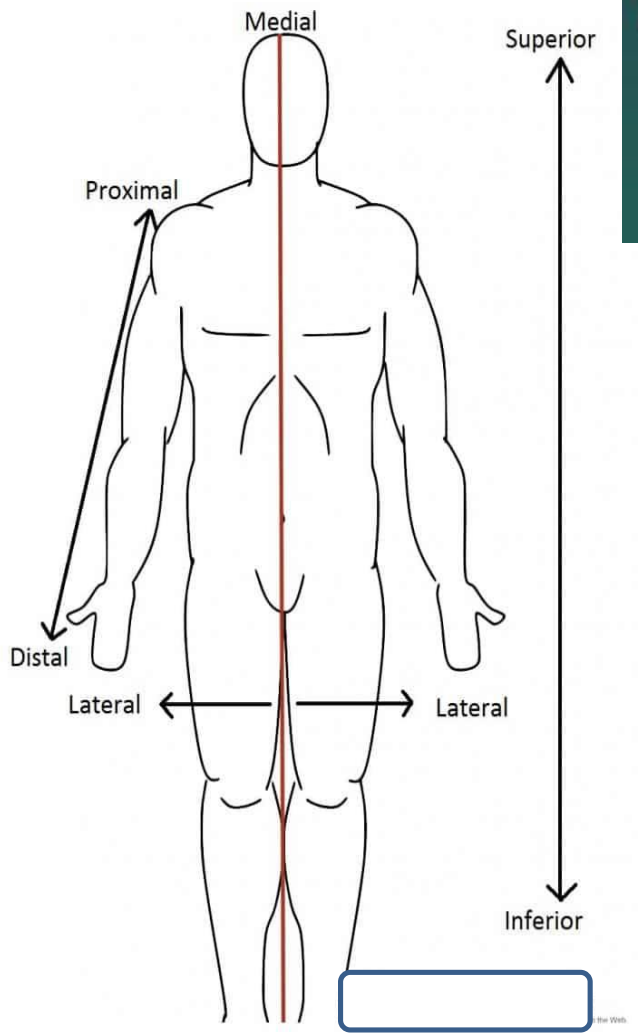
AL MUSTAQBAL UNIVERSITY

College of Medicine / First Year

ANATOMY

(L3) Thigh Region



Assist Prof. Dr. Abdulhusein Mizhir Almaamuri

Learning Objectives

- Describe the fascial organization of the thigh
- Outline the anatomy and clinical applications of the saphenous veins and inguinal lymph nodes, including their role in surgery and disease
- Identify the anterior compartment muscles and explain their functional role as stabilizers of the knee joint
- Define the boundaries and contents of the femoral triangle, femoral sheath, and adductor canal
- Trace the course and distribution of the femoral artery, vein, and nerve within the thigh
- Explain the anatomical basis of femoral hernias and the risks associated with their progression

Regions of lower limb

The lower limbs have six major regions

- ❑ **The gluteal region:** transitional region between the trunk and free lower limbs.
- ✓ **the buttocks**
- ✓ **hip region** overlies the hip joint and greater trochanter
- ❑ **The femoral region (thigh)**. The transition from trunk to free lower limb occurs abruptly in the inguinal region or groin.
- ❑ **The popliteal fossa (The knee region)**
- ✓ condyles of the distal femur and proximal tibia,
- ✓ the head of the fibula
- ✓ the patella
- ✓ the joints between these bony structures.
- ❑ **The leg region** includes most of the tibia and fibula
- ❑ **The ankle** includes the medial and lateral malleoli that flank the ankle joint.
- ❑ **The foot region** containing the tarsus, metatarsus, and phalanges

THIGH

The thigh is the proximal segment of the lower limb proper, from the hip to the knee. The femur is the bony core of the thigh.

Fascia

The fatty layer of the superficial fascia on the anterior abdominal wall extends into the thigh and continues down over the lower limb without interruption.

The membranous layer of the superficial fascia of the anterior abdominal wall extends into the thigh and attaches to **the deep fascia (fascia lata)** about a fingerbreadth below the inguinal ligament. This relationship is important in connection with extravasation of urine after a rupture of the urethra.

The deep fascia (fascia lata) encloses the thigh like a spandex legging. Its upper end attaches to the pelvis and the inguinal ligament. It is thickened on its lateral aspect to form the **iliotibial tract**, which is attached above to the iliac tubercle and below to the lateral condyle of the tibia. The iliotibial tract receives the insertion of the **tensor fasciae latae** and the greater part of the **gluteus maximus** muscle. In the gluteal region, the deep fascia forms investing sheaths that enclose the tensor fasciae latae and the gluteus maximus muscles.

The saphenous opening is a gap in the deep fascia in the front of the thigh just below the inguinal ligament. It is filled with loose connective tissue called the **cribriform fascia**. It transmits the **great saphenous vein**, some small branches of the **femoral artery**, and **lymph vessels**. The saphenous opening is situated about 1.5 in. (4 cm) **below and lateral** to the pubic tubercle. The falciform margin is the lower lateral border of the opening, which lies anterior to the femoral vessels. The border of the opening then curves upward and medially, and then laterally behind the femoral vessels, to attach to the pectineal line of the superior ramus of the pubis.

Cutaneous Nerves

The lateral cutaneous nerve of the thigh, a branch of the lumbar plexus (L2 and 3), enters the thigh behind the lateral end of the inguinal ligament. Having divided into anterior and posterior branches, it supplies the skin of the lateral aspect of the thigh and knee. It also supplies the skin of the lower lateral quadrant of the buttock.

The femoral branch of the genitofemoral nerve, a branch of the lumbar plexus (L1 and 2), enters the thigh behind the middle of the inguinal ligament and supplies a small area of skin. **The genital branch** supplies the cremaster muscle.

The ilioinguinal nerve, a branch of the lumbar plexus (L1), enters the thigh through the superficial inguinal ring. It distributes to the skin of the root of the penis and adjacent part of the scrotum (or root of the clitoris and adjacent part of the labium majus in the female) and to a small skin area below the medial part of the inguinal ligament.

The medial cutaneous nerve of the thigh, a branch of the femoral nerve, supplies the medial aspect of the thigh and joins the patellar plexus.

The intermediate cutaneous nerve of the thigh, a branch of the femoral nerve, divides into two branches that supply the anterior aspect of the thigh and joins the patellar plexus.

Branches from **the anterior division of the obturator nerve** supply a variable area of skin on the medial aspect of the thigh.

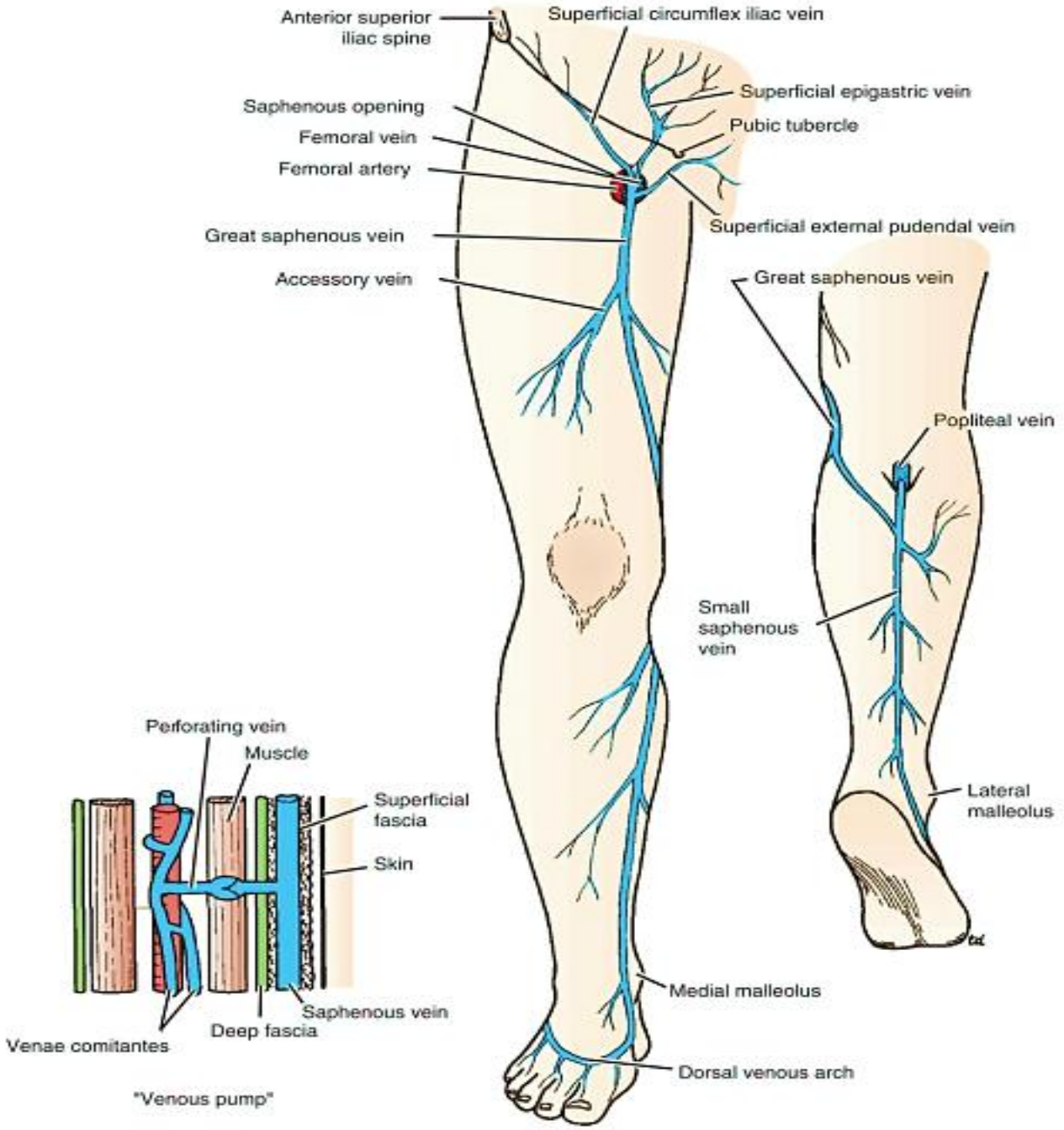
The patellar plexus lies in front of the knee and is formed from the terminal branches of the lateral, intermediate, and medial cutaneous nerves of the thigh and the infrapatellar branch of the saphenous nerve.

The posterior cutaneous nerve of the thigh, a branch of the sacral plexus, leaves the gluteal region by emerging from beneath the lower border of the gluteus maximus muscle. It descends on the back of the thigh, and in the popliteal fossa, it pierces the deep fascia and supplies the skin. It gives off numerous branches to the skin on the back of the thigh and the upper part of the leg.

Superficial Veins

The superficial veins of the leg are the great and small saphenous veins and their tributaries. They are comparable to the basilic and cephalic veins in the upper limb and have significant clinical importance.

The great saphenous vein drains the medial end of the **dorsal venous arch** of the foot and passes upward directly in front of the medial malleolus. It then ascends in company with the saphenous nerve in the superficial fascia over the medial side of the leg. The vein passes behind the knee and curves forward around the medial side of the thigh. It passes through the lower part of the saphenous opening in the deep fascia and joins the femoral vein about 1.5 in. (4 cm) below and lateral to the pubic tubercle.

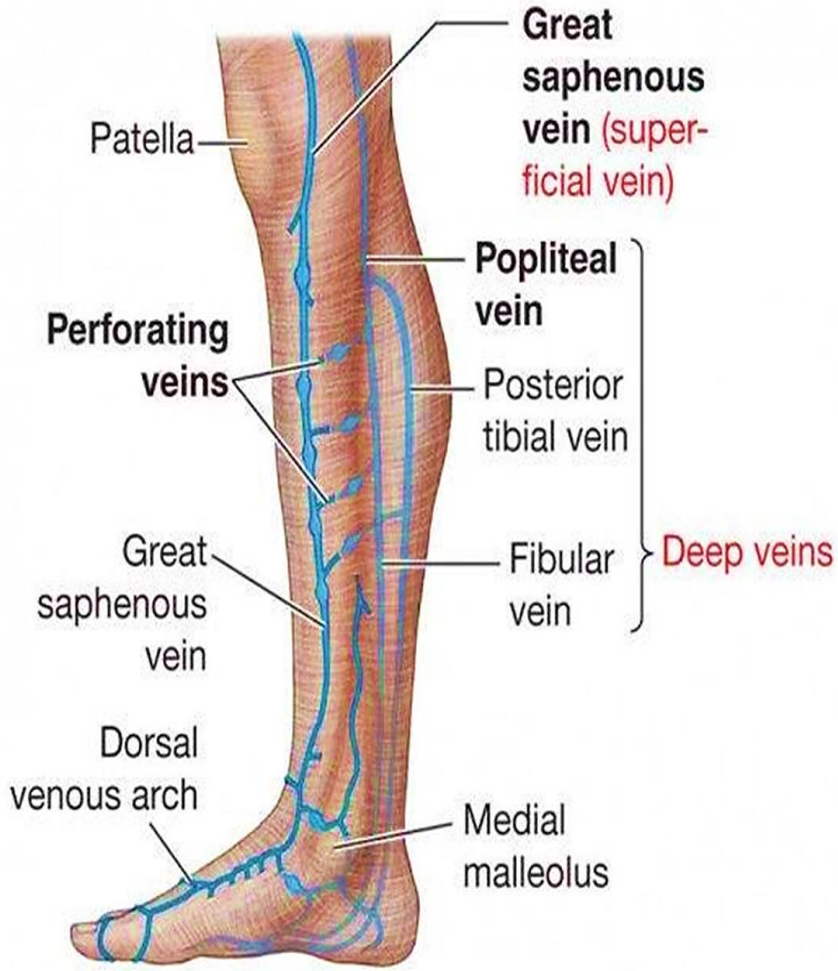


The great saphenous vein possesses numerous valves and is connected to the **small saphenous vein** by one or two branches that pass behind the knee.

Several perforating veins connect the great saphenous vein with the deep veins along the medial side of the calf

The great saphenous vein usually receives **three tributaries** that are variable in size and arrangement at the saphenous opening in the deep fascia:
the superficial circumflex iliac vein, the superficial epigastric vein, and the superficial external pudendal vein. These veins correspond with the like-named three branches of the femoral artery found in this region.

