FRONT OF THE THIGH

INTRODUCTION

-The thigh consists of a cylinder of compact bone, the femoral shaft, surrounded by muscle groups traversed by important neurovascular structures.

-It is the part of the lower limb between the hip and knee joint.

-The muscles are grouped according to function and lie within osteofascial compartments that are defined by fascial septa running between the femur and an enveloping tube of thick fascia, the fascia lata.

-The front of thigh corresponds to the back of arm.

-The skin of the thigh distal to the inguinal ligament and gluteal fold is supplied mainly by branches of the femoral and profunda femoris arteries.

-There is some contribution from the obturator, inferior gluteal and popliteal arteries, and from direct cutaneous, musculocutaneous and fascio cutaneous vessels.

-Cutaneous veins are tributaries of vessels that correspond to the named arteries.

-Cutaneous lymphatic drainage is to the superficial inguinal nodes, mainly via collecting trunks accompanying the long saphenous vein.

SOFT TISSUES

Subcutaneous tissue

-The subcutaneous tissue (tela subcutanea) of the thigh and buttock consists, as elsewhere in the limbs, of loose areolar tissue containing a variable quantity of fat.

-In some regions, particularly near the inguinal ligament, it splits into recognizable layers, between which may be found the branches of superficial vessels and nerves.

-It is thick in the inguinal region, where its two layers enclose the superficial inguinal lymph nodes, long saphenous vein and other smaller vessels. Here, the superficial layer is continuous with that of the abdominal fascia.

-The deep layer, a thin fibroelastic stratum, is most marked medial to the long saphenous vein and inferior to the inguinal ligament, and is interposed between the subcutaneous vessels and nerves and the deep fascia, fusing with the latter a little below the ligament.

-This membranous layer of subcutaneous tissue overlies the saphenous opening, blending with its circumference and with the femoral sheath.

-Over the opening, it is perforated by the long saphenous vein, by the superficial branches of the femoral artery other than the superficial circumflex iliac branch(which perforates the fascia lata separately), and lymphatic vessels; hence the term cribriform fascia.

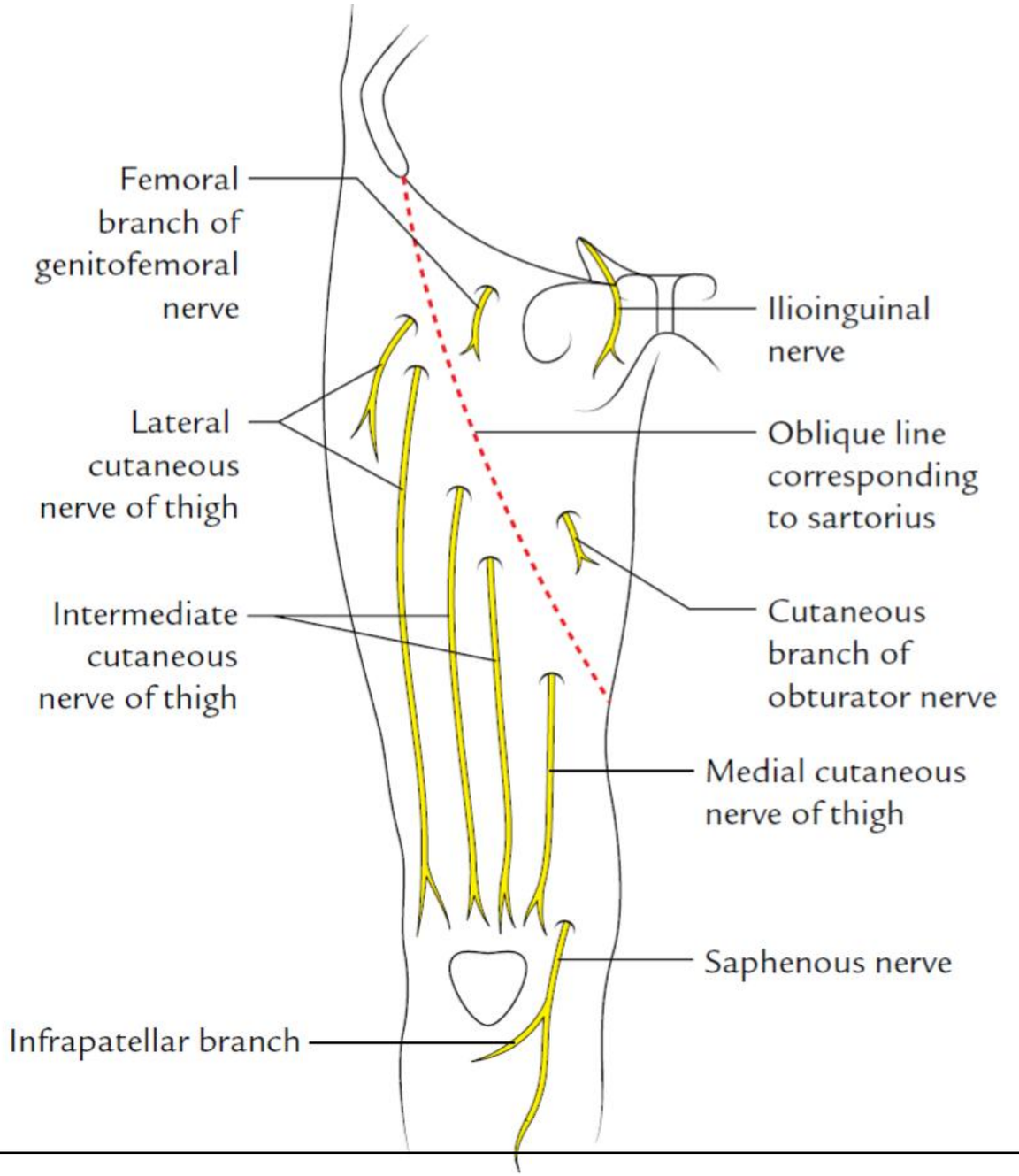
The superficial fascia on the front of the thigh contains:-

