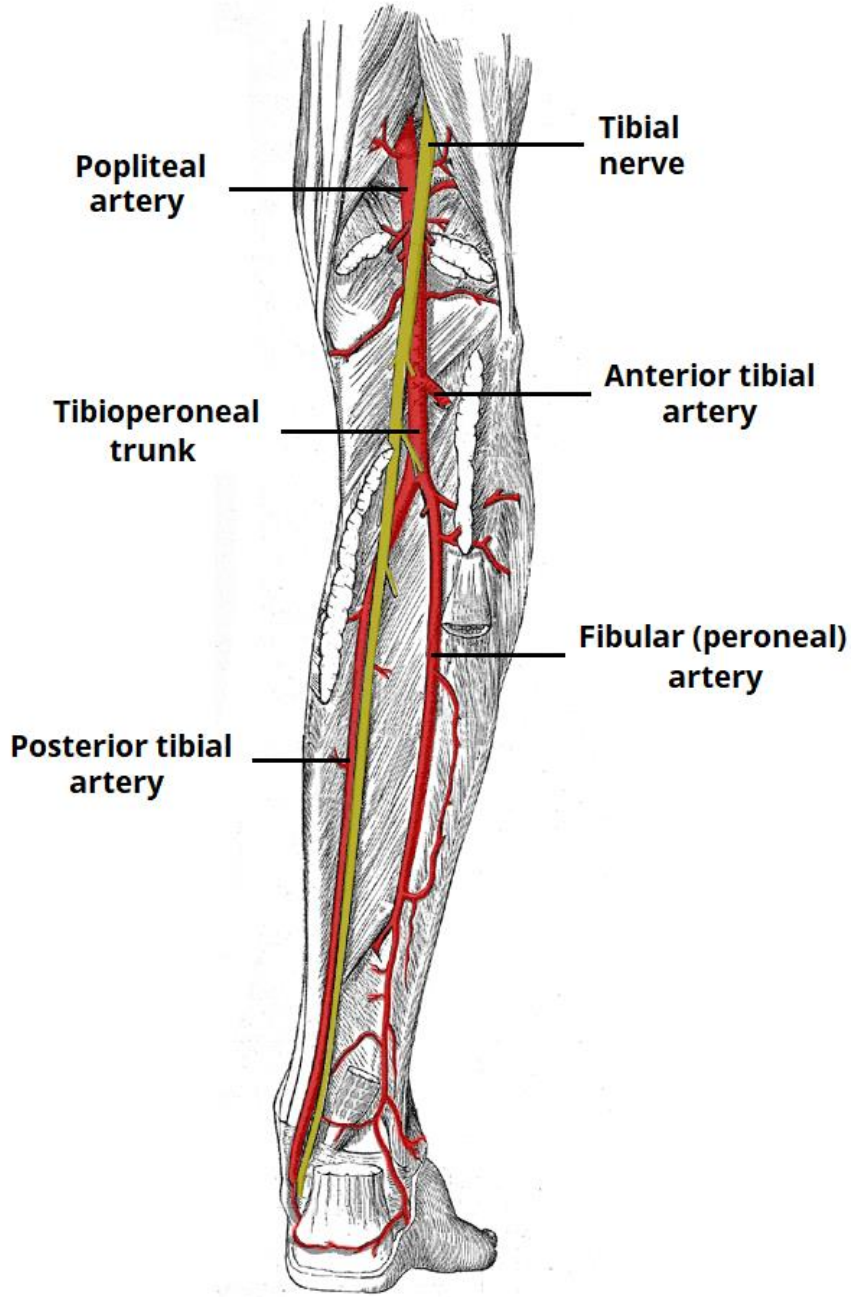
- The **popliteal artery** descends down the posterior thigh, giving rise to genicular branches that supply the knee joint. It moves through the popliteal fossa, exiting between the gastrocnemius and popliteus muscles.
- At the lower border of the popliteus, the popliteal artery terminates by dividing into the **anterior tibial artery** and the tibioperoneal trunk. In turn, the tibioperoneal trunk bifurcates into the posterior tibial and fibular arteries:

In the Leg

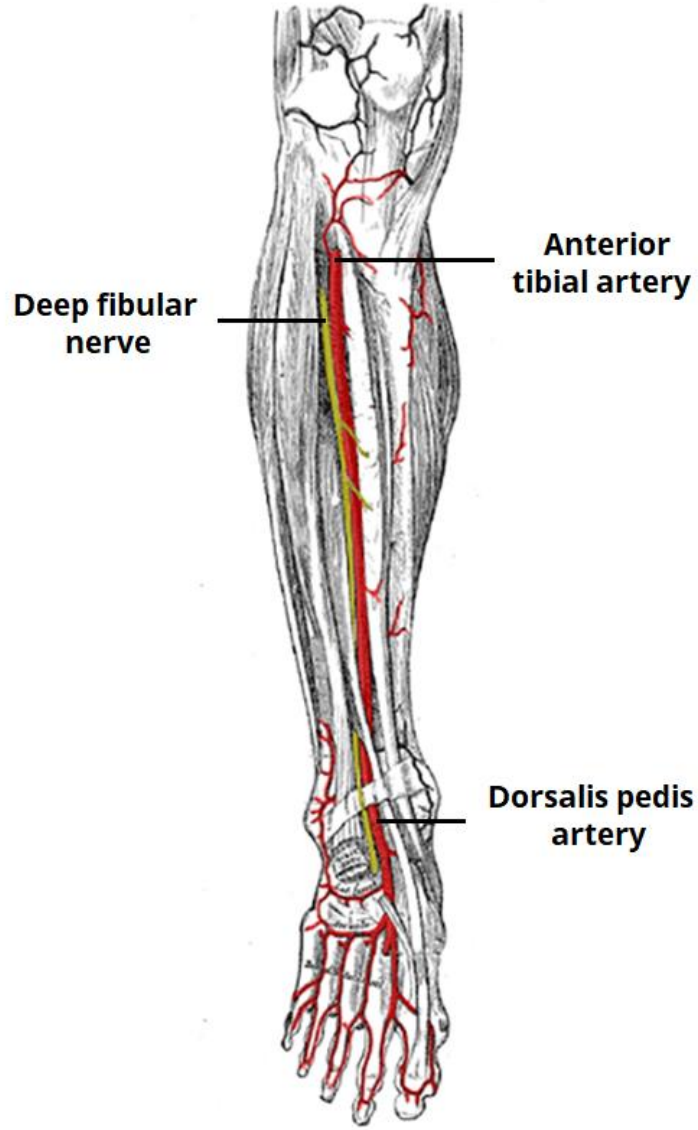
- **Anterior tibial artery**, passes anteriorly between the tibia and fibula, through a gap in the interosseous membrane. It then moves inferiorly down the leg. It runs down the entire length of the leg, and into the foot, where it becomes the dorsalis pedis artery.

- **Posterior tibial artery** – continues inferiorly, along the surface of the deep posterior leg muscles (such as tibialis posterior). It enters the sole of the foot via the tarsal tunnel, accompanying the tibial nerve.

- **Fibular (peroneal) artery** – descends posteriorly to the fibula, within the posterior compartment of the leg. It gives rise to perforating branches, which penetrate the intermuscular septum to supply muscles in the lateral compartment of the leg.



(i) Posterior Leg



(ii) Anterior Leg

In the Foot

- Arterial supply to the foot is delivered via two arteries:
- **Dorsalis pedis** (a continuation of the anterior tibial artery)
- **Posterior tibial**

VENOUS DRAINAGE OF THE LOWER LIMB

- The veins of the lower limb drain deoxygenated blood and return it to the heart. They can be divided into two groups – deep and superficial**:**
- **Deep veins** are located underneath the deep fascia of the lower limb, accompanying the major arteries.
- **Superficial veins** are found in the subcutaneous tissue. They eventually drain into the deep veins.