An additional vein, known as **the accessory vein**, usually joins the main vein about the middle of the thigh or higher up at the saphenous opening. Many small veins from the back of the thigh curve around the medial and lateral aspects of the thigh and ultimately drain into the great saphenous vein.
Superficial veins from the lower part of the back of the thigh join the small saphenous vein in the popliteal fossa



Clinical Notes

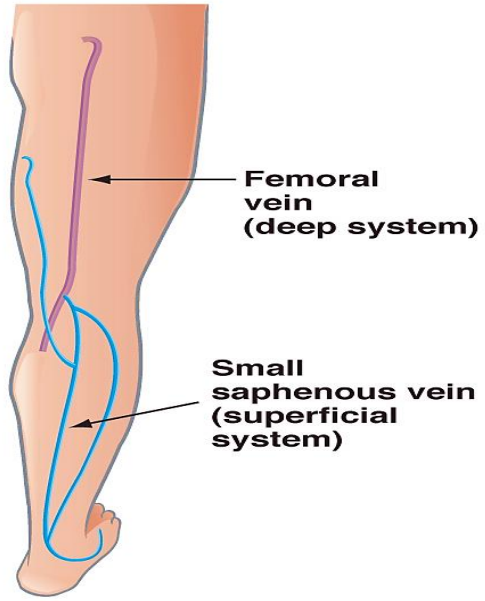
Lower Limb Veins

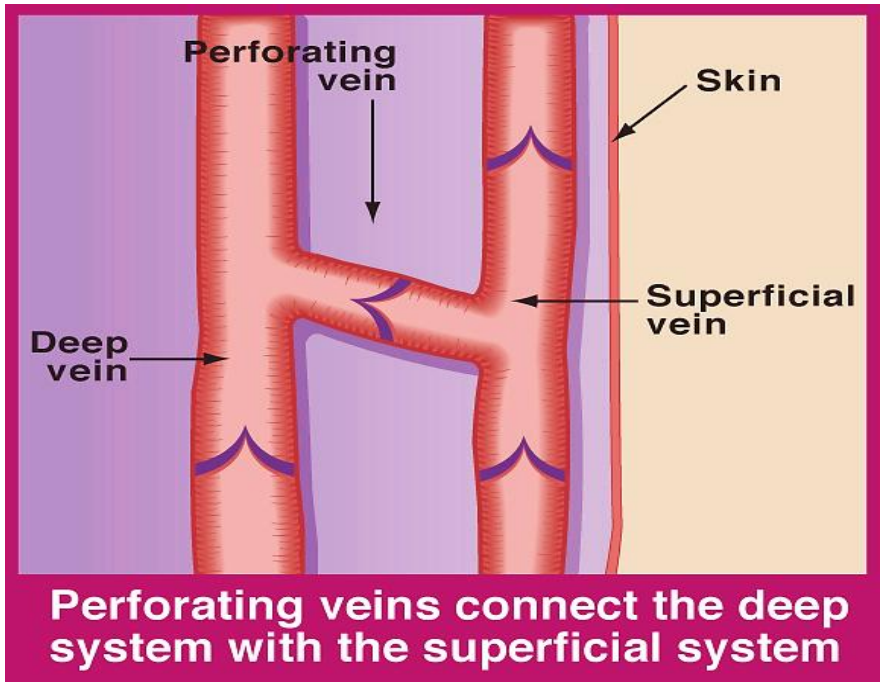
The veins of the lower limb are organized into three groups: **superficial, deep, and perforating.**

The superficial veins consist of the great and small saphenous veins and their tributaries, which are situated beneath the skin in the superficial fascia. The constant position of the great saphenous vein in front of the medial malleolus should be remembered for patients requiring emergency blood transfusion.

The deep veins are the venae comitantes to the anterior and posterior tibial arteries, the popliteal vein, and the femoral veins and their tributaries.

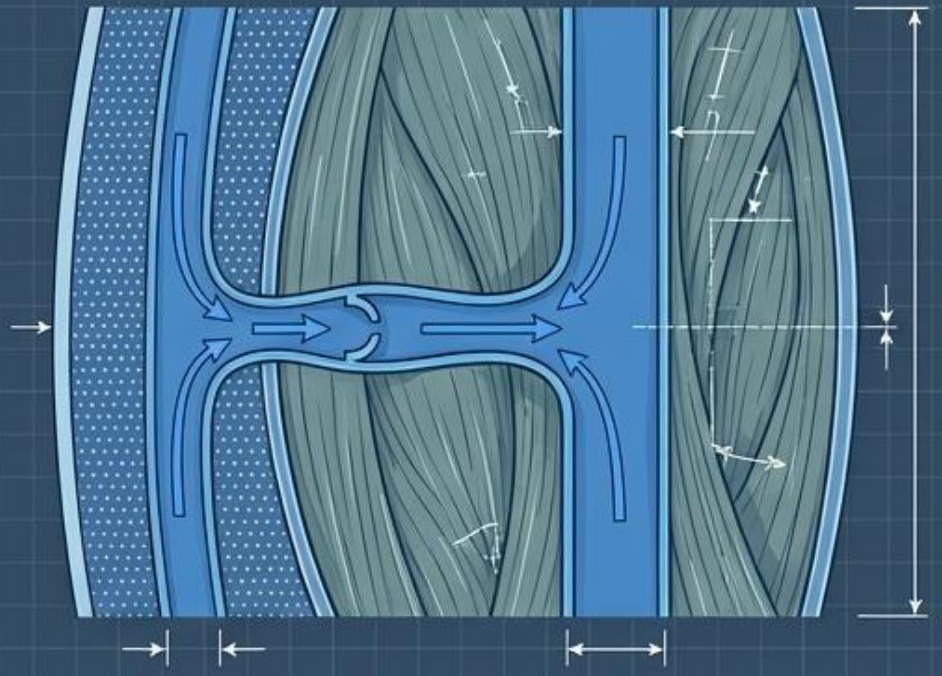
The perforating veins are communicating vessels that run between the superficial and deep veins. Many of these veins are found particularly in the region of the ankle and the medial side of the lower part of the leg. They possess valves that are arranged to allow the flow of blood only from the superficial veins to the deep veins.





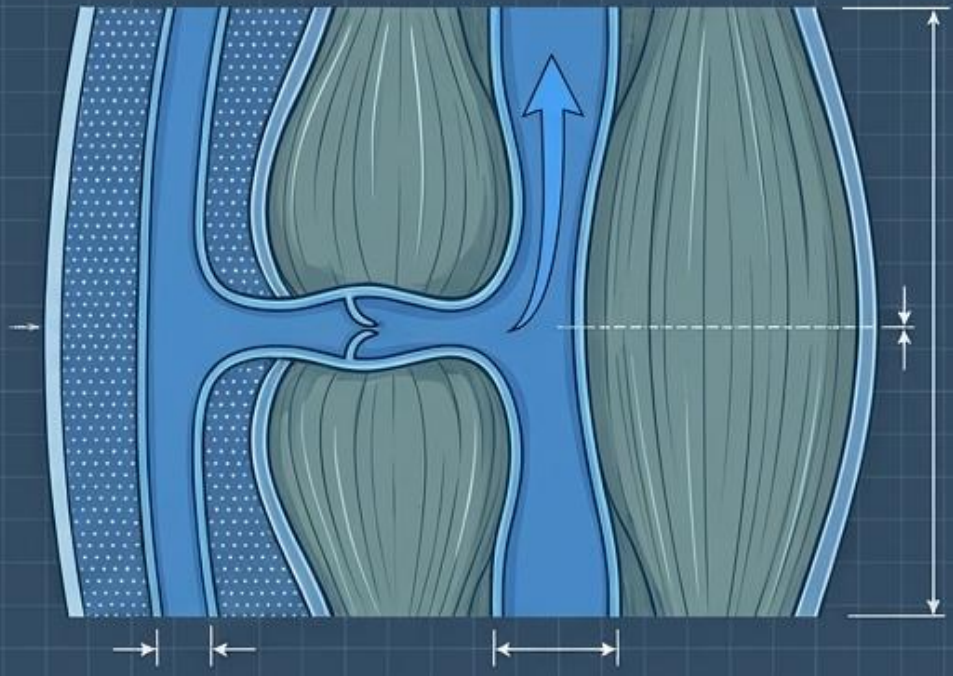
Superficial Venous Network & The Venous Pump

A. Resting State



Blood flows from the low-pressure superficial system to the deep venae comitantes via valved perforating veins.

B. Exercise / Muscle Contraction



Muscles bulge within the closed fascial compartment, actively compressing deep veins. Perforator valves lock shut, preventing high-pressure blood from escaping backward.

Path of the Great Saphenous Vein (GSV):

1. Drains medial dorsal arch
2. Ascends anterior to medial malleolus
3. Passes behind knee
4. Curves anteriorly to saphenous opening
5. Joins femoral vein

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Lower Limb Venous Pump

Within the closed fascial compartments of the lower limb, the thin-walled, valved **venae comitantes** are subjected to intermittent pressure at rest and during exercise. The pulsations of the adjacent arteries help move the blood up the limb. However, the contractions of the large muscles within the compartments during exercise compress these deeply placed veins and force the blood up the limb.

The **superficial saphenous veins**, except near their termination, lie within the superficial fascia and are not subject to these compression forces.

The valves in the **perforating veins** prevent the high-pressure venous blood from being forced outward into the low-pressure superficial veins. Moreover, as the muscles within the closed fascial compartments relax, venous blood is **sucked from** the superficial into the deep veins.

Varicose Veins

A varicosed vein is one that has a larger diameter than normal and is elongated and tortuous. This condition commonly occurs in the superficial veins of the lower limb and, although not life threatening, is responsible for considerable discomfort and pain.

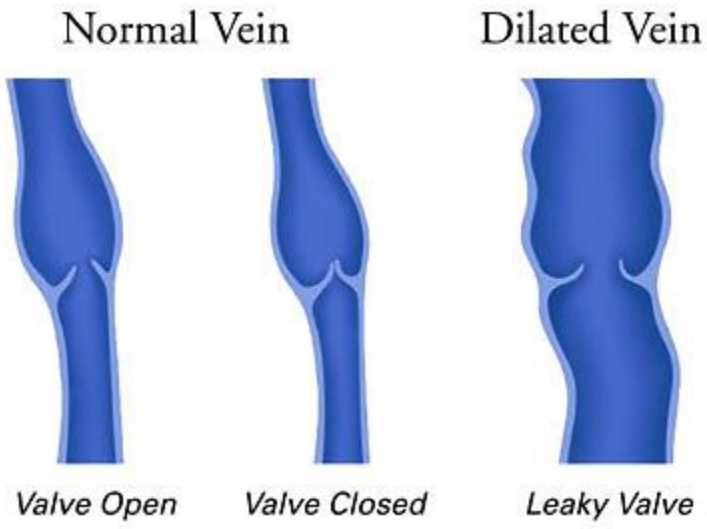
Varicose veins have many causes, including **hereditary weakness** of the vein walls, **incompetent valves**, **elevated intra-abdominal pressure** as a result of multiple pregnancies or abdominal tumors, and **thrombophlebitis** of the deep veins, which results in the superficial veins becoming the main venous pathway for the lower limb. It is easy to understand how this condition can be produced by incompetence of a valve in a perforating vein. Every time the patient exercises, high-pressure venous blood escapes from the deep veins into the superficial veins and produces a varicosity, which might be localized to begin with but becomes more extensive later.

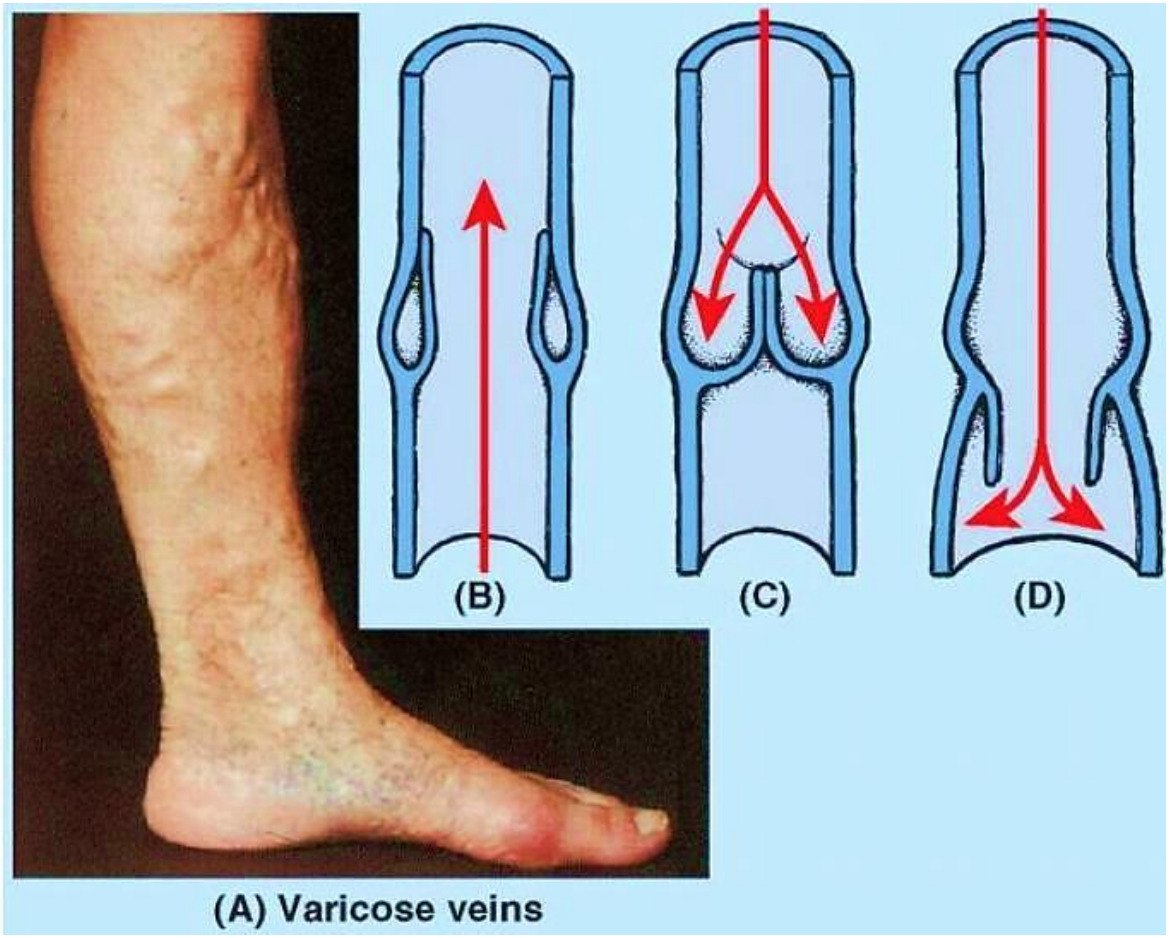
The successful operative treatment of varicose veins depends on the **ligation and division** of all **the main tributaries** of the great or small saphenous veins to prevent a collateral venous circulation from developing, and the **ligation and division** of all the **perforating veins** responsible for the leakage of high-pressure blood from the deep to the superficial veins. In addition, a common practice is now to remove or strip the superficial veins. Needless to say, it is imperative to ascertain that the deep veins are patent before taking operative measures.

Varicose veins • Frequently, the great saphenous vein and its tributaries become varicose (dilated so that the cusps of their valves do not close).

• In a healthy vein, the valves allow blood to flow toward the heart (B) while keeping blood from flowing away from the heart (C).

• Valves in varicose veins (D) are incompetent due to dilation or rotation and no longer function properly. As a result, blood flows inferiorly in the veins, producing varicose veins.