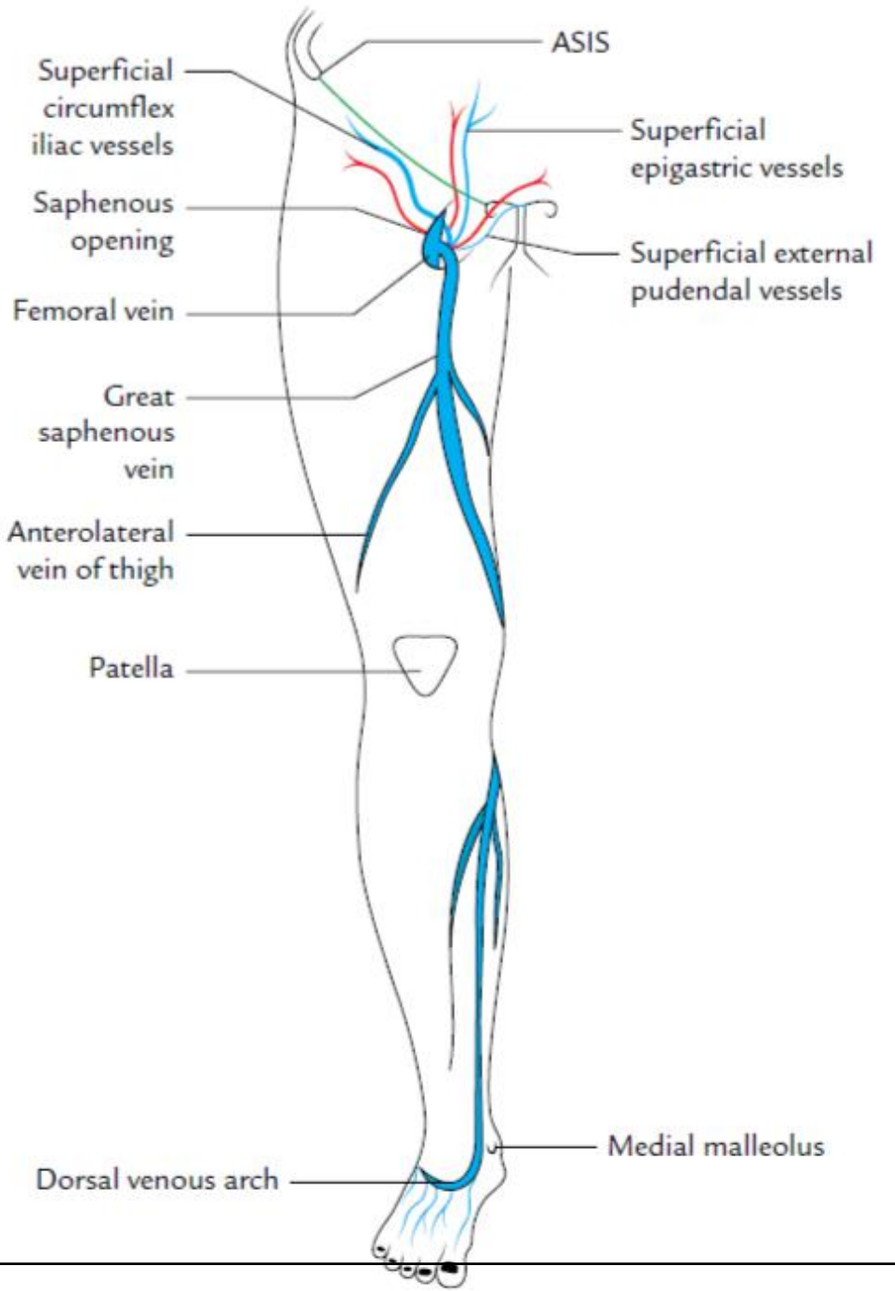
1)Cutaneous nerves

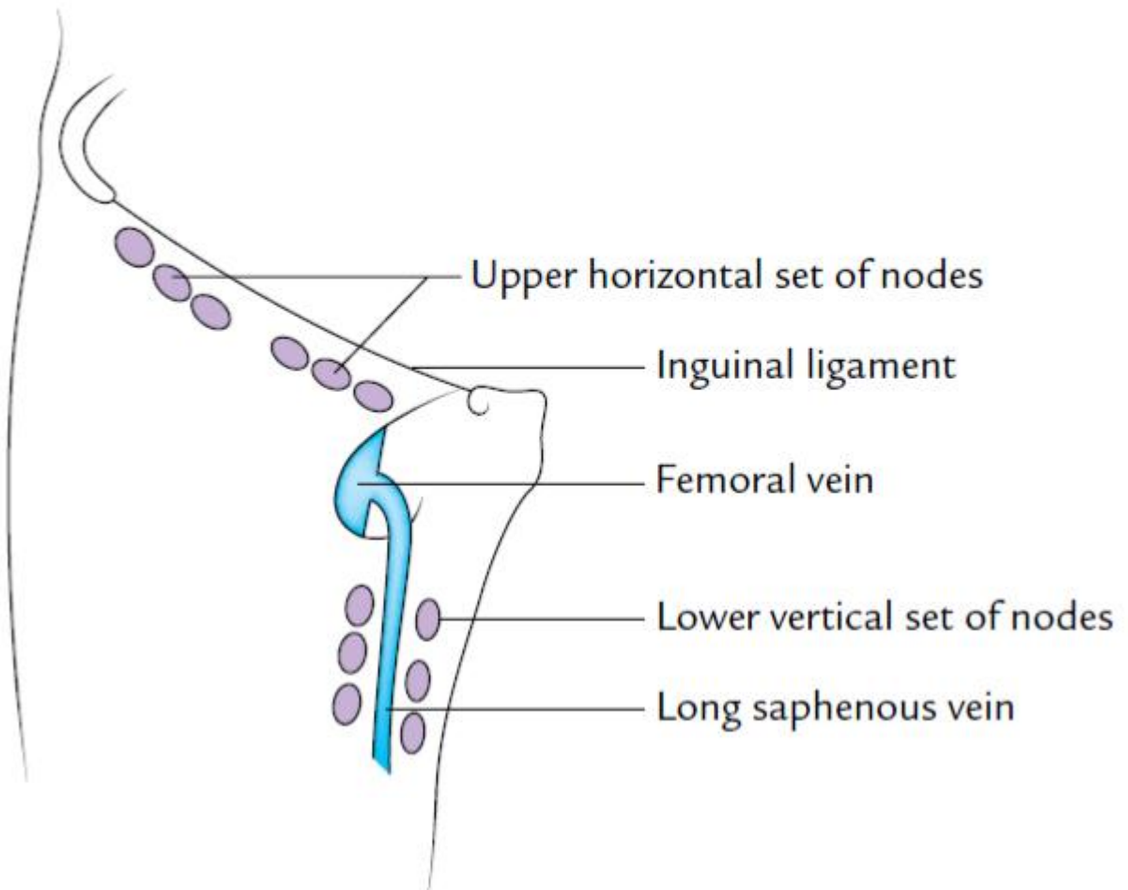
2)Cutaneous arteries

3)Termination of saphenous vein and its tributaries

4)Superficial inguinal lymph nodes







Deep Fascia Of The Thigh

-The deep fascia of the thigh is very strong and envelops the thigh like a sleeve.

-It is called fascia lata because it encloses a wide area of the thigh.

-The fascia lata is thicker in the proximal and lateral parts of the thigh.

-It is thin posteriorly and over the adductor muscles, but thicker around the knee.

-The fascia lata is attached superiorly and posteriorly to the back of the sacrum and coccyx, laterally to the outer margin of the iliac crest, anteriorly to the inguinal ligament and superior ramus of the pubis, and medially to the inferior ramus of the pubis, the ramus and tuberosity of the ischium,and the lower border of the sacrotuberous ligament.

-From the iliac crest,it descends as a dense layer over gluteus medius to the upper border of gluteus maximus, where it splits into two layers, one passing superficial and the other deep to the muscle, the layers reuniting at the lower border of the muscle.

-Inferiorly it is attached on the front and sides of the knee,it is attached to subcutaneous bony prominences and the capsule of the knee joint.

Modifications of Deep Fascia Of The Thigh

-The deep fascia of the thigh presents two modifications:-

1)Iliotibial tract

2)Saphenous opening.

Iliotibial Tract

-Over the flattened lateral surface of the thigh, the fascia lata thickens to form a strong band(2 cm wide),called the iliotibial tract.

-The upper end of the tract splits into two layers, where it encloses and anchors tensor fasciae latae and receives, posteriorly, most of the tendon of gluteus maximus.

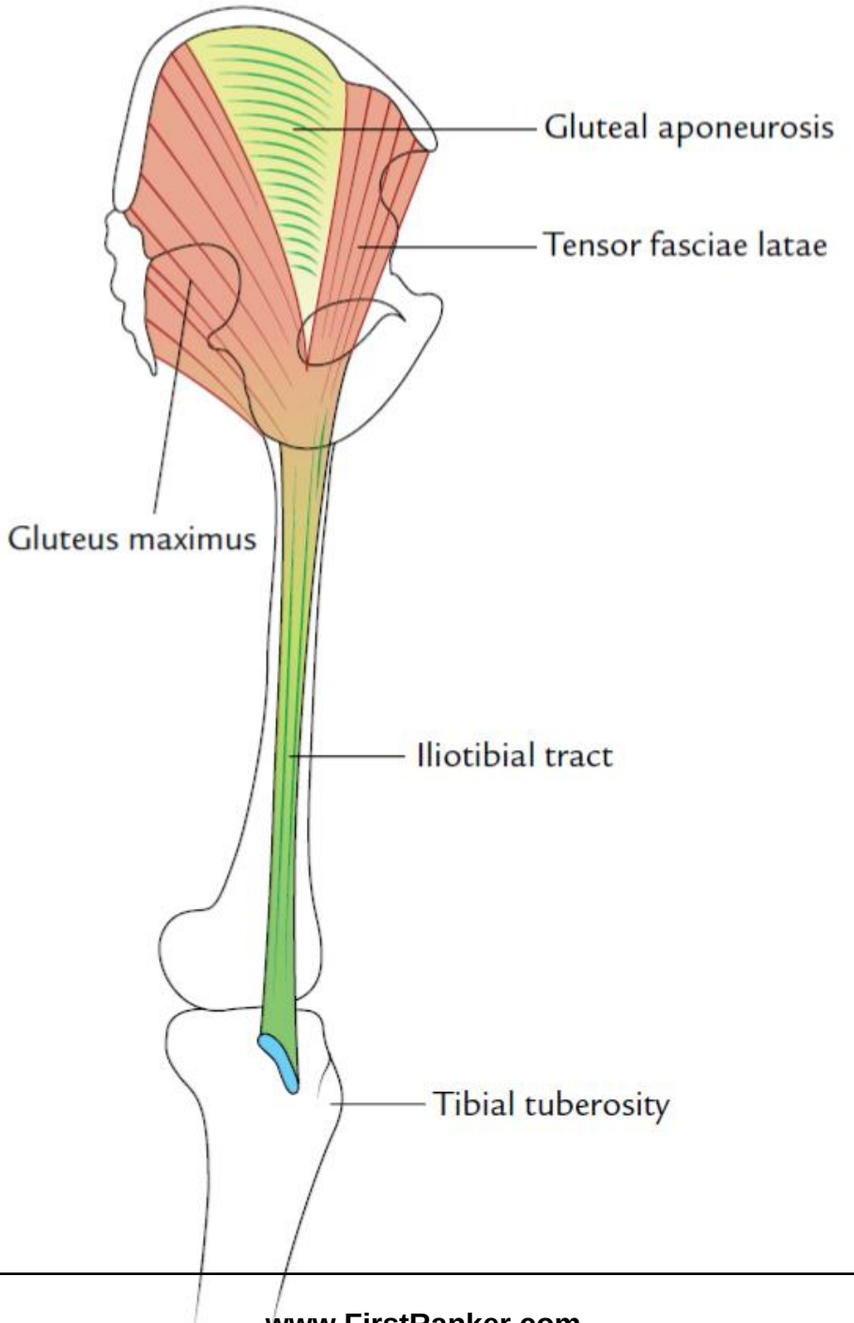
-The superficial layer ascends lateral to tensor fasciae latae to the iliac crest; the deeper layer passes up and medially, deep to the muscle, and blends with the lateral part of the capsule of the hip joint.