Deep Veins of the Lower Limb

- The deep venous drainage system of the lower limb is located beneath the deep fascia of the lower limb. As a general rule, the deep veins accompany and share the name of the major arteries in the lower limb. Often, the artery and vein are located within the same **vascular sheath** – so that the arterial pulsations aid the venous return.

The Foot and Leg

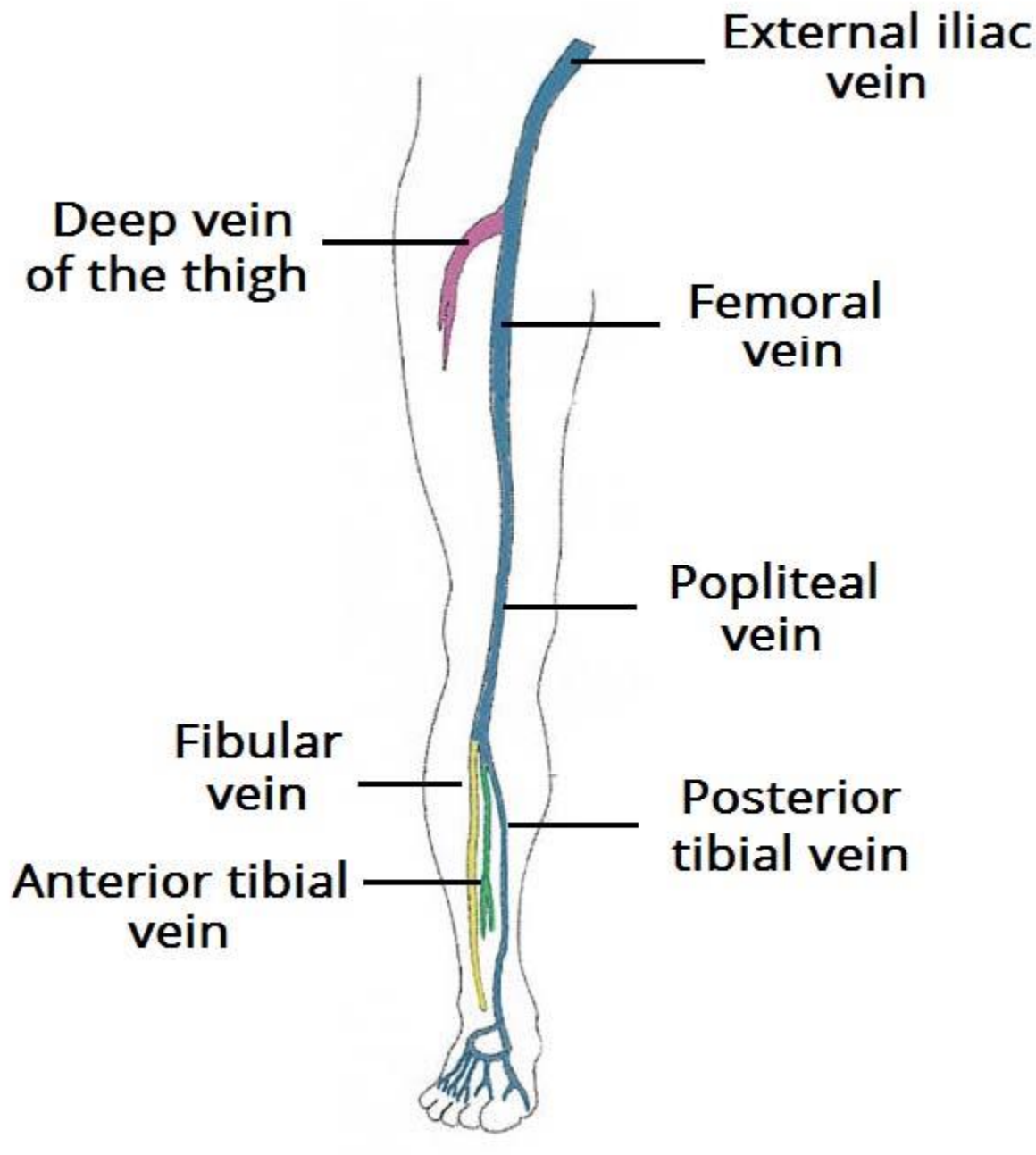
- The main venous structure of the foot is the **dorsal venous arch**, which mostly drains into the superficial veins. Some veins from the arch penetrate deep into the leg, forming the **anterior tibial vein**.
- On the plantar aspect of the foot, medial and lateral **plantar** veins arise. These veins combine to form the **posterior tibial** and **fibular** veins. The posterior tibial vein accompanies the posterior tibial artery, entering the leg posteriorly to the **medial malleolus**.
- On the posterior surface of the knee, the anterior tibial, posterior tibial and fibular veins unite to form the **popliteal vein**. The popliteal vein enters the thigh via the **adductor canal**.