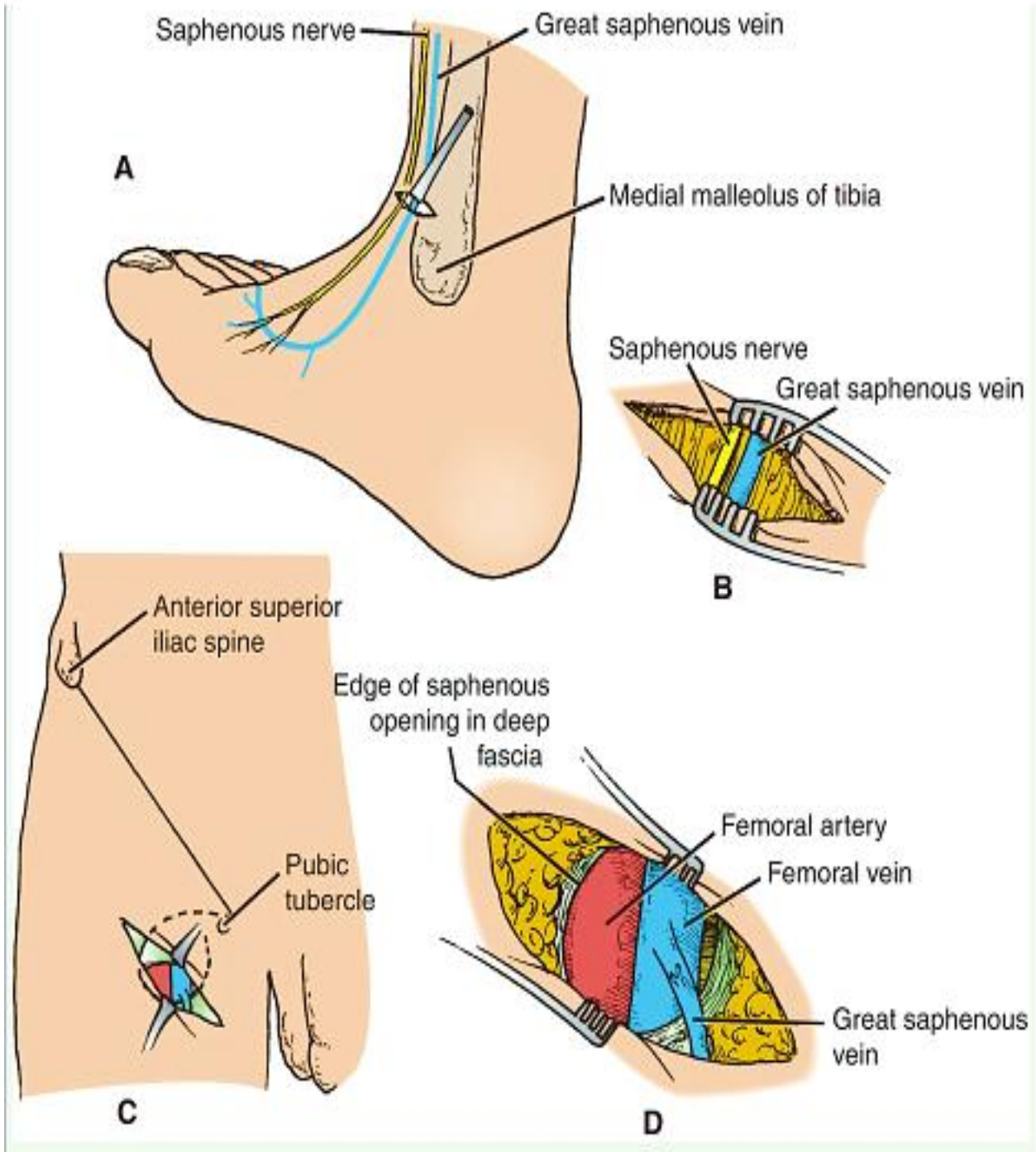




Great Saphenous Vein Cutdown

Exposure of the great saphenous vein through a skin incision (cutdown) is usually performed at **the ankle**. This site has the disadvantage
that phlebitis (inflammation of the vein wall) is a potential complication.

The great saphenous vein also can be entered at **the groin** in the femoral triangle, where phlebitis is relatively rare. The larger diameter
of the vein at this site permits the use of large-diameter catheters and the rapid infusion of large volumes of fluids.

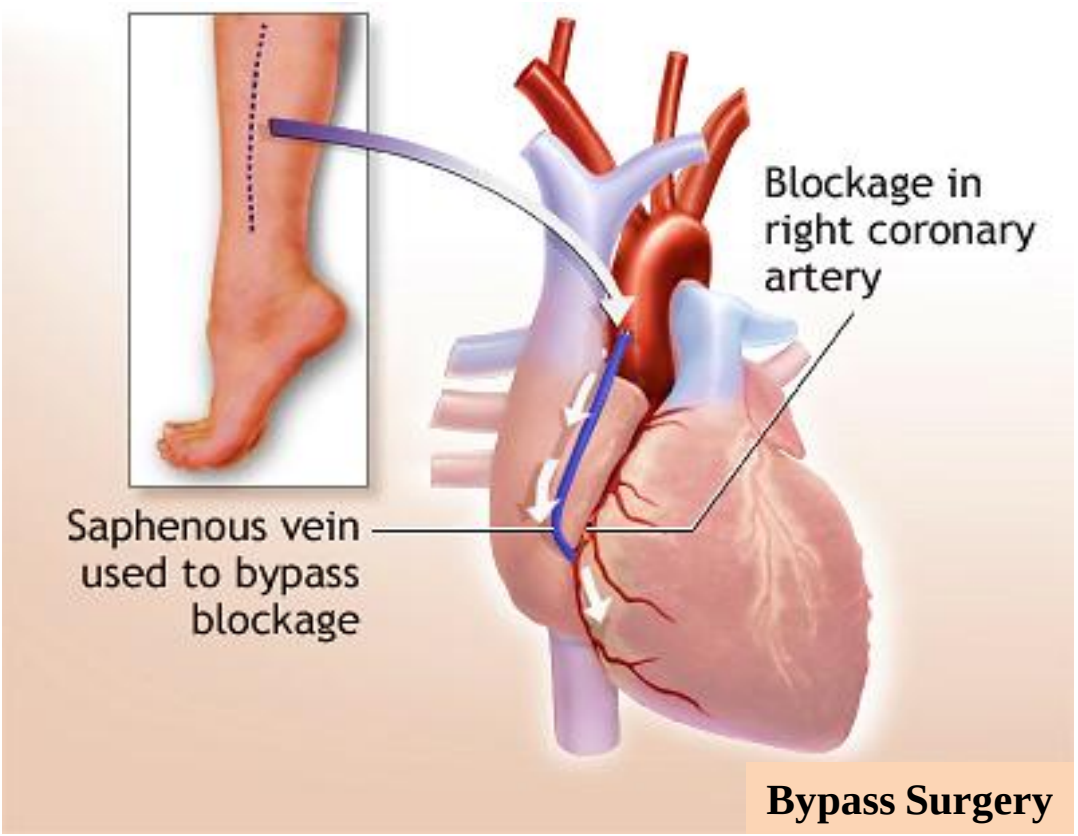


Great saphenous vein cutdown.
A,B. At the ankle. The great saphenous vein is constantly found in front of the medial malleolus of the tibia.
C,D. At the groin. The great saphenous vein drains into the femoral vein two fingerbreadths below and lateral to the pubic tubercle.

Great Saphenous Vein in Coronary Bypass Surgery

In patients with occlusive coronary disease caused by atherosclerosis, the diseased arterial segment can be bypassed by inserting a graft consisting of a portion of the great saphenous vein. The venous segment is reversed so that its valves do not obstruct the arterial flow. Following removal of the great saphenous vein at the donor site, the superficial venous blood ascends the lower limb by passing through the perforating veins and entering the deep veins. The great saphenous vein can also be used to bypass obstructions of the brachial or femoral arteries.

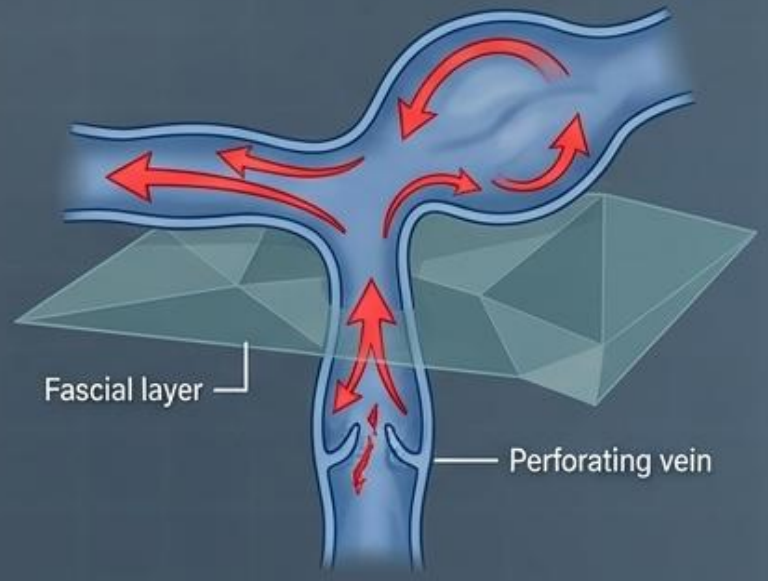
Coronary bypass surgery is an open heart surgery (the chest is opened, but not the heart itself). It is done through an opening through the breast bone. While one surgeon is working **on the chest**, another surgeon works on taking a length of vein **(saphenous vein)** for the bypass through a long incision along the inside of the lower leg. The vein is sewn in above and below the blockage in the coronary artery.



Bypass Surgery

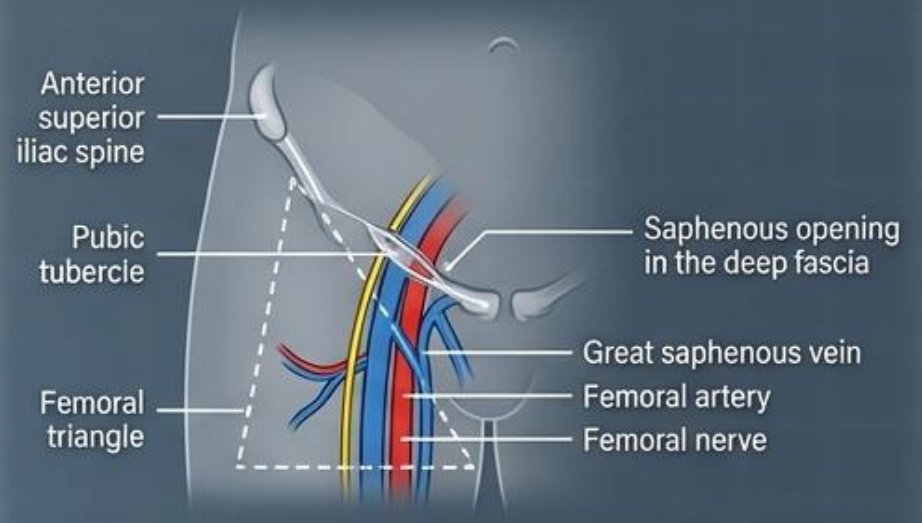
Clinical Spotlight:
Venous Pathologies & Surgical Access

Varicose Veins



Mechanism: Incompetent valve in perforating vein.
Result: High-pressure deep venous blood leaks backward during muscle contraction, causing the superficial vein to become elongated and tortuous.

Great Saphenous Vein Cutdown



Ankle Approach

- **Location:** Constant, directly anterior to the medial malleolus.
- **Caution:** Saphenous nerve lies immediately anterior to the vein.
- **Risk:** Phlebitis.

Groin Approach

- **Location:** Entered in the femoral triangle (4 cm below/lateral to pubic tubercle).
- **Benefit:** Larger diameter allows rapid infusion; lower phlebitis risk.

Note: The GSV is also harvested and reversed (preventing valve obstruction) for coronary artery bypass grafting.

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Inguinal Lymph Nodes

The inguinal lymph nodes are divided into superficial and deep groups.

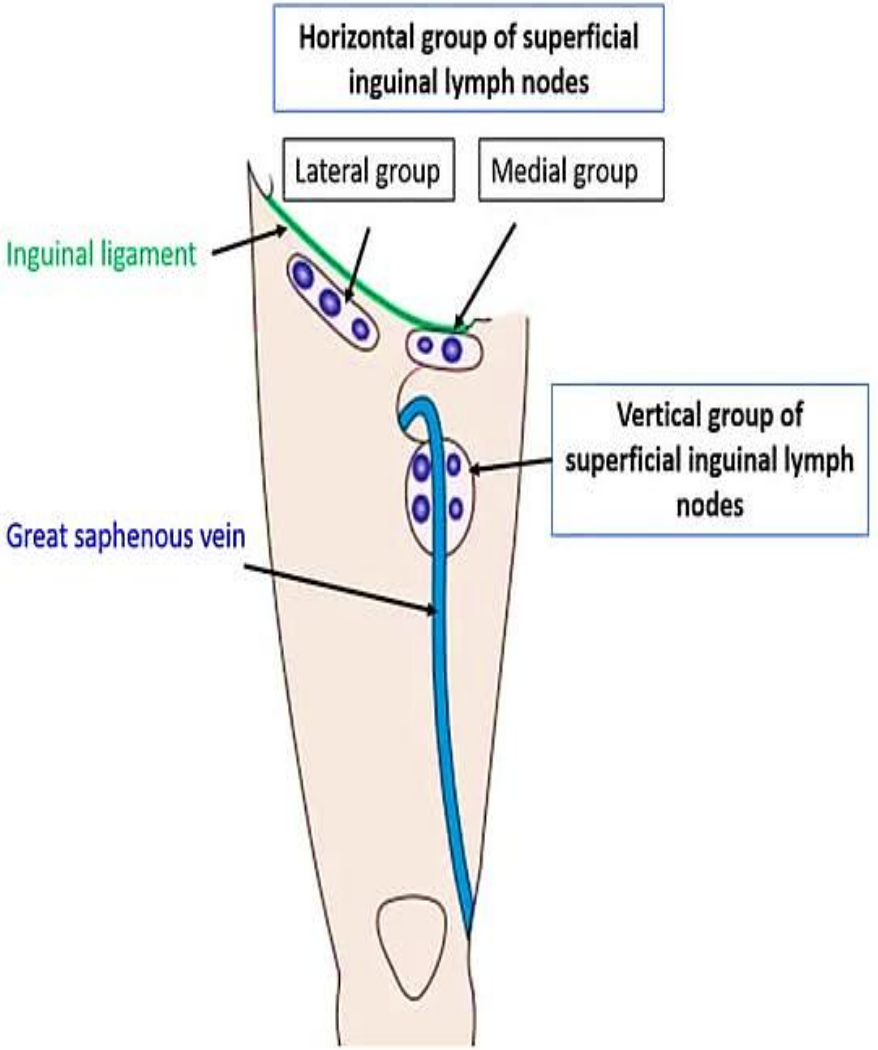
Superficial Inguinal Lymph Nodes

The superficial nodes lie in the superficial fascia below the inguinal ligament and can be divided into a horizontal and a vertical group.

The horizontal group lies just below and parallel to the inguinal ligament. **The medial members** of the group receive superficial lymph vessels from the anterior abdominal wall below the level of the umbilicus and from the perineum. The lymph vessels from the urethra, the external genitalia of both sexes (but not the testes), and the lower half of the anal canal drain by this route. **The lateral members** of the group receive superficial lymph vessels from the back below the level of the iliac crests.

The vertical group lies along the terminal part of the great saphenous vein and receives most of the superficial lymph vessels of the lower limb. Lymph from the skin and superficial fascia on the back of the thigh drains upward and forward into the vertical group.

The efferent lymph vessels from the superficial inguinal nodes pass through the saphenous opening in the deep fascia and join the deep inguinal node.