-Distally, the iliotibial tract is attached to a smooth, triangular facet (Gerdy's tubercle) on the anterolateral aspect of the lateral condyle of the tibia, where it is superficial to, and blends with, an aponeurotic expansion from vastus lateralis.

-The upper part of iliotibial tract provides insertion to two muscles-the Gluteus maximus(except deep fibres of its lower half) and the Tensor fasciae latae.

-When the knee is extended against resistance, it stands out as a strong, visible ridge on the anterolateral aspect of the thigh and knee.Thus iliotibial tract stabilizies the knee both in extension and in partial flexion,hence it is constantly used in walking and running.

-Distally, the fascia lata is attached to all exposed bony points around the knee joint, such as the condyles of the femur and tibia, and the head of the fibula.



Saphenous opening

-The saphenous opening is an aperture in the deep fascia, inferolateral to the medial end of the inguinal ligament, which allows passage for the long saphenous vein and other smaller vessels.

-The cribriform fascia, which is pierced by these structures, fills in the aperture and must be removed to reveal it.

-Adjacent subsidiary openings may exist to transmit venous tributaries.

-In the adult, the approximate centre of the saphenous opening is 3 cm lateral to a point just distal to the pubic tubercle. The length and width of the opening vary considerably.

-The fascia lata in this part of the thigh displays superficial and deep strata (not to be confused with the superficial and deep layers of the subcutaneous tissue described above).

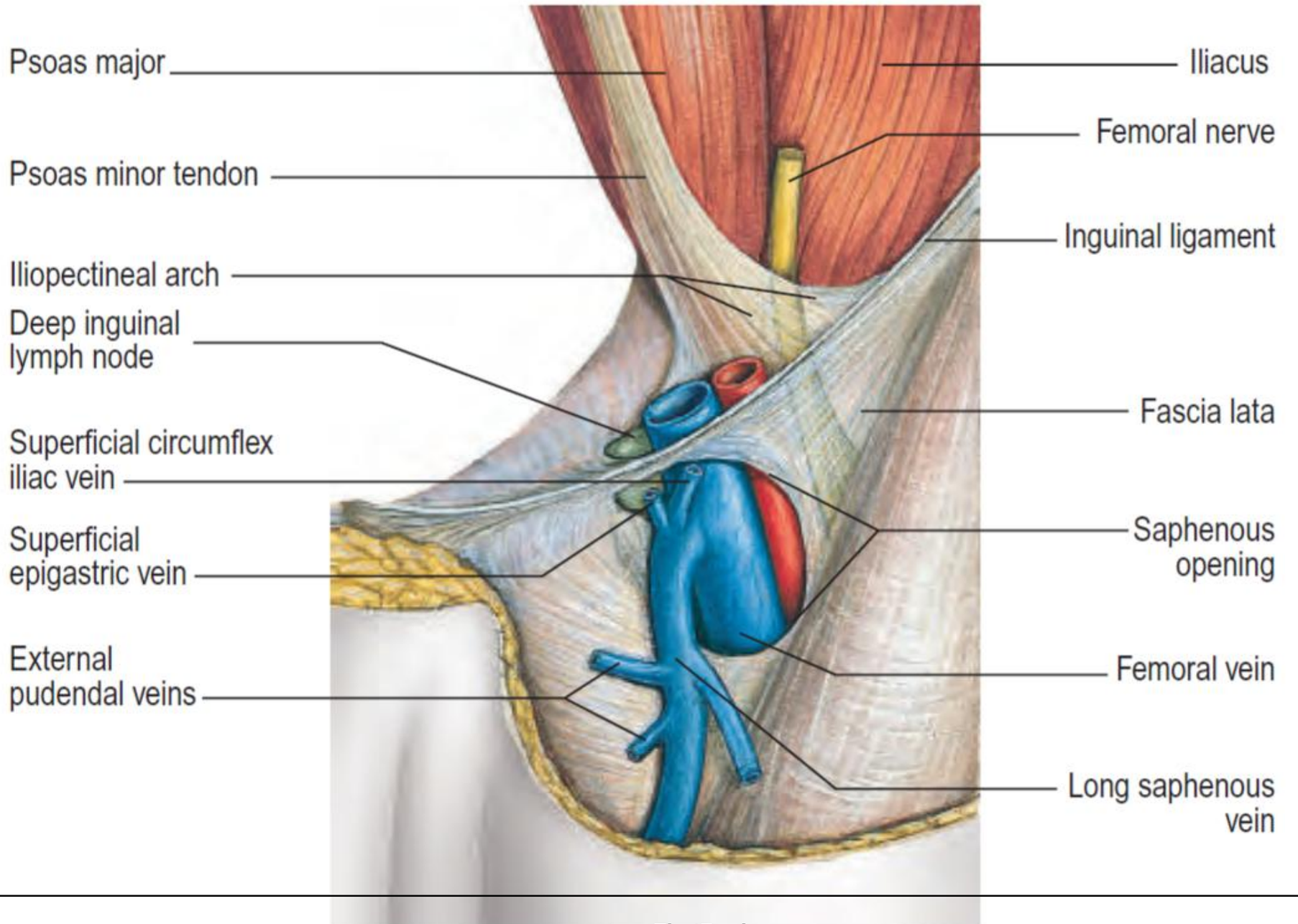
-They lie, respectively, anterior and posterior to the femoral sheath, with the saphenous opening situated where the two layers are in continuity. This serves to explain the somewhat oblique and spiral configuration of the saphenous opening.

-The superficial layer, lateral and superior to the saphenous opening, is attached, in continuity, to the crest and anterior superior spine of the ilium, to the whole length of the inguinal ligament, and to the pecten pubis and lacunar ligament. It is reflected inferolaterally from the pubic tubercle as the arched falciform margin, which forms the superior,lateral and inferior boundaries of the saphenous opening; this margin adheres to the anterior layer of the femoral sheath, and the cribriform fascia is attached to it.

-The falciform margin is considered to have superior and inferior horns. The inferior horn is well defined, and is continuous behind the long saphenous vein with the deep stratum of the fascia lata.

-The deep layer is medial to the saphenous opening and is continuous with the superficial stratum at its lower margin.

-Traced upwards, it covers pectineus, adductor longus and gracilis, passes behind the femoral sheath, with which it blends, and continues to the pecten pubis.



Structures passing through the saphenous opening are as follows:-

1)Great saphenous vein.

2)Superficial epigastric and superficial external pudendal vessels.

3)Few lymph vessels connecting superficial and deep inguinal lymph nodes.

Intermuscular septa

-The deep surface of the fascia lata yields two intermuscular septa, which are attached to the whole of the linea aspera and to its proximal and distal prolongations.

-The lateral septum, thicker and stronger than the medial one, extends from the attachment of gluteus maximus to the lateral femoral condyle; it lies between vastus lateralis in front and the short head of biceps femoris behind, and provides partial attachment for them.