The Thigh

- Once the popliteal vein has entered the thigh, it is known as the **femoral vein**. It is situated anteriorly, accompanying the femoral artery.
- The **deep vein of the thigh** (profunda femoris vein) is the other main venous structure in the thigh. Via perforating veins, it drains blood from the thigh muscles. It then empties into the distal section of the femoral vein.
- The femoral vein leaves the thigh by running underneath the inguinal ligament, at which point it is known as the **external iliac** vein.

The Gluteal Region

- The gluteal region is drained by **inferior** and **superior gluteal** veins. These empty into the **internal iliac** vein.


External iliac vein
Deep vein of the thigh
Femoral vein
Popliteal vein
Fibular vein
Posterior tibial vein
Anterior tibial vein

Clinical Relevance: Deep Vein Thrombosis

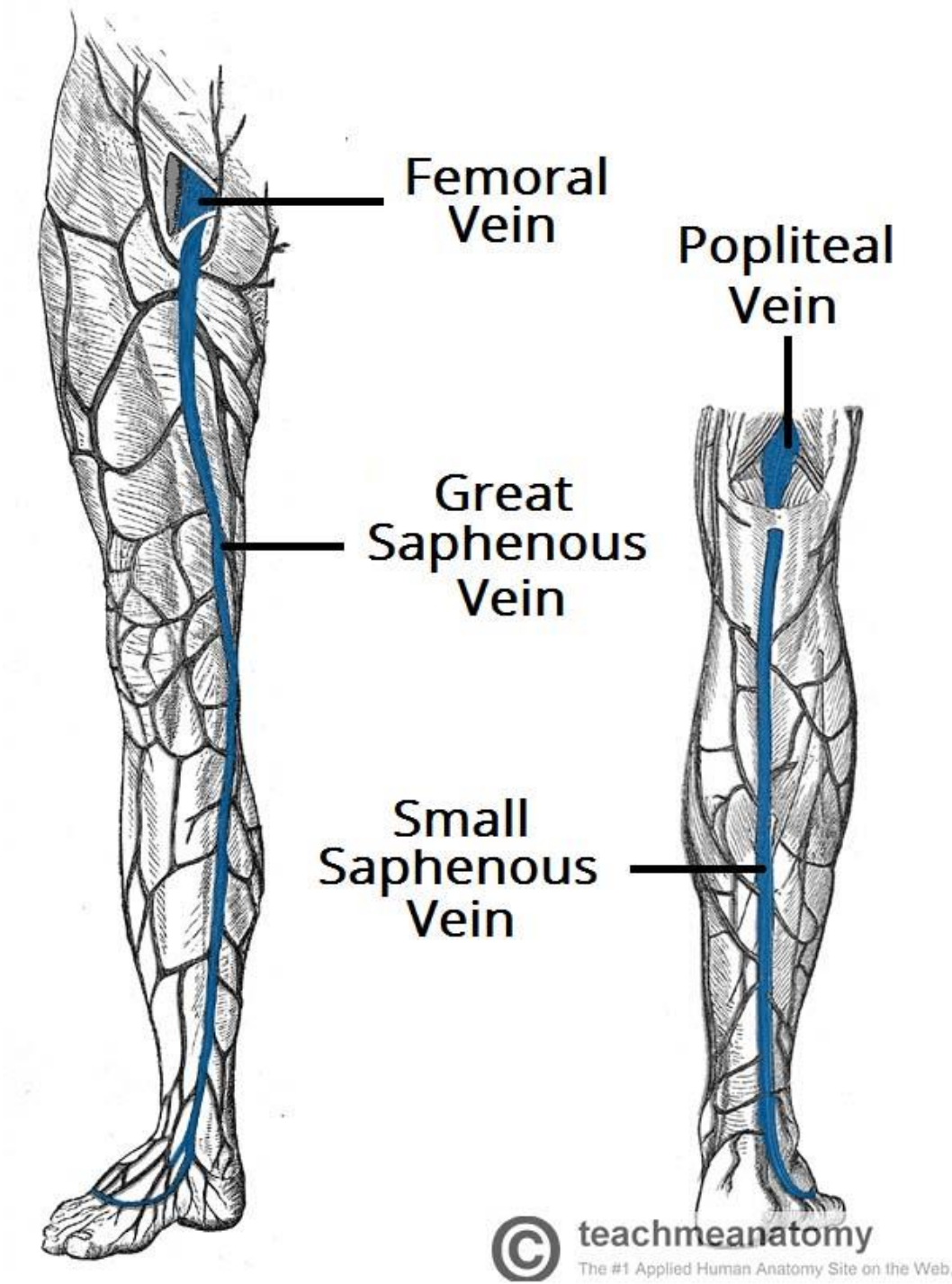
- Deep vein thrombosis (DVT) is the formation of the **blood clot** within the deep veins of the lower limbs, causing blockage of the vessel. Locally, this causes pain, swelling and tenderness of the affected limb.
- The main complication of a DVT is **pulmonary embolism.** The thrombus can become dislodged, and travel into pulmonary circulation. Pulmonary occlusion prevents blood from returning to the heart, resulting in **mechanical shock**.
- Patients that are considered high risk of developing a DVT undergo **prophylactic treatment** to prevent thrombosis.

Superficial Veins of the Lower Limb

- The superficial veins of the lower limb run in the **subcutaneous tissue**. There are two major superficial veins – the great saphenous vein, and the small saphenous vein.