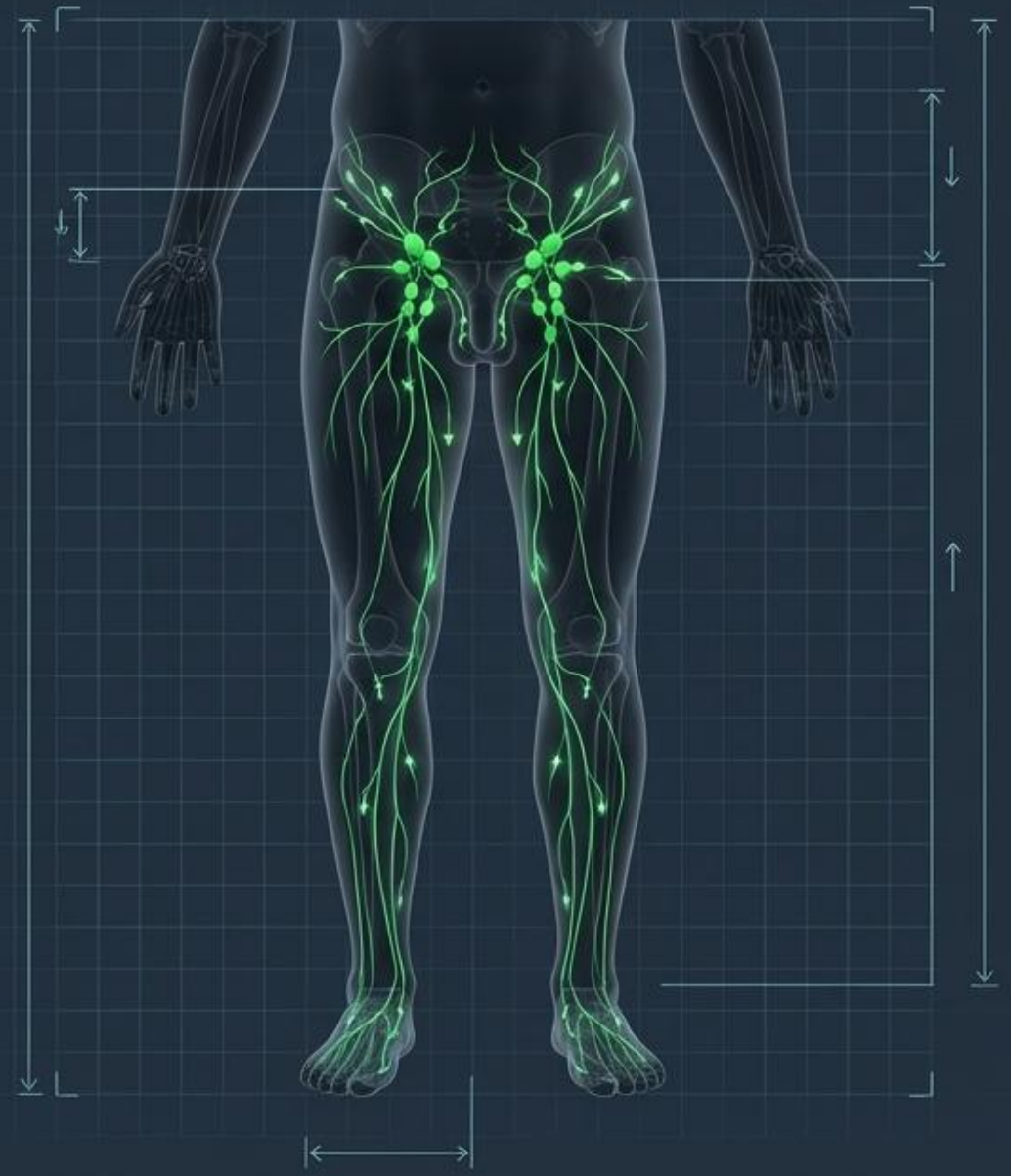
Deep Inguinal Lymph Nodes

The deep nodes are located beneath the deep fascia and lie along the medial side of the femoral vein. The efferent vessels from these nodes enter the abdomen by passing through the femoral canal to lymph nodes along the external iliac artery. The deep inguinal lymph nodes are variable in number, but there are commonly three. They lie along the medial side of the terminal part of the femoral vein, and the most superior is usually located in the femoral canal. They receive all the lymph from the superficial inguinal nodes via lymph vessels that pass through the cribriform fascia of the saphenous opening. They also receive lymph from the deep structures of the lower limb that have ascended in lymph vessels alongside the arteries, some having passed through the popliteal nodes. The efferent lymph vessels from the deep inguinal nodes ascend into the abdominal cavity through the femoral canal and drain into the external iliac nodes.

Clinical Notes, Lower Limb Lymphatics

The superficial and deep inguinal lymph nodes not only drain all the lymph from the lower limb but also drain lymph from the skin and superficial fascia of the anterior and posterior abdominal walls below the level of the umbilicus. Lymph from the external genitalia and the mucous membrane of the lower half of the anal canal also drains into these nodes. Remember the large distances the lymph has had to travel in some instances before it reaches the inguinal nodes. For example, a patient may present with an enlarged, painful inguinal lymph node caused by lymphatic spread of pathogenic organisms that entered the body through a small scratch on the undersurface of the big toe.

The Lymphatic Defense Network: Inguinal Nodes



Superficial Group

- Horizontal Members: Parallel to inguinal ligament. Drain the
  - anterior abdominal wall (below umbilicus), perineum, external genitalia, and lower anal canal.
- Vertical Members: Along the terminal GSV. Drain the
  - majority of the superficial lower limb.

Deep Group

- Located deep to fascia along the medial femoral vein (uppermost node inside the Femoral Canal).
- Receives all superficial node efferents and deep leg structures.

X-Ray

Clinical Note: The Distance Rule

Swollen, painful inguinal lymph nodes can be caused by a primary infection as distant as a small scratch on the big toe, or an undiscovered carcinoma in the lower anal canal.

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Thigh Fascial Compartments and Muscles

Three fascial septa pass from the inner aspect of the deep fascial sheath of the thigh to the linea aspera of the femur. This arrangement divides the thigh into three compartments, each having its own complement of muscles, nerves, and arteries. The compartments are anterior, medial, and posterior in position. This general pattern of organization of the limb into defined compartments is the same in both the upper and lower limbs.

Anterior Fascial Compartment Contents

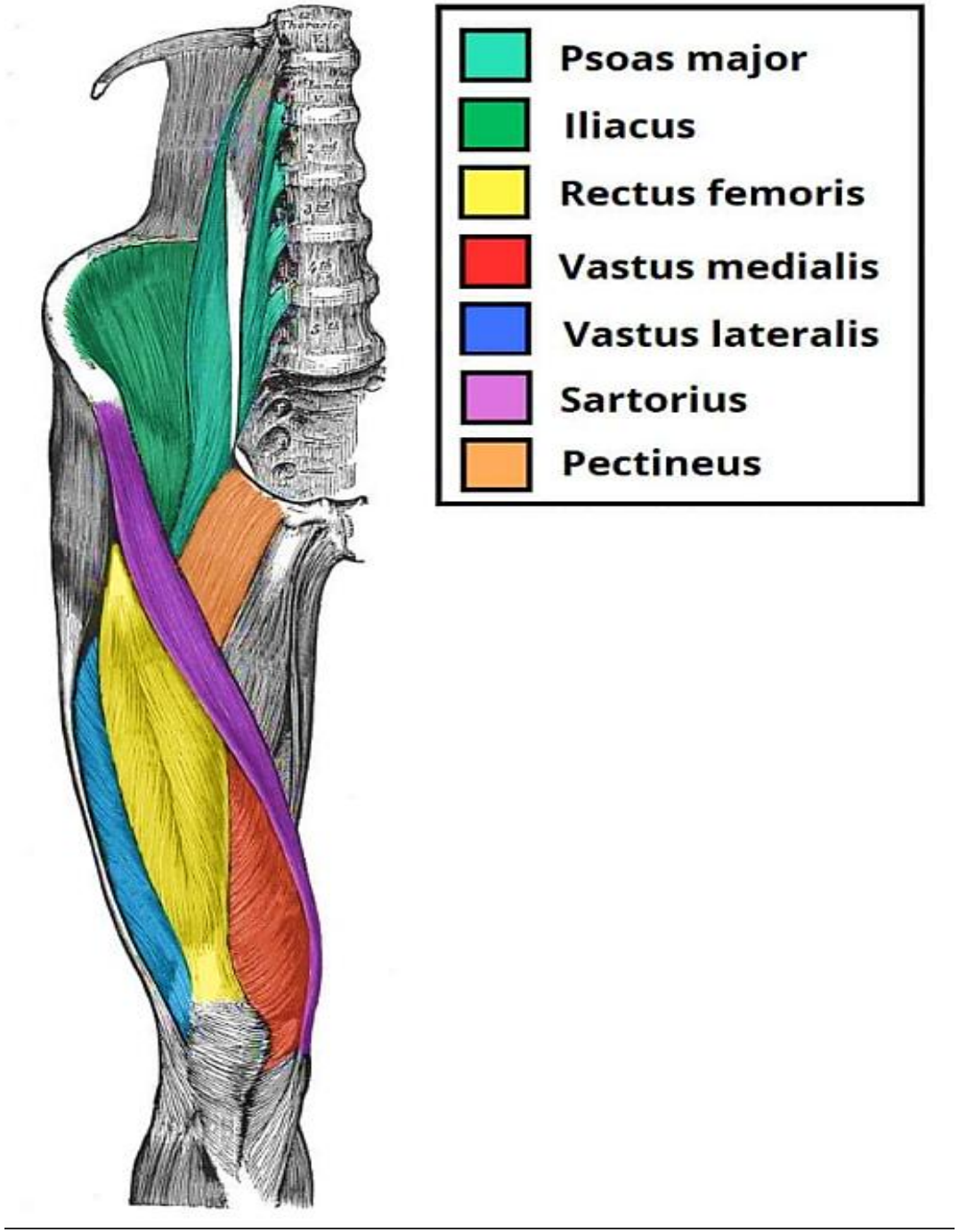
Muscles: Sartorius, iliopsoas, pectineus, and quadriceps femoris