-The medial, thinner and weaker septum lies between vastus medialis and the adductors and pectineus.

-Numerous smaller septa, such as that separating the thigh adductors and flexors, pass between the individual muscles, ensheathing them and sometimes providing partial attachment for their fibre.

Fascial Compartments Of The Thigh

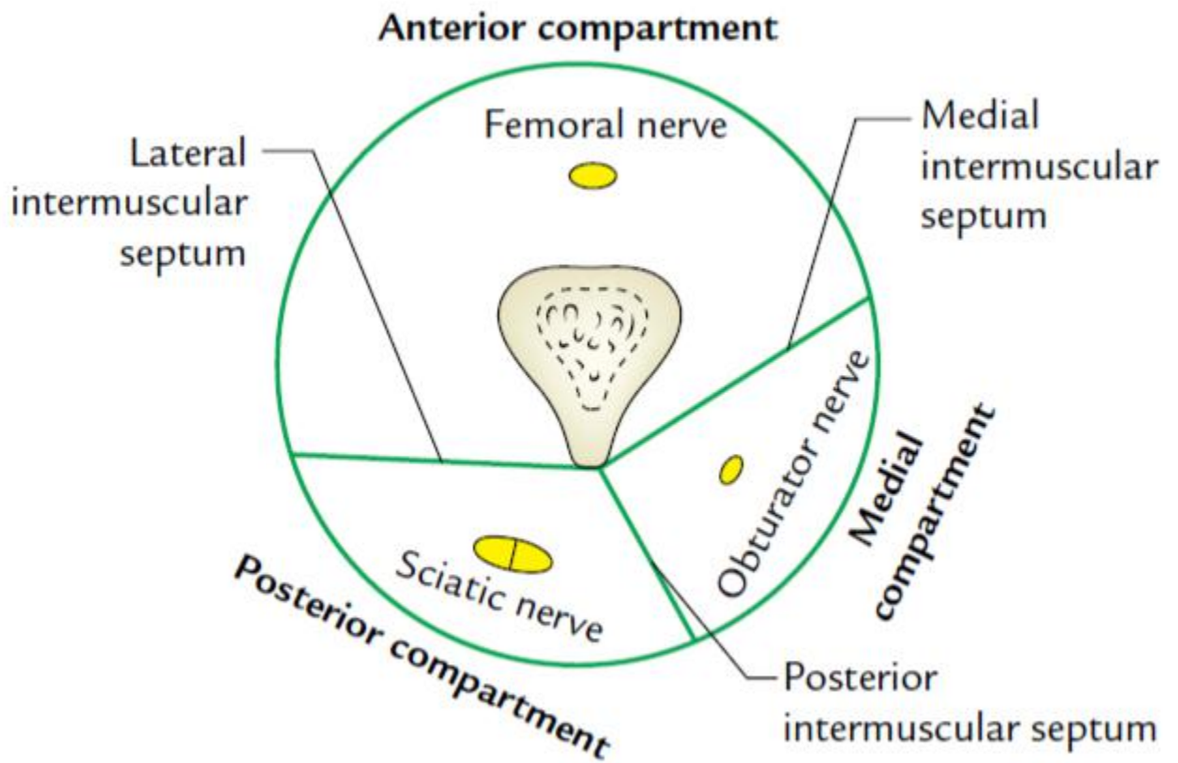
-There are three functional groups of muscle in the thigh: namely, anterior (extensor), posterior (flexor) and medial (adductor).

-The anterior and posterior groups occupy separate osteofascial compartments that are limited peripherally by the fascia lata and separated from each other by the femur and the medial and lateral intermuscular septa .

-The adductor muscles do not possess a separate compartment limited by fascial planes.

-Nevertheless, it is customary to speak of three compartments: anterior, posterior and medial.

-The muscles of the three compartments are described below. Adductor magnus, adductor longus and pectineus could each be considered to be constituents of two compartments,i.e. adductor magnus in the posterior and the medial compartments,and adductor longus and pectineus in the anterior and the medial compartments.



-The nerve supply to the compartments of the thigh mainly follows the ‘one compartment – one nerve’ principle.

-Thus, the femoral nerve supplies the anterior compartment muscles, the obturator nerve supplies the medial compartment muscles, and the sciatic nerve supplies those in the posterior compartment.

-The dual functional and compartmental attribution of adductor magnus, adductor longus and pectineus are reflected in their dual nerve supplies.In contrast to the motor innervation, the arterial supply to the compartmental muscle groups does not exhibit such a direct relationship.

-All groups receive a supply from the femoral system, particularly from the profunda femoris artery and its branches.

-The adductors receive a contribution from the obturator artery, and the hamstrings receive a proximal supply from the inferior gluteal artery. Further details are given in the descriptions of the individual muscles.

MUSCLES OF THE THIGH

-The presence and position of the femoral neck cause the femoral shaft to lie obliquely; consequently, the anterior (extensor) muscle group,quadriceps femoris, runs obliquely distally and medially and so applies a pull to the patella that is both laterally and proximally directed.

-The adductor muscles occupy the region between quadriceps femoris and the medial margin of the thigh. They are attached distally to the posterior surface of the femur and lie more posteriorly than quadriceps femoris.

-The posterior muscle group, the hamstrings, lie behind the adductors. The attachments of these muscles determine the nature and direction of displacement of femoral shaft fractures.

Anterior Compartment Of The Thigh

The extensor compartment of the thigh is bounded laterally by lateral intermuscular septum and medially by medial intermuscular septum.

CONTENTS

1)Muscles

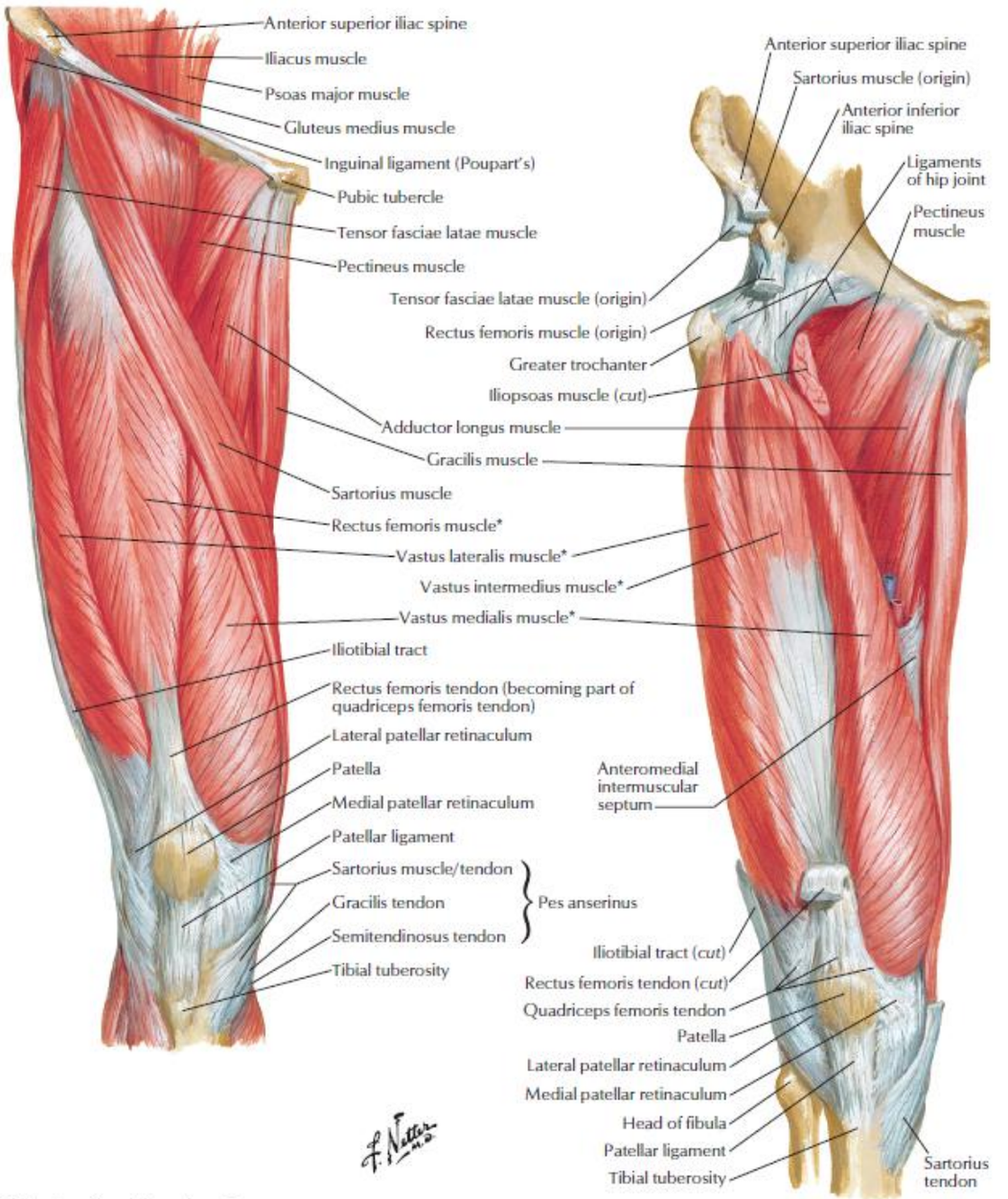
-Quadriceps femoris(Rectus femoris,Vastus lateralis,Vastus medialis and Vastus intermedius),Articularis genu,Sartorius and Tensor fascia latae.