- **The Great Saphenous Vein**
- The **great saphenous vein** is formed by the dorsal venous arch of the foot, and the dorsal vein of the great toe. It ascends up the medial side of the leg, passing anteriorly to the **medial malleolus** at the ankle, and posteriorly to the medial condyle at the knee.
- As the vein moves up the leg, it receives tributaries from other small superficial veins. The great saphenous vein terminates by draining into the femoral vein immediately inferior to the **inguinal ligament**.
- Surgically, the great saphenous vein can be harvested and used as a vessel in coronary artery bypasses.

The Small Saphenous Vein

- The **small saphenous vein** is formed by the dorsal venous arch of the foot, and the dorsal vein of the little toe. It moves up the posterior side of the leg, passing posteriorly to the **lateral malleolus**, along the lateral border of the calcaneal tendon. It moves between the two heads of the gastrocnemius muscle and empties into the **popliteal vein** in the popliteal fossa.



Clinical Relevance: Varicose veins

- Varicose veins are large, swollen veins that often appear on the legs and feet. They happen when the valves in the veins do not work properly, so the blood does not flow effectively.
- The veins rarely need treatment for health reasons, but if swelling, aching, and painful legs result, and if there is considerable discomfort, treatment is available.
- There are various options, including some home remedies.
- In severe cases, a varicose vein may rupture, or develop into varicose ulcers on the skin. These will require treatment.
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Thank You!