Blood supply: Femoral artery

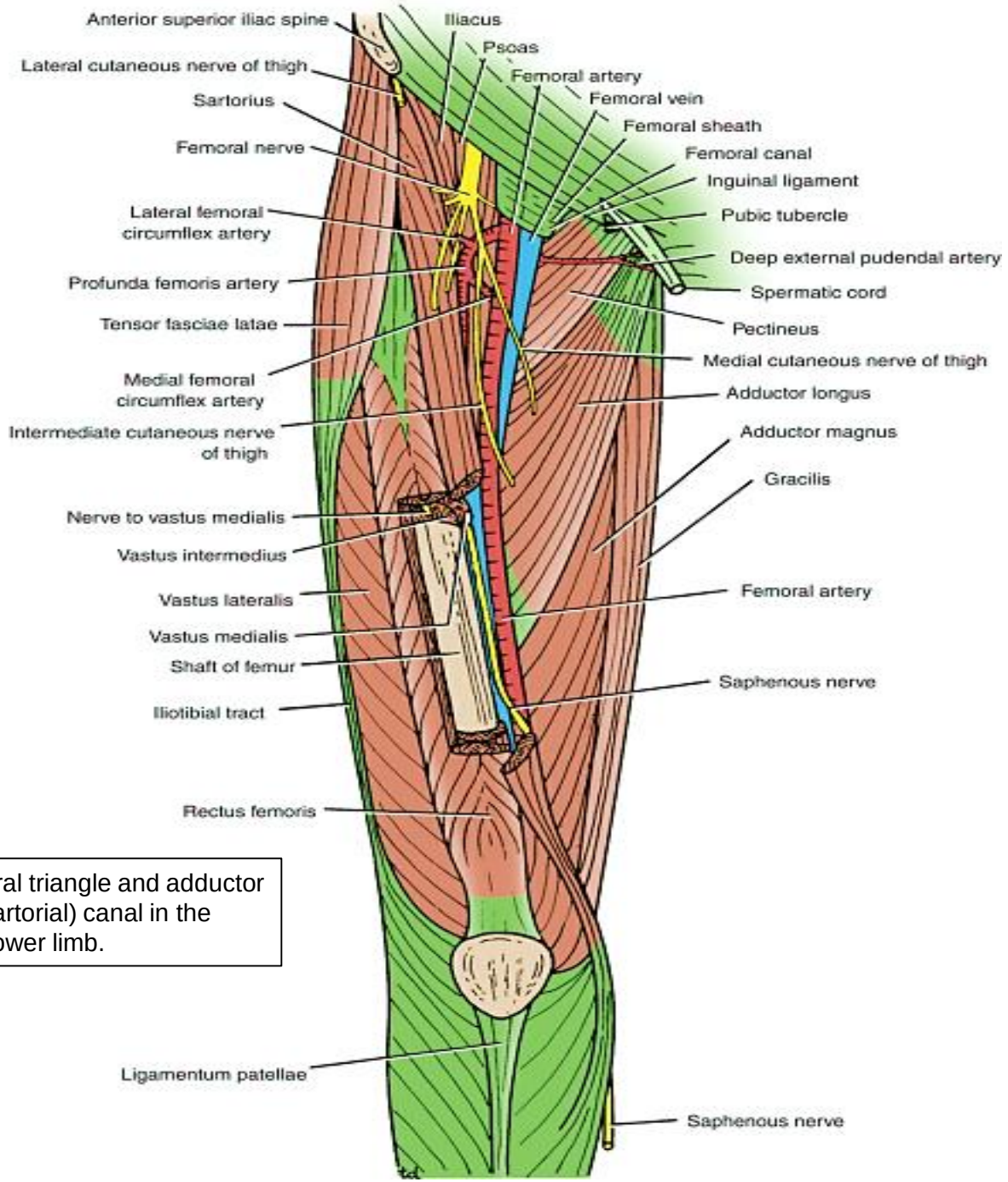
Nerve supply: Femoral nerve

Anterior Fascial Compartment Muscles

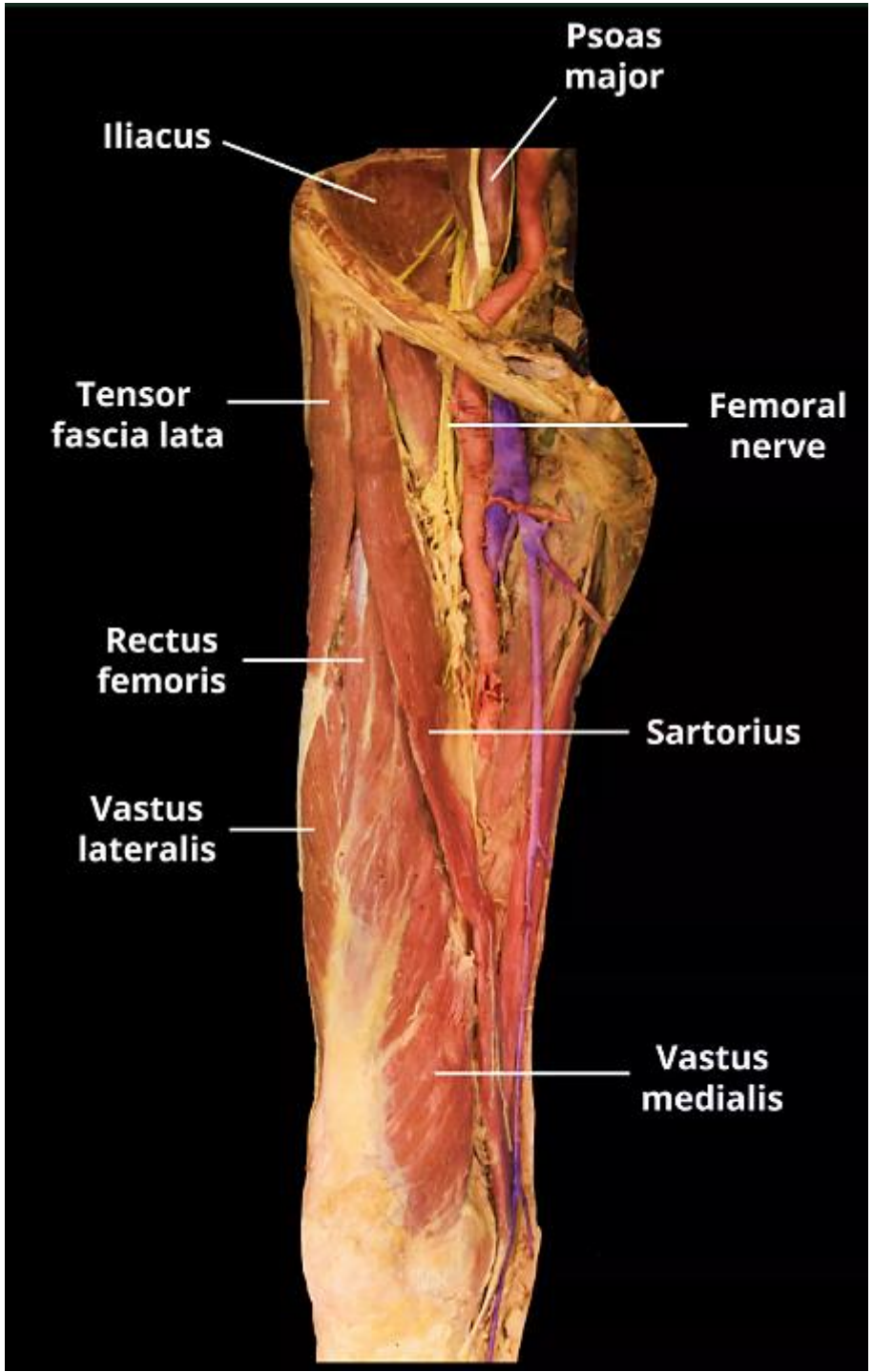
Recall that the iliacus and psoas major are separate muscles in the abdomen, but merge together in the thigh to form a single iliopsoas muscle.



MUSCLE	ORIGIN	INSERTION	NERVE SUPPLY	NERVE ROOT[a]	ACTION
Sartorius	Anterosuperior iliac spine	Upper medial surface of shaft of tibia	Femoral nerve	L2, 3	Flexes, abducts, laterally rotates thigh at hip joint; flexes and medially rotates leg at knee joint
Iliacus	Iliac fossa of hip bone	With psoas into lesser trochanter of femur	Femoral nerve	**L2,** 3	Flexes thigh on trunk; if thigh is fixed, it flexes the trunk on the thigh as in sitting up from lying down
Psoas	Transverse processes, bodies, and intervertebral discs of the 12th thoracic and five lumbar vertebrae	With iliacus into lesser trochanter of femur	Lumbar plexus	**L1, 2,** 3	Flexes thigh on trunk; if thigh is fixed, it flexes the trunk on thigh as in sitting up from lying down
Pectineus	Superior ramus of pubis	Upper end of linea aspera of shaft of femur	Femoral nerve (sometimes obturator nerve)	**L2,** 3	Flexes and adducts thigh at hip joint
Quadriceps Femoris					
Rectus femoris	Straight head: anteroinferior iliac spine Reflected head: ilium above acetabulum	Quadriceps tendon into patella, then via ligamentum patellae into tubercle of tibia	Femoral nerve	L2, **3, 4**	Extension of leg at knee joint; flexes thigh at hip joint
Vastus lateralis	Upper end and shaft of femur	Quadriceps tendon into patella, then via ligamentum patellae into tubercle of tibia	Femoral nerve	L2, **3, 4**	Extension of leg at knee joint
Vastus medialis	Upper end and shaft of femur	Quadriceps tendon into patella, then via ligamentum patellae into tubercle of tibia	Femoral nerve	L2, **3, 4**	Extension of leg at knee joint; stabilizes patella
Vastus intermedius	Anterior and lateral surfaces of shaft of femur	Quadriceps tendon into patella, then via ligamentum patellae into tubercle of tibia	Femoral nerve	L2, **3, 4**	Extension of leg at knee joint; articularis genus retracts synovial membrane

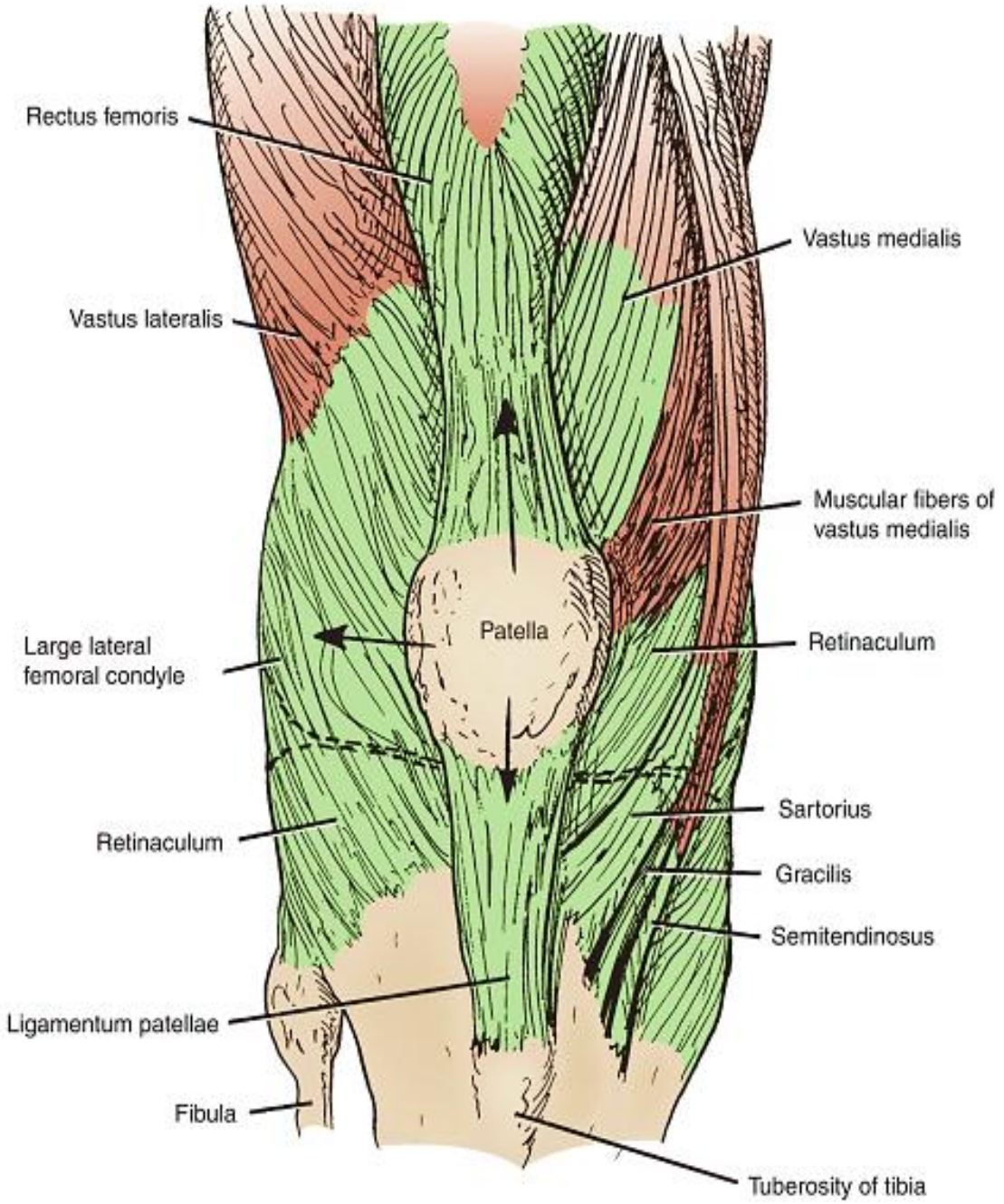


Femoral triangle and adductor (subsartorial) canal in the right lower limb.



Action of Quadriceps Femoris Muscle (Quadriceps Mechanism)

The quadriceps femoris muscle (consisting of the rectus femoris, the vastus intermedius, the vastus lateralis, and the vastus medialis) inserts into the patella and, via the ligamentum patellae (patellar ligament), attaches to the tibial tuberosity. Together, they provide a powerful extensor of the knee joint. Some of the tendinous fibers of the vastus lateralis and vastus medialis form bands, or retinacula, which join the capsule of the knee joint and strengthen it. The lowest muscle fibers of the vastus medialis are almost horizontal and prevent the patella from being pulled laterally during contraction of the quadriceps muscle. The tone of the quadriceps muscle greatly strengthens the knee joint. The rectus femoris muscle is the only component of the quadriceps that crosses the hip joint, and it flexes the hip in addition to extending the knee.



Clinical Notes, Quadriceps Femoris as Knee Joint Stabilizer

The quadriceps femoris is a most important extensor muscle for the knee joint. Its tone greatly strengthens the joint; therefore, this muscle mass must be carefully examined when disease of the knee joint is suspected. Both thighs should be examined, and the size, consistency, and strength of the quadriceps muscles should be tested. Reduction in size caused by muscle atrophy can be tested by measuring the circumference of each thigh a fixed distance above the superior border of the patella.

The vastus medialis muscle extends farther distally than the vastus lateralis. The vastus medialis is the first part of the quadriceps muscle to atrophy in knee joint disease and the last to recover.

Rectus Femoris Rupture

The rectus femoris muscle can rupture in sudden violent extension movements of the knee joint. The muscle belly retracts proximally, leaving a gap that may be palpable on the anterior surface of the thigh. Surgical repair is indicated in complete rupture of the muscle.

Ligamentum Patellae Rupture

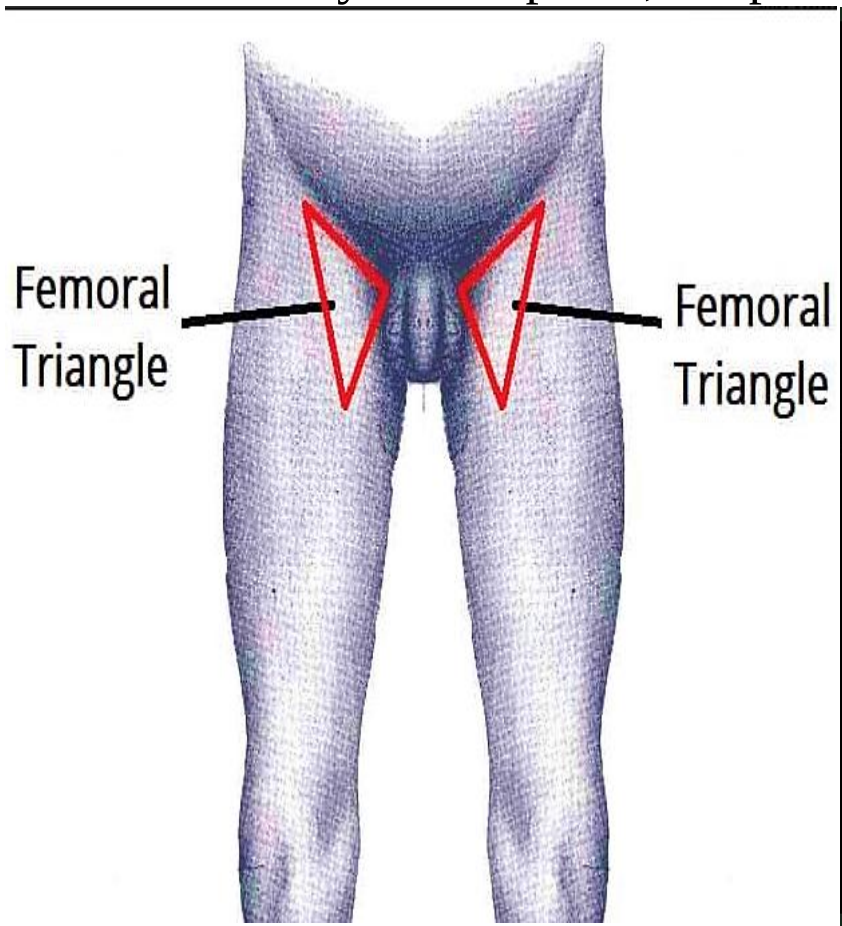
This can occur when a sudden flexing force is applied to the knee joint when the quadriceps femoris muscle is actively contracting.

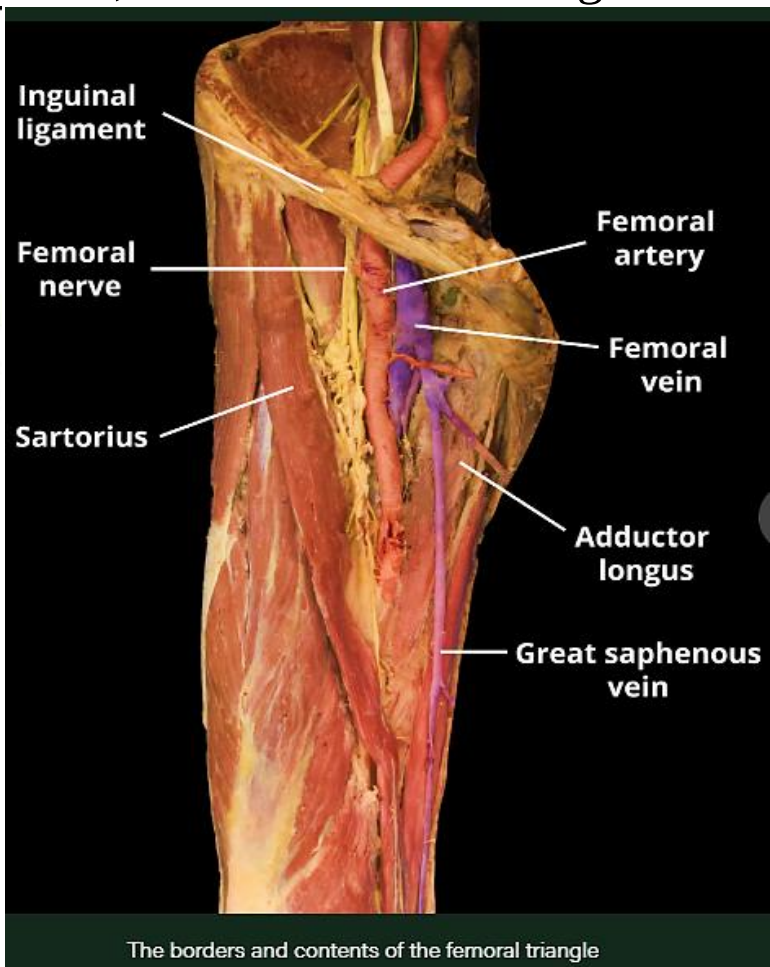
Femoral Triangle

The femoral triangle is a triangular depression situated in the upper part of the medial aspect of the thigh just below the inguinal ligament. Its boundaries are as follows:

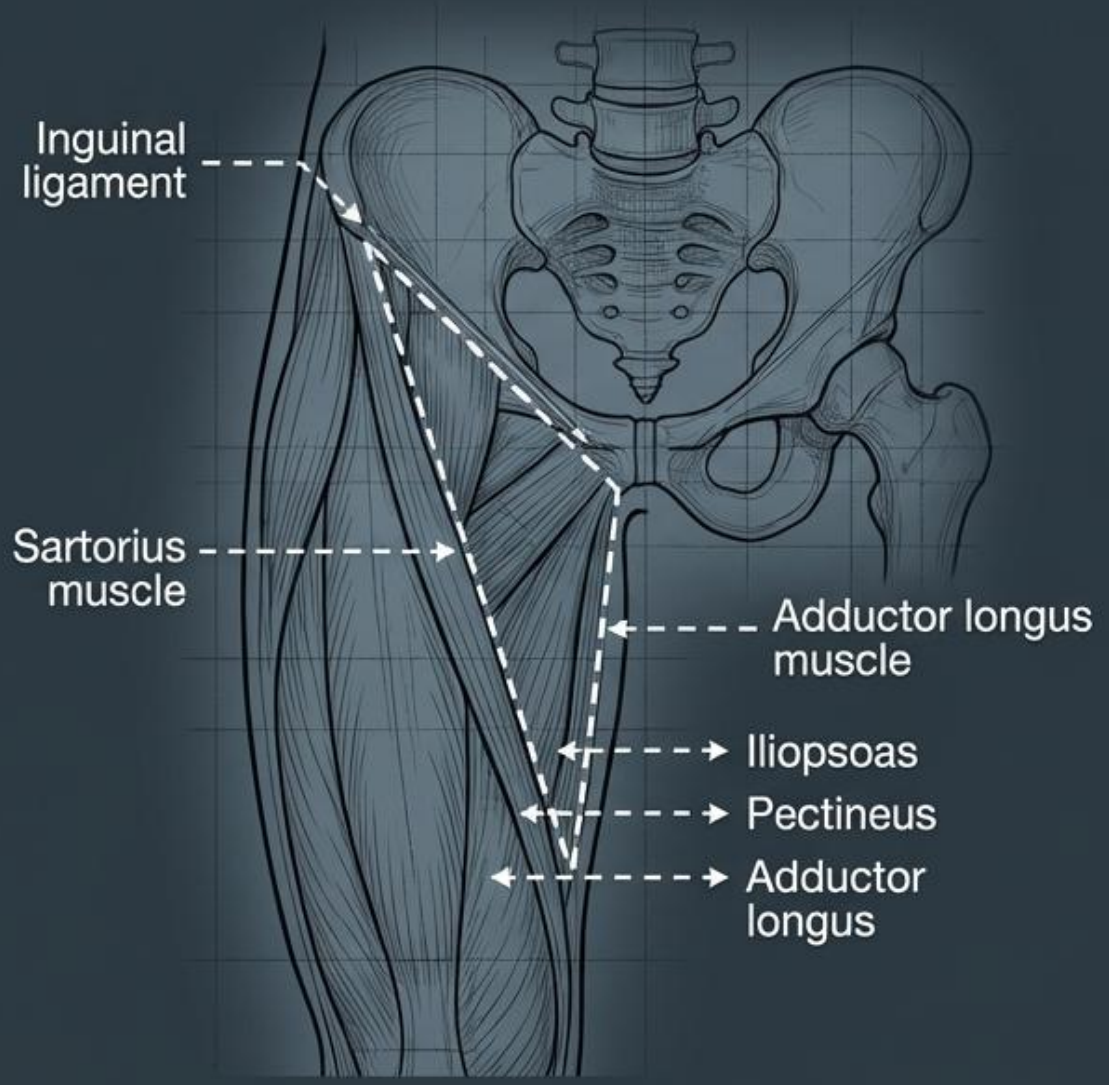
Superiorly: Inguinal ligament
Laterally: Sartorius muscle
Medially: Adductor longus muscle
Floor: Gutter shaped and formed from lateral to medial by the iliopsoas, the pectineus, and the adductor longus
Roof: Skin and fasciae of the thigh

The major contents
of the femoral triangle are as follows:
Femoral nerve and its terminal branches
Femoral sheath
Femoral artery and its branches
Femoral vein and its tributaries
Deep inguinal lymph nodes





The Main Gateway: The Femoral Triangle



Borders & Floor

- Superior: Inguinal ligament
- Lateral: Sartorius muscle
- Medial: Adductor longus muscle
- Floor (Lateral to Medial): Iliopsoas → Pectineus → Adductor longus

N	**N - Nerve:** Femoral Nerve (Note: Lies outside the femoral sheath)
A	**A - Artery:** Femoral Artery (in lateral sheath compartment)
V	**V - Vein:** Femoral Vein (in intermediate sheath compartment)
L	**L - Lymphatics:** Deep nodes in the Femoral Canal (medial sheath compartment)

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Adductor (Subsartorial) Canal

The adductor canal is an intermuscular cleft situated on the medial aspect of the middle third of the thigh deep to the sartorius muscle. It begins above at **the apex of the femoral triangle** and ends below at the opening in the adductor magnus **(the adductor hiatus)**. In cross section, it is triangular and has three walls:

The anteromedial wall is formed by the sartorius muscle and fascia.

The posterior wall is formed by the adductor longus and magnus.

The lateral wall is formed by the vastus medialis.

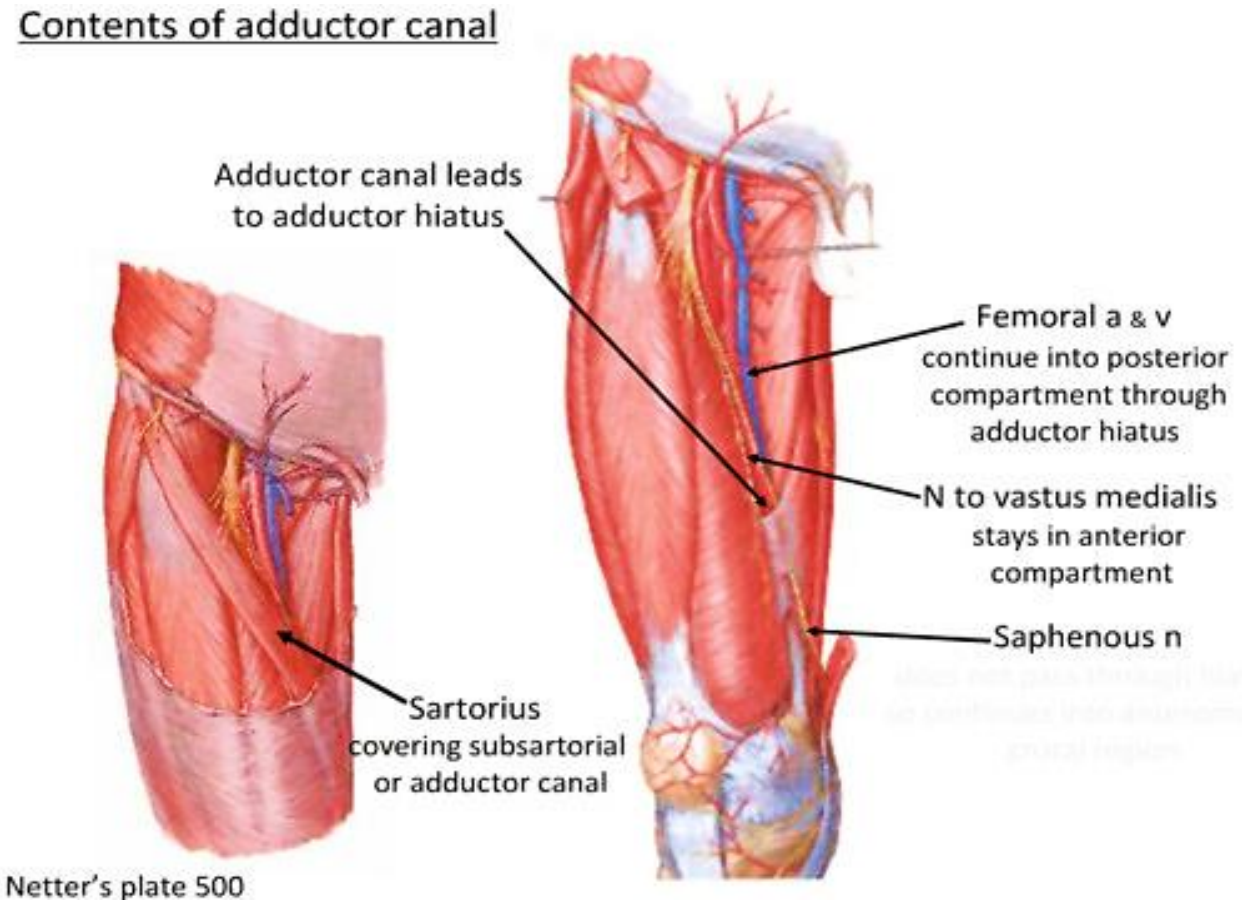
The adductor canal contains the following:

Terminal part of the femoral artery

Femoral vein

Deep lymph vessels

Saphenous nerve, the nerve to the vastus medialis, and the terminal part of the obturator nerve

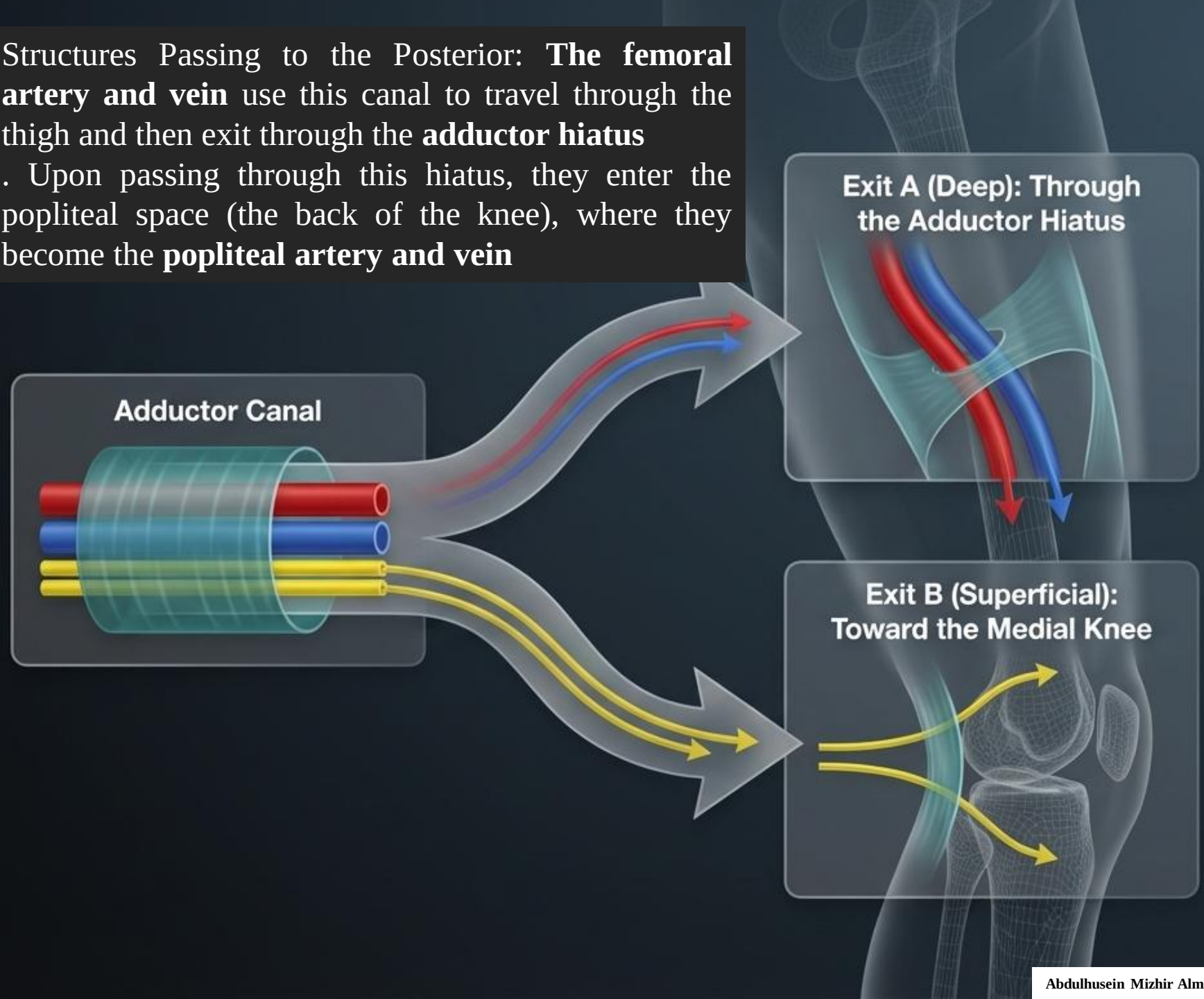


Adductor (Subsartorial) Canal

Structures Passing to the Posterior: **The femoral artery and vein** use this canal to travel through the thigh and then exit through the **adductor hiatus** . Upon passing through this hiatus, they enter the popliteal space (the back of the knee), where they become the **popliteal artery and vein**

Selective Passage:
It is important to note that **not all contents** of the canal enter the posterior compartment.

While the vessels pass through to the back, the **saphenous nerve** and the nerve to the vastus medialis **stay in the anterior compartment** and do not pass through the hiatus



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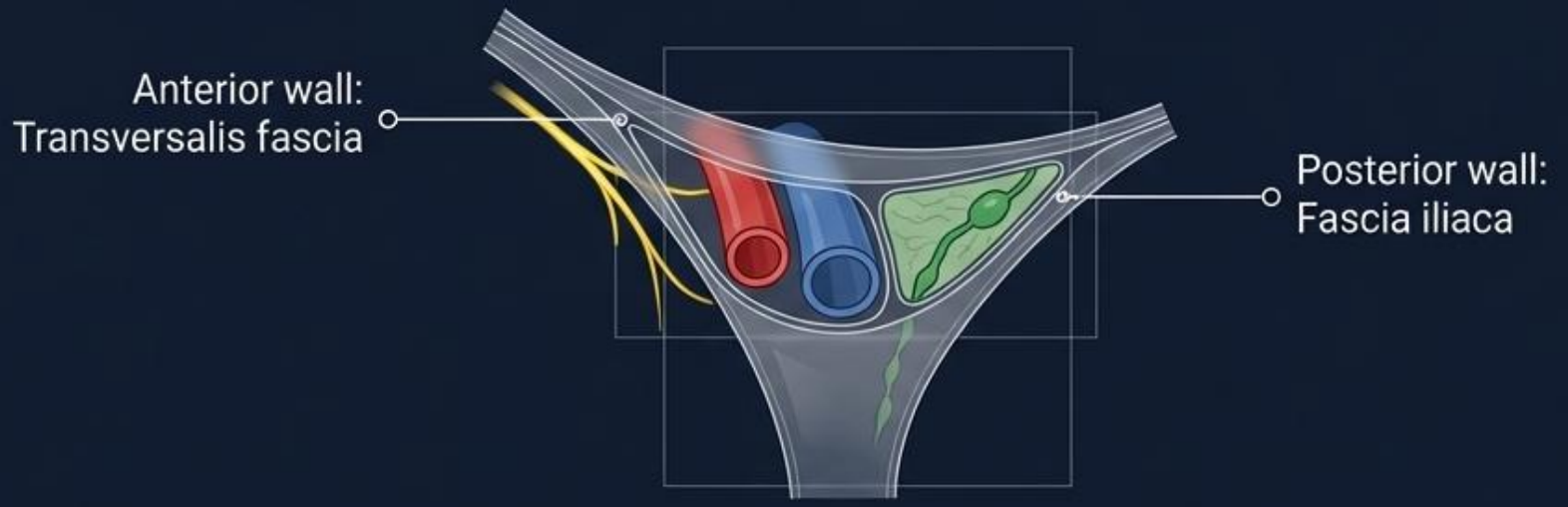
Femoral Sheath

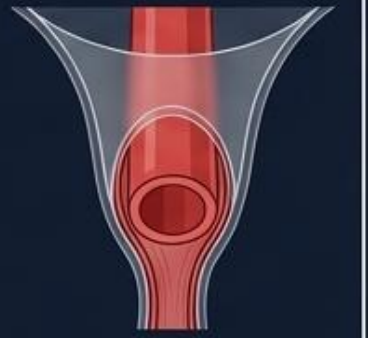
The femoral sheath is a downward protrusion of the fascial lining of the abdominal walls into the thigh. Its **anterior wall** is continuous above with the transversalis fascia and its **posterior wall** with the fascia iliaca. The sheath surrounds the femoral vessels and lymphatics for about 1 in. (2.5 cm) below the inguinal ligament.
Thin fibrous septa divide the sheath into three compartments: lateral, intermediate, and medial.