2)Nerve

-Femoral nerve

3)Artery

-Femoral artery



*Muscles of quadriceps femoris

-Sartorius and Rectus femoris,act at both the hip and knee joints, and vasti medialis, lateralis and intermedius, which act only at the knee.

-Articularis genus completes the group: it retracts the synovial capsule of the knee joint.

-Rectus femoris and the vasti extend the knee joint through a common tendon and hence are collectively termed quadriceps femoris.

-Adductor longus and pectineus are sometimes considered to be part of both the anterior and the adductor compartments.

FEMORAL TRIANGLE

-The femoral triangle is a depressed, intermuscular space in the anteromedial aspect of the proximal thigh(upper one third), lying immediately distal to the inguinal ligament .Its apex is directed downward.

BOUNDARIES:

Lateral: Medial border of sartorius.

Medial: Medial border of adductor longus.

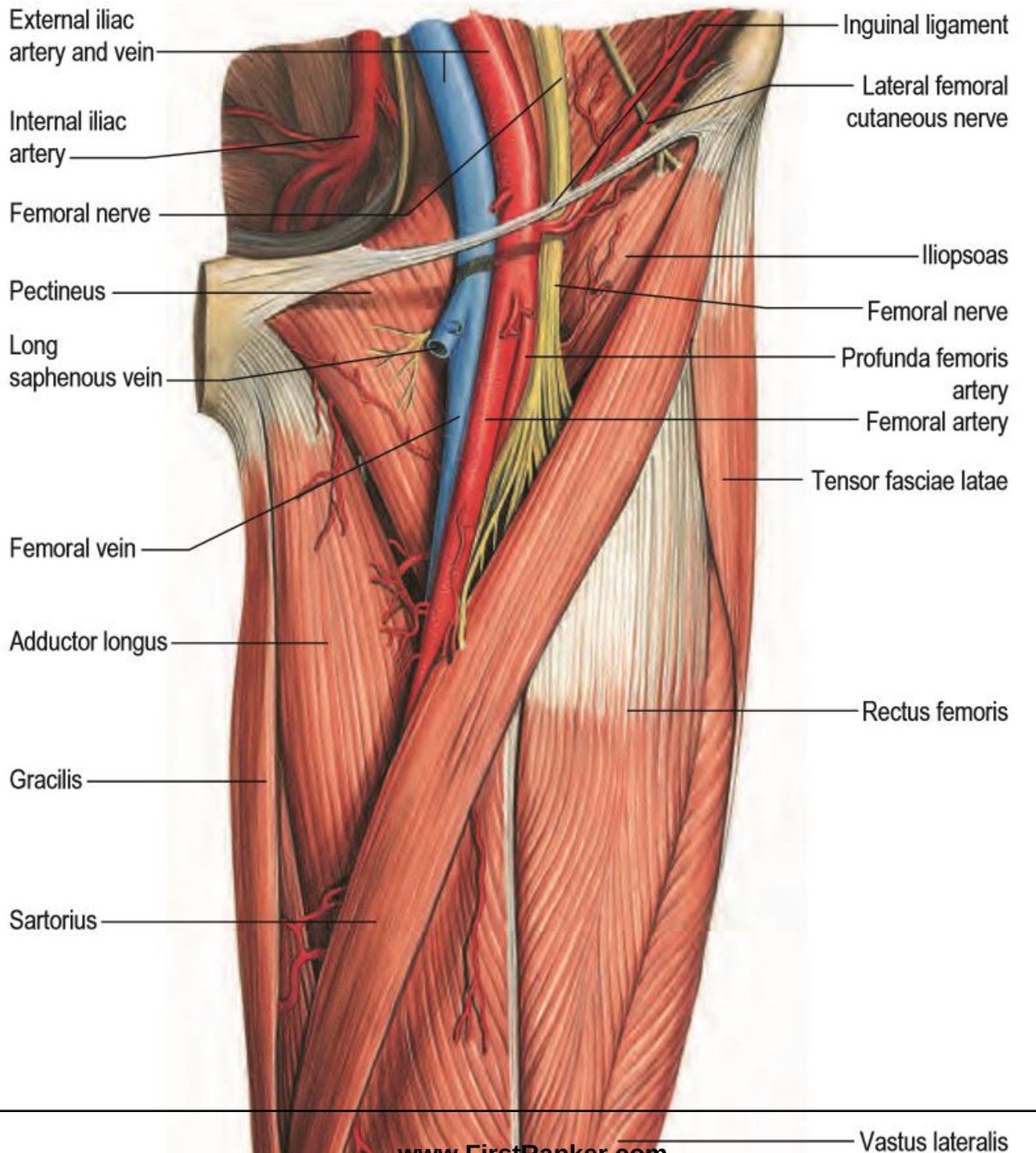
Base: Inguinal ligament.

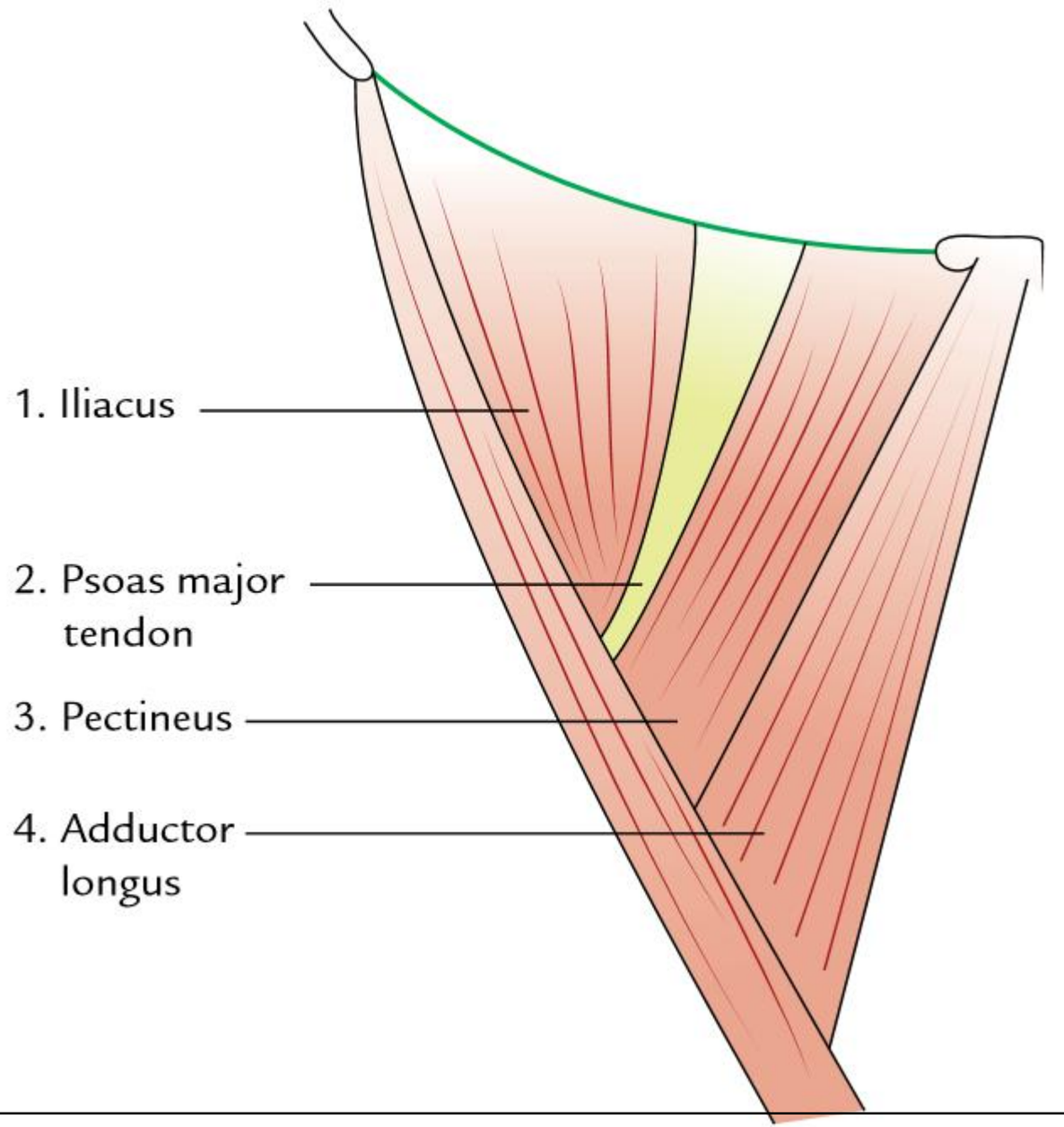
Apex: It is formed by the meeting point of the medial borders of adductor longs and sartorius and it overlaps adductor longus.

Floor: It is gutter-shaped and muscular. Its floor is provided laterally by iliacus and tendon of psoas major, and medially by pectineus and adductor longus.

Roof: It is formed by the fascia lata having saphenous opening.

-The superficial fascia overlying the roof contains superficial branches of the femoral artery and accompanying veins, upper part of great saphenous vein, superficial inguinal lymph nodes, femoral branch of the genitofemoral nerve, and branches of ilioinguinal nerve.





CONTENTS OF FEMORAL TRIANGLE:

1)Femoral artery and its branches.

2)Femoral vein and its tributaries.

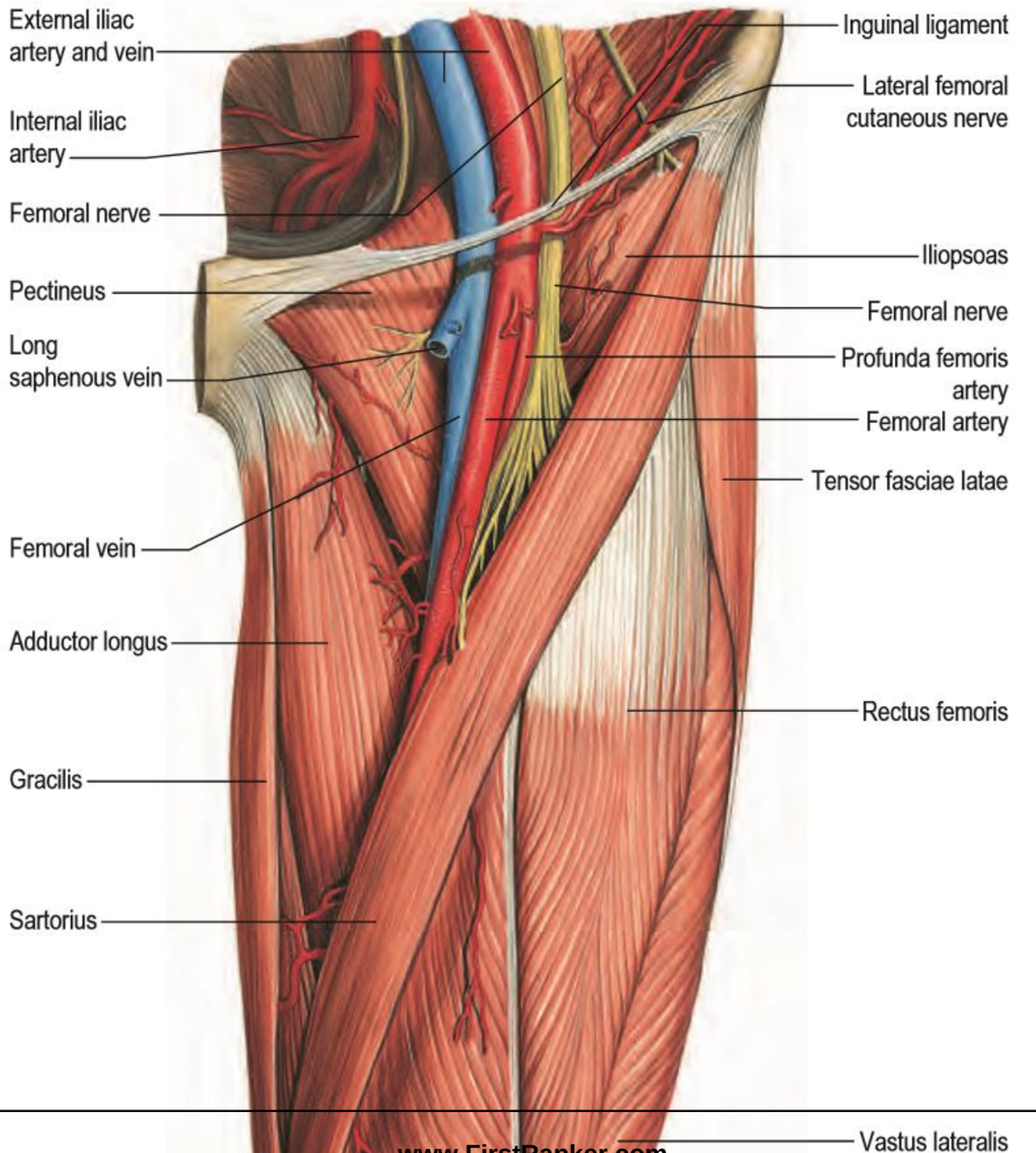
3)Femoral nerve.

4)Deep inguinal lymph nodes.

5)Lateral cutaneous nerve of the thigh.

6)Femoral branch of the genitofemoral nerve.

7)Fibrofatty tissue



FEMORAL ARTERY

-The femoral artery traverses the femoral triangle from the midpoint of its base to the apex.

-The artery passes downward and medially.

-At the base of triangle, it lies lateral to the femoral vein but at its apex it lies anterior to the vein.

-The femoral artery gives three superficial branches (superficial epigastric, superficial circumflex iliac, and superficial external pudendal) and two deep branches (profunda femoris and deep external pudendal).

-The profunda femoris is the largest branch of the femoral artery. It arises from the lateral side of the femoral artery about 3.5 cm below the inguinal ligament and spirals medially behind the femoral vessels.

FEMORAL VEIN

-The femoral vein accompanies the femoral artery.

-The vein is posterior to the femoral artery at the apex and medial to it at the base of the triangle.

-It receives the great saphenous vein and profunda femoris vein and veins corresponding to the superficial branches of femoral artery.

FEMORAL NERVE

-The femoral nerve lies lateral to the femoral artery, outside the femoral sheath, in the groove between the iliacus and the psoas major.

-About 2.5 cm below the inguinal ligament it divides into anterior and posterior divisions which enclose lateral circumflex femoral artery between them.

-The anterior division gives off two cutaneous branches—intermediate and medial cutaneous nerves of the thigh.

-The posterior division gives rise to one cutaneous nerve—the saphenous nerve.

LYMPH NODES

-The deep inguinal lymph nodes are usually three in number and lie medial to the upper part of the femoral vein.

-The lowest one is situated below the junction of great saphenous and femoral veins, the middle one in the femoral canal (the gland of Cloquet/Rosenmüller), and the highest one in the femoral ring.