The femoral artery, as it enters the thigh beneath the inguinal ligament, occupies the **lateral compartment** of the sheath. **The femoral vein**, as it leaves the thigh, lies medial to the artery and occupies the **intermediate compartment**. **Lymph vessels** occupy the most **medial compartment** as they leave the thig. Notice that the femoral nerve does not occupy the femoral sheath.

The small medial compartment for the lymph vessels is termed the **femoral canal**. It is about 0.5 in. (1.3 cm) long, and its upper opening is called the **femoral ring**. **The femoral septum**, which is a condensation of extraperitoneal tissue, plugs the opening of the femoral ring and closes the ring. The **femoral canal contains** fatty connective tissue, all the efferent lymph vessels from the deep inguinal lymph nodes, and one of the deep inguinal lymph nodes.

The Femoral Sheath: Fascial Protection



Lateral Compartment	Intermediate Compartment	Medial Compartment (Femoral Canal)
Contains the Femoral Artery. Blends inferiorly with the arterial tunica adventitia. 	Contains the Femoral Vein. 	Contains loose fatty tissue, efferent lympatics, and Cloquet's node. Does not adhere to vessel walls, creating a structural weakness. 

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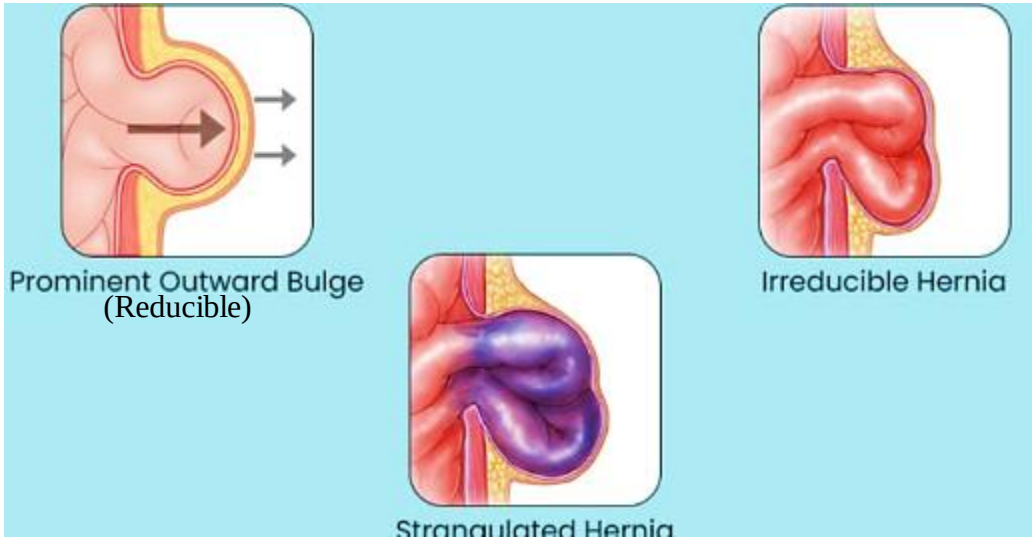
The femoral sheath **adheres** to the **walls of the blood vessels** and inferiorly **blends** with the **tunica adventitia** of these vessels. The part of the femoral sheath that forms the medially located **femoral canal does not adhere** to the walls of the small lymph vessels. Therefore, this site is a potentially weak area in the abdominal wall. A protrusion of peritoneum could be forced down the femoral canal, pushing the femoral septum before it. Such a condition is known as a **femoral hernia**. The femoral ring has the following important relations: anteriorly, the **inguinal ligament**; posteriorly, the **superior ramus of the pubis**; medially, the **lacunar ligament**; and laterally, **the femoral vein.**

Because of these anatomic structures, in case of femoral henia, the neck of the hrrnial sac is unable to expand. Once an abdominal viscus has passed through the neck into the body of the sac, it may be difficult to push it up and return it to the abdominal cavity **(irreducible hernia).** Furthermore, after the patient strains or coughs, a piece of bowel may be forced through the neck, and its blood vessels may be compressed by the femoral ring, seriously impairing its blood supply **(strangulated hernia).**

A femoral hernia is a dangerous condition and should always be treated surgically.
The lower end of the femoral canal is normally closed by the adherence of its medial wall to the tunica adventitia of the femoral vein. It lies close to the saphenous opening in the deep fascia of the thigh.



Hernia Progression

Anterior Fascial Compartment Blood Supply

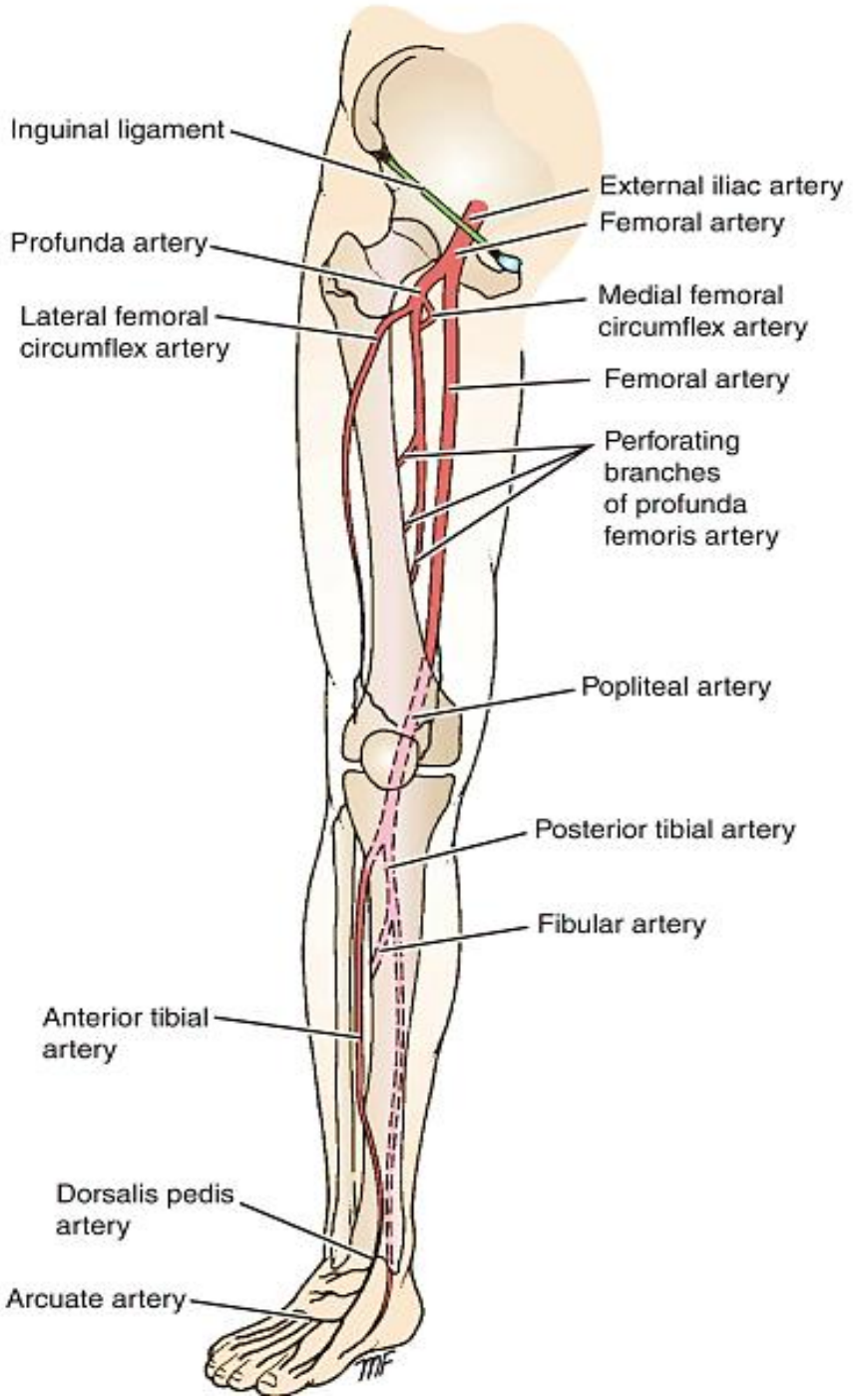
The femoral artery and vein supply and drain the anterior compartment of the thigh. The artery is the continuation of the external iliac artery from the pelvis. The vein drains into the external iliac vein.

Femoral Artery

The femoral artery is the main arterial supply to the lower limb. It enters the thigh deep to the inguinal ligament. Here, it lies midway between the anterosuperior iliac spine and the symphysis pubis. It descends almost vertically toward the adductor tubercle of the femur and ends at the adductor hiatus (an opening in the adductor magnus muscle) by entering the popliteal space as the popliteal artery.

Relations

Anteriorly: In the upper part of its course, it is superficial and is covered by the skin and fascia roofing the femoral triangle. In the lower part of its course, it passes deep to the sartorius muscle in the adductor canal.
Posteriorly: The artery lies on the iliopsoas muscle, which separates it from the hip joint, the pectineus, and the adductor longus. The femoral vein intervenes between the artery and the adductor longus.
Medially: It is related to the femoral vein in the upper part of its course
Laterally: The femoral nerve and its branches.



Branches

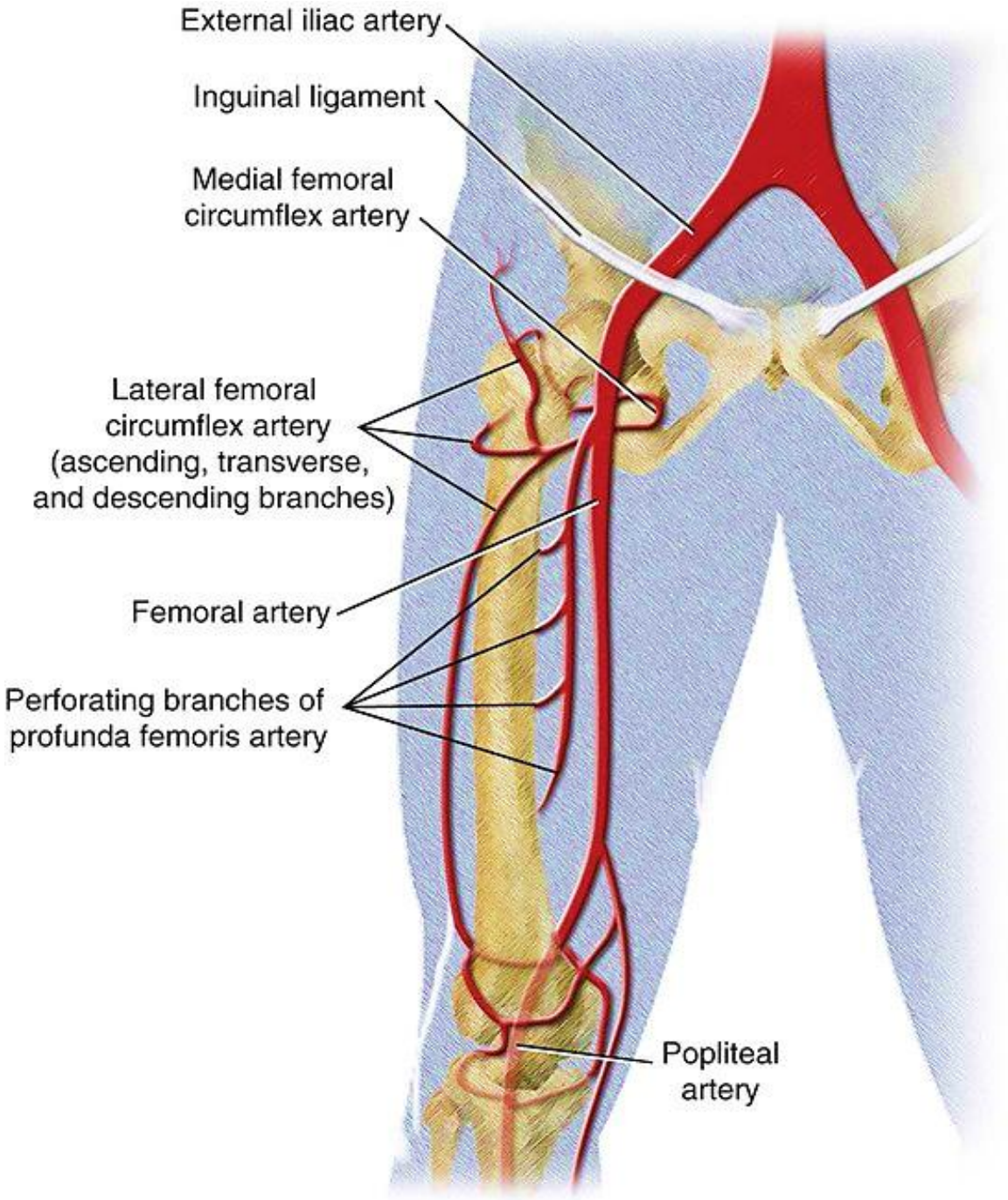
The superficial circumflex iliac artery is a small branch that runs up to the region of the anterosuperior iliac spine.

The superficial epigastric artery is a small branch that crosses the inguinal ligament and runs to the region of the umbilicus.

The superficial external pudendal artery is a small branch that runs medially to supply the skin of the scrotum (or labium majus).

The deep external pudendal artery runs medially and supplies the skin of the scrotum (or labium majus).

The profunda femoris artery is a large and important branch that arises from the lateral side of the femoral artery about 1.5 in. (4 cm) below the inguinal ligament. It passes medially behind the femoral vessels and enters the medial fascial compartment of the thigh. At its origin, it gives off the medial and lateral femoral circumflex arteries, and during its course, it gives off three perforating arteries. It ends by becoming the fourth perforating artery. The descending genicular artery is a small branch that arises from the femoral artery near its termination. It assists in supplying the knee joint.