FEMORAL SHEATH

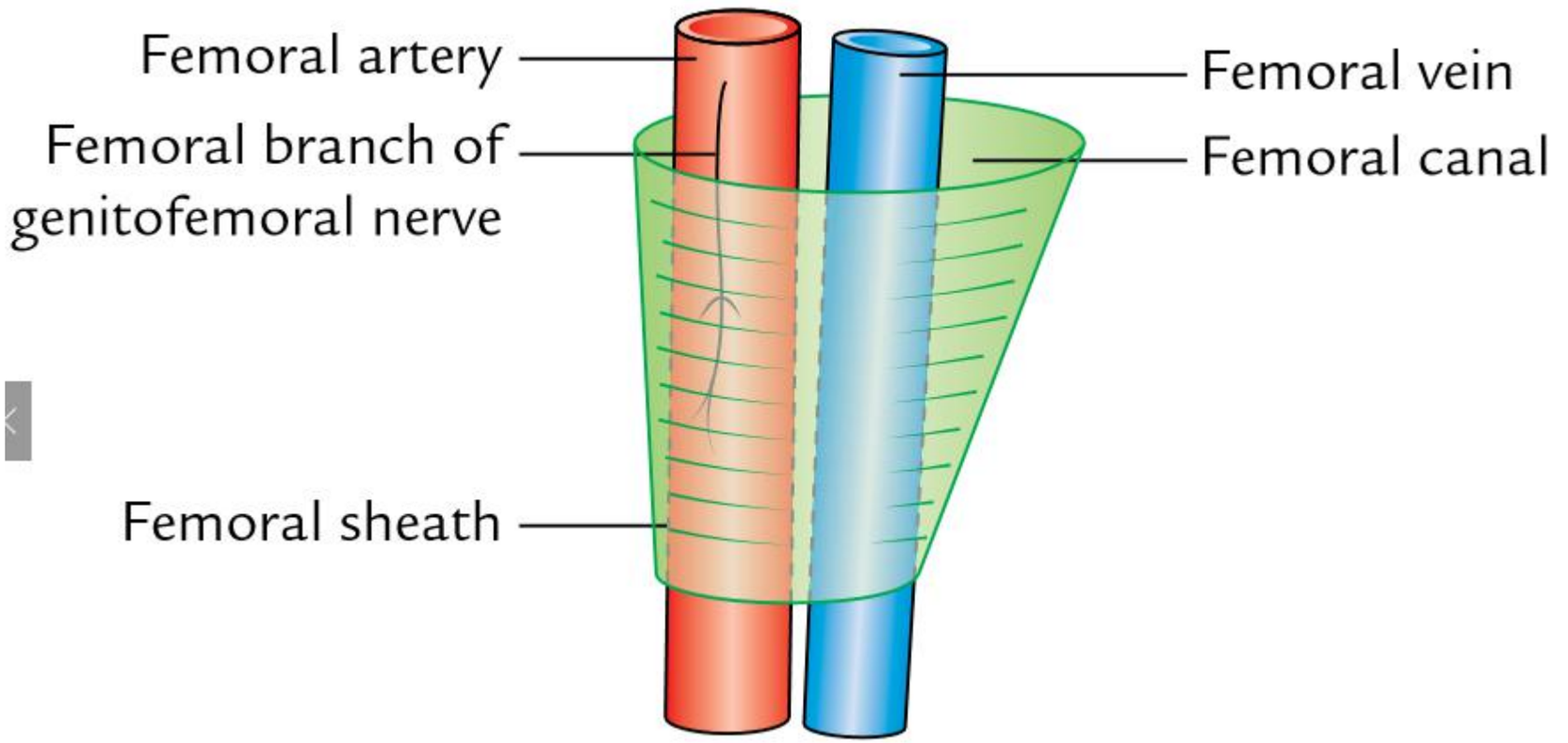
-The femoral sheath is a funnel-shaped distal prolongation of extraperitoneal fascia, formed of transversalis fascia anterior to the femoral vessels, and of the iliac fascia posteriorly.

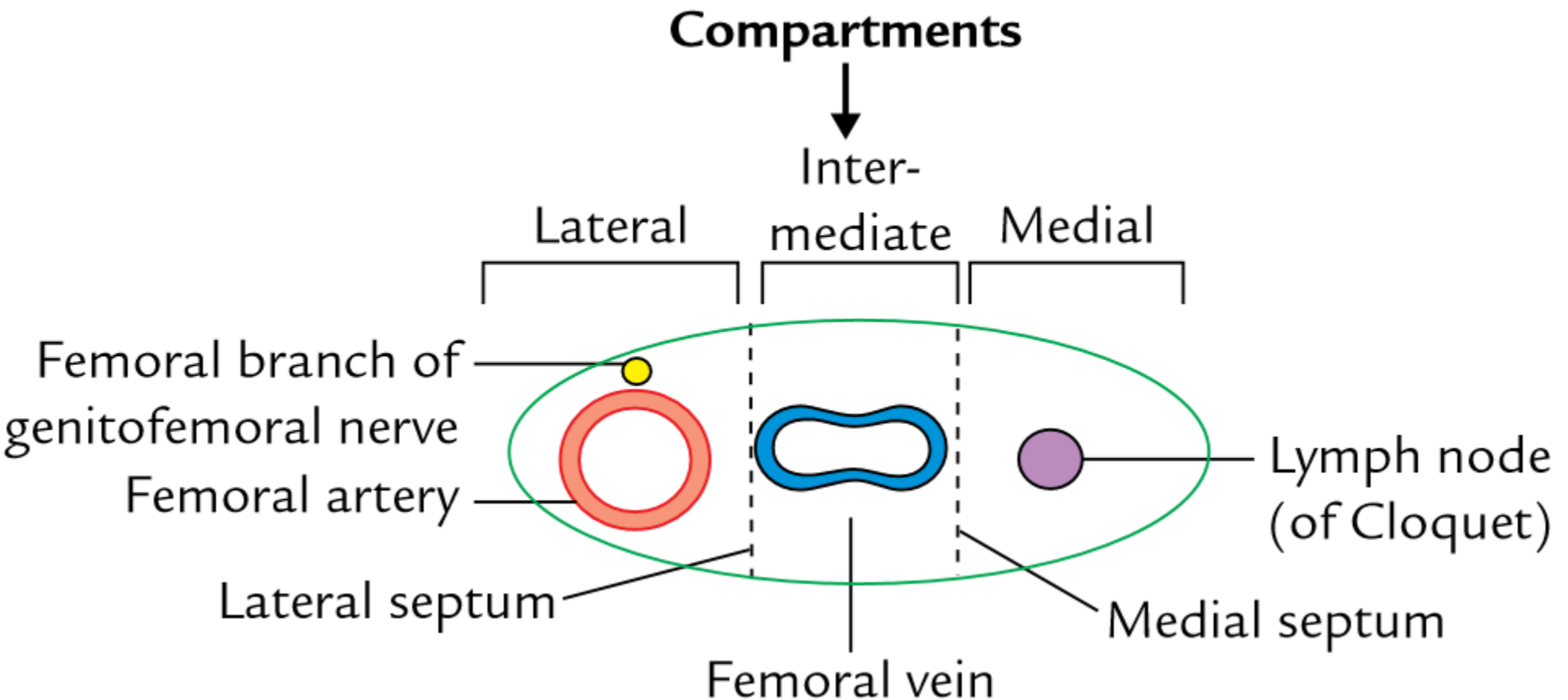
-It is wider proximally and its tapered distal end fuses with the vascular adventitia 3 or 4 cm distal to the inguinal ligament.

-The femoral branch of the genitofemoral nerve perforates its lateral wall.

-The medial wall slopes laterally and is pierced by the long saphenous vein and lymphatic vessels.

- Like the carotid sheath, the femoral sheath encloses a mass of connective tissue in which the vessels are embedded.





The interior of the femoral sheath is divided into three compartments by two anteroposterior fibrous septa:-

1)Lateral compartment containing the femoral artery;

2)Intermediate compartment containing the femoral vein;

3)Medial compartment (the femoral canal) which contains lymph vessels and an occasional lymph node(i.e lymph node of Cloquet/Rosenmuller) embedded in areolar tissue. The presence of this canal allows the femoral vein to distend. The canal is conical and approximately 1.25 cm in length.

- Its proximal (wider) end, termed the femoral ring.