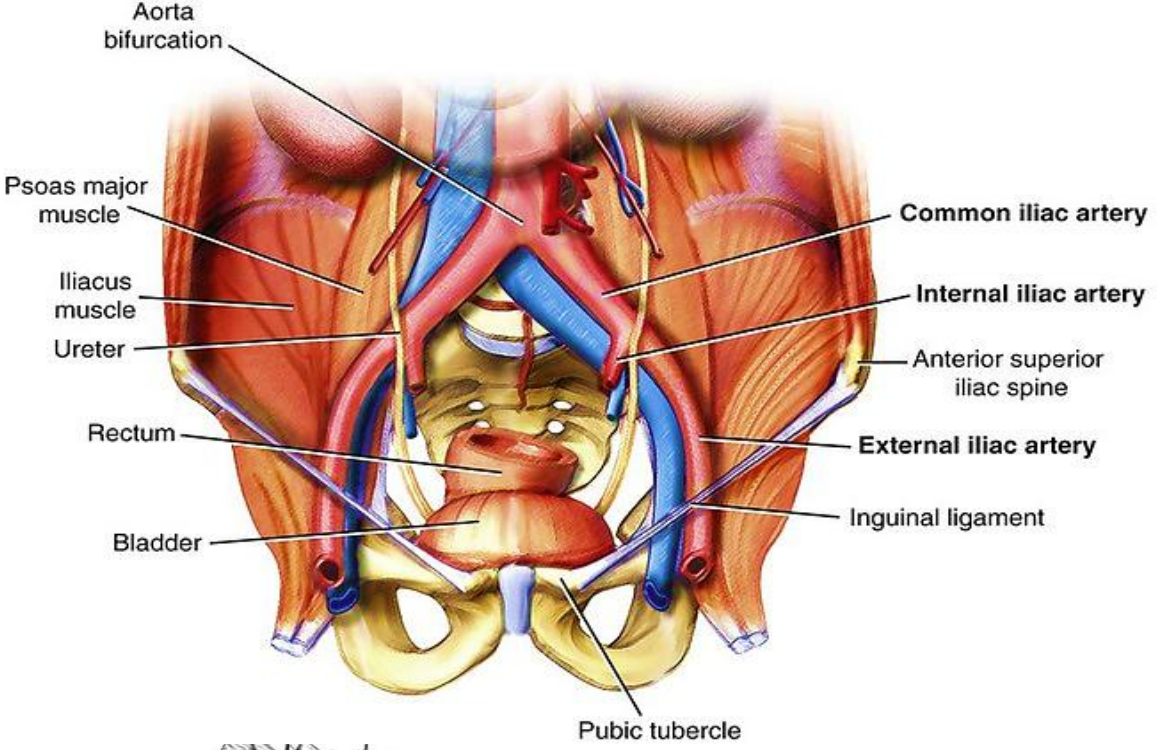
Femoral Vein

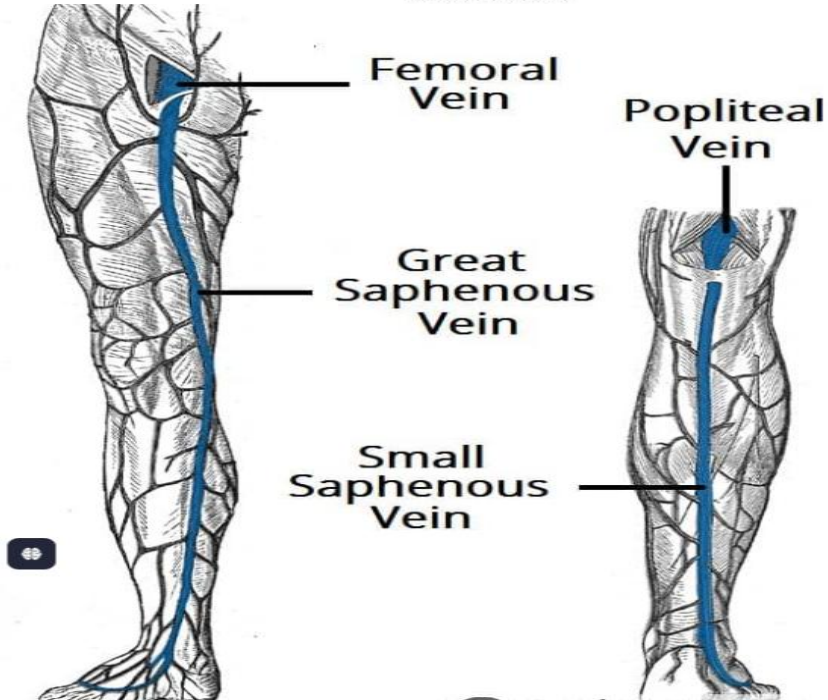
The femoral vein enters the thigh by passing through the adductor hiatus (an opening in the adductor magnus muscle) as a continuation of the **popliteal vein**. It ascends through the thigh, lying at first on the lateral side of the artery, then posterior to it, and finally on its medial side.

It leaves the thigh in the intermediate compartment of the femoral sheath and passes behind the inguinal ligament to become the **external iliac vein**.

The tributaries of the femoral vein are the **great saphenous** vein and the veins that correspond to the branches of the femoral artery.

The superficial circumflex iliac vein, the superficial epigastric vein, and the external pudendal veins drain into the **great saphenous vein.**





Anterior Fascial Compartment Nerve Supply

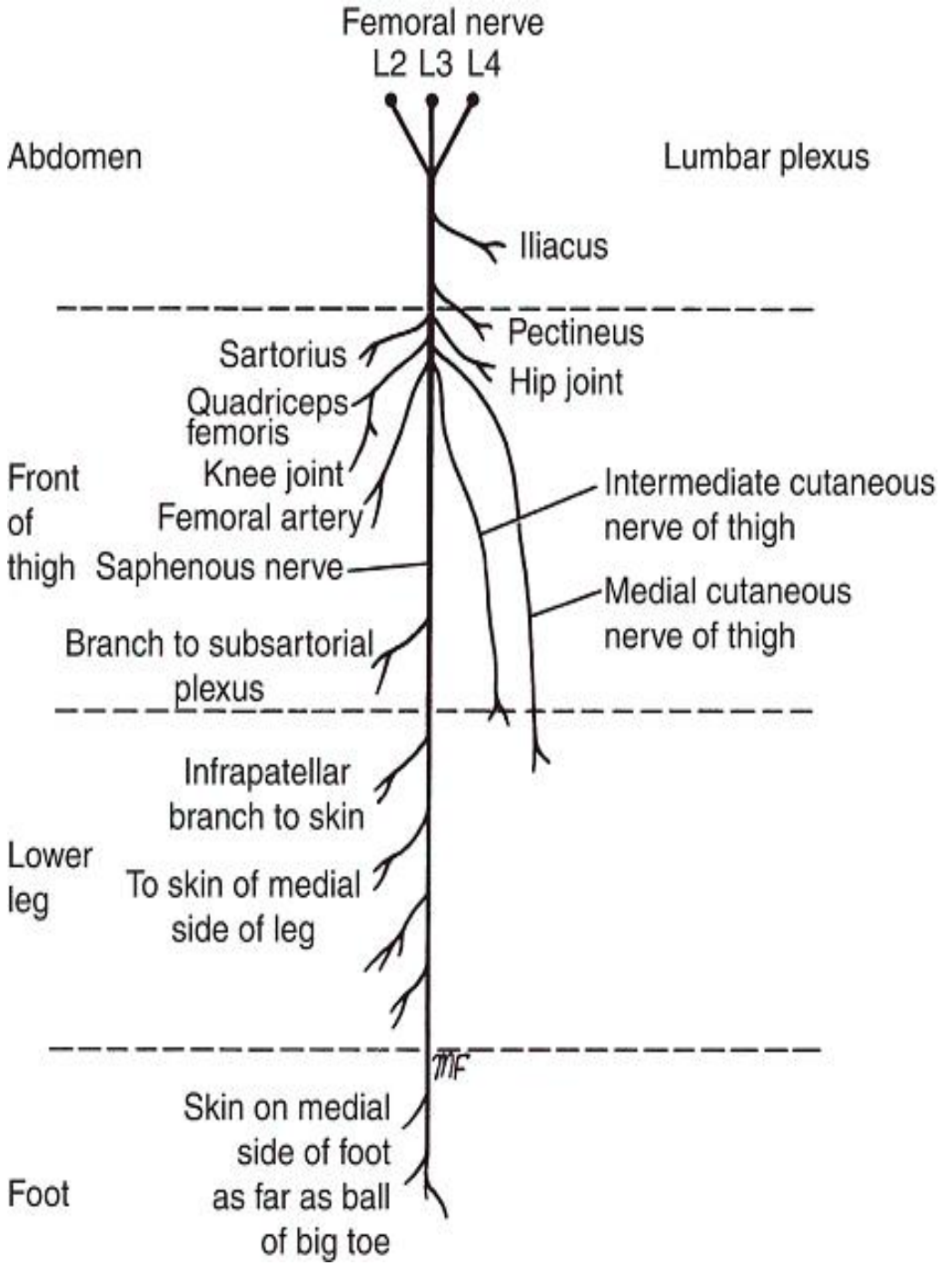
The femoral nerve is the largest branch of the lumbar plexus (L2, 3, and 4).

It emerges from the lateral border of the psoas major muscle within the abdomen and passes downward in the interval between the psoas major and iliacus. It lies behind the fascia iliaca and enters the thigh lateral to the femoral artery and the femoral sheath, behind the inguinal ligament.

About 1.5 in. (4 cm) below the inguinal ligament, it terminates by dividing into **anterior and posterior divisions**.

The femoral nerve supplies **all the muscles** of the anterior compartment of the thigh and also has a significant **cutaneous territory** along the length of the limb.

Note that the femoral nerve **does not** enter the thigh within the femoral sheath.



Branches

Anterior Division

The anterior division gives off two cutaneous and two muscular branches.

The cutaneous branches are the medial cutaneous nerve of the thigh and the intermediate cutaneous nerve that supply the skin of the medial and anterior surfaces of the thigh, respectively.

The muscular branches supply the sartorius and the pectineus. However, sometimes the obturator nerve supplies the pectineus.

Posterior Division

The posterior division gives off one cutaneous branch, **the saphenous nerve**, and **muscular branches** to the quadriceps muscle.

The saphenous nerve runs downward and medially and crosses the femoral artery from its lateral to its medial side. It emerges on the medial side of the knee between the tendons of sartorius and gracilis. It then runs down the medial side of the leg in company with the great saphenous vein. It passes in front of the medial malleolus and along the medial border of the foot, where it terminates in the region of the ball of the big toe.

The muscular branch **of the rectus femoris** also supplies the **hip joint.**

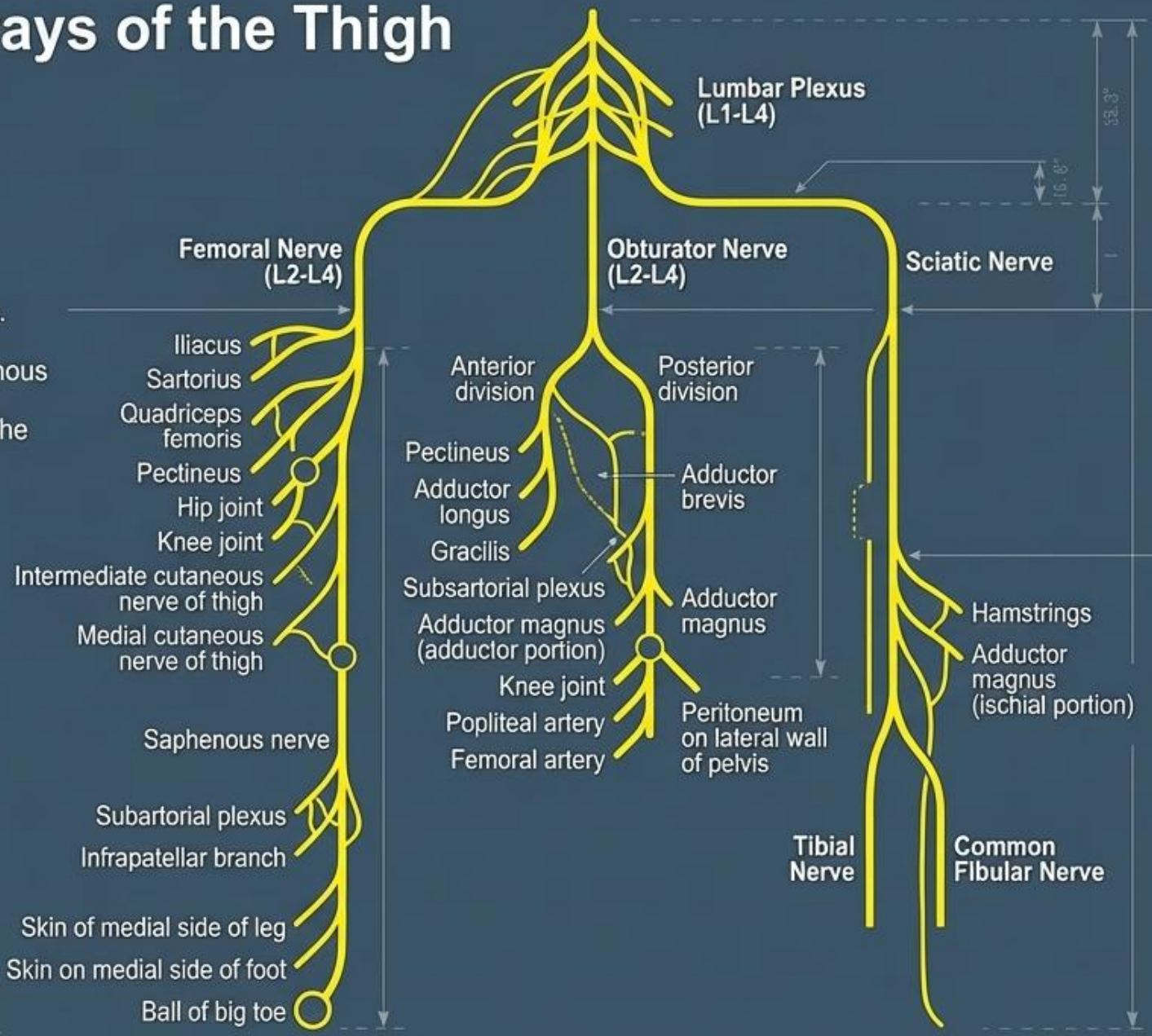
The branches to the three **vasti muscles** also supply the **knee joint.**

Neural Pathways of the Thigh

The Three Pillars

Femoral Nerve (L2-L4)

- **Motor:** Anterior compartment.
- **Cutaneous:** Medial, Intermediate, and the Saphenous Nerve (which tracks with the GSV down the medial leg to the big toe).



Obturator Nerve (L2-L4)

- **Motor:** Medial compartment.
- **Structure:** Splits into Anterior and Posterior divisions around the adductor brevis.

Sciatic Nerve

- **Motor:** Posterior compartment.
- **Structure:** Descends deeply on adductor magnus, splitting into Tibial and Common Fibular nerves before entering the popliteal fossa.

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THANK YOU!