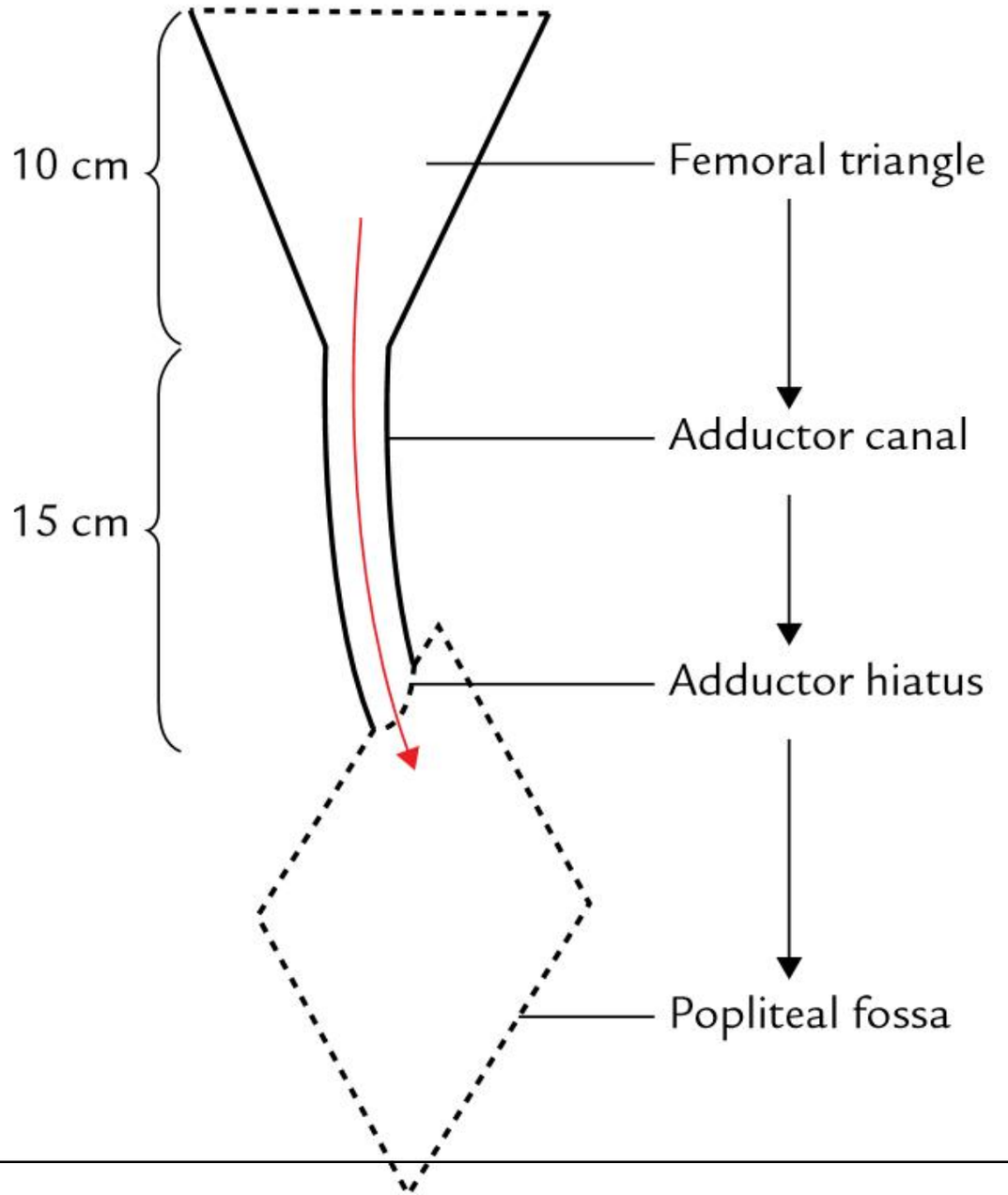
-The ring is filled by condensed extraperitoneal tissue, the femoral septum, which is covered on its proximal aspect by the parietal peritoneum. Numerous lymph vessels that connect the deep inguinal to the external iliac lymph nodes traverse the femoral septum .

ADDUCTOR CANAL (SUBSARTORIAL CANAL/ HUNTER'S CANAL)

-The adductor canal is a trough shaped intermuscular tunnel occupying the distal two-thirds of the medial aspect of the thigh .

-It starts at the apex of the femoral triangle and extends distally as far as the distal attachment of the tendon of adductor magnus.

-It provides passage to the femoral vessels from femoral triangle to the popliteal fossa .



BOUNDARIES

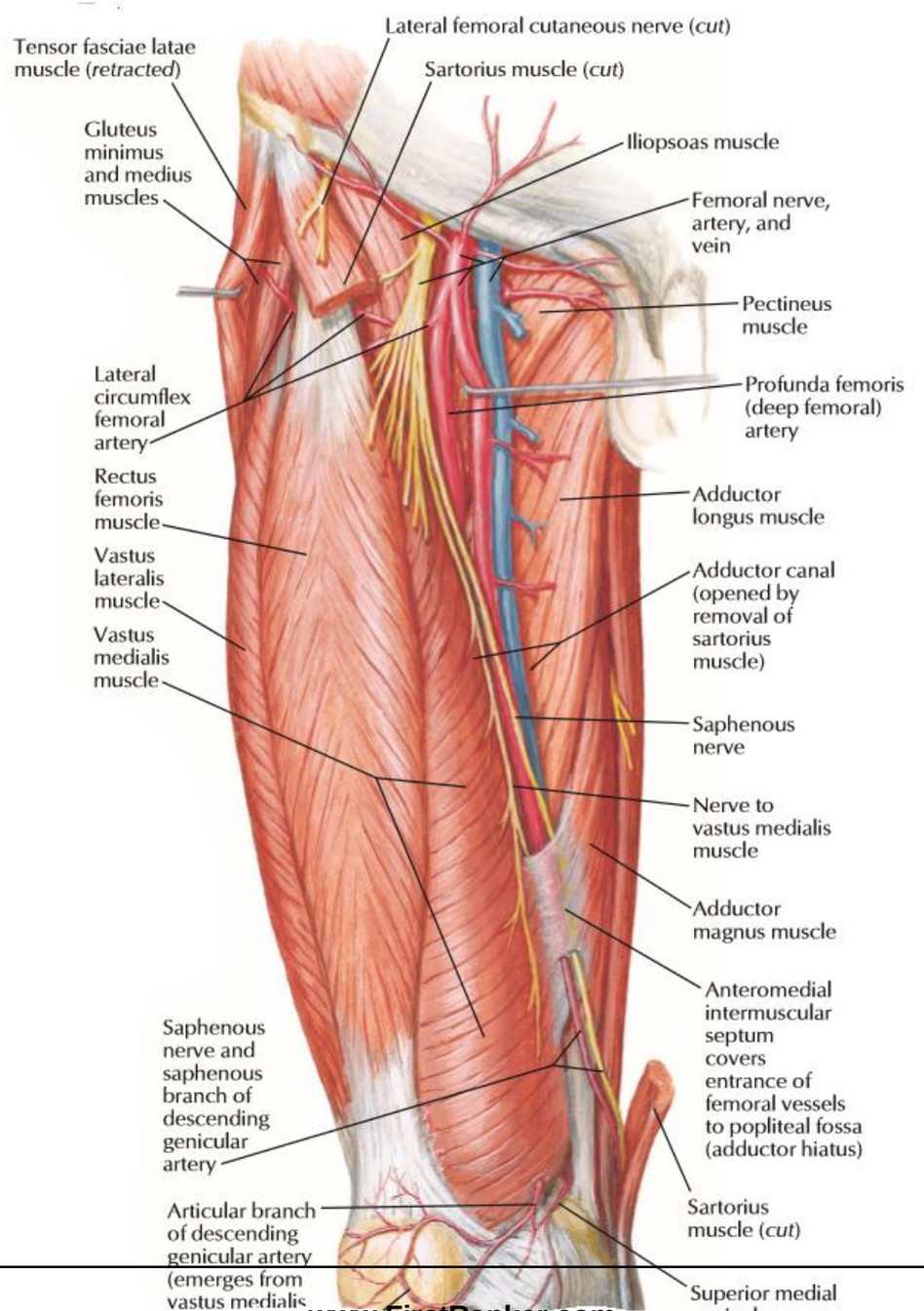
-The adductor canal is triangular in cross section.

Anterolateral wall: It is formed by vastus medialis.

Posterior (floor): It is formed by adductor longus above and adductor magnus below.

Medial (roof): is a strong and dense fascia that extends from the medial surface of vastus medialis to the medial edge of the adductors longus and magnus, overlapping in its stride the femoral vessels in the adductor canal. This fascia, on account of being overlain by sartorius, is termed the subsartorial fascia.

(The subsartorial plexus of nerves lies on the roof underneath the sartorius. The plexus is formed by branches from the medial cutaneous nerve of the thigh, the saphenous nerve, and the anterior division of the obturator nerve. It supplies the overlying fascia lata and the skin).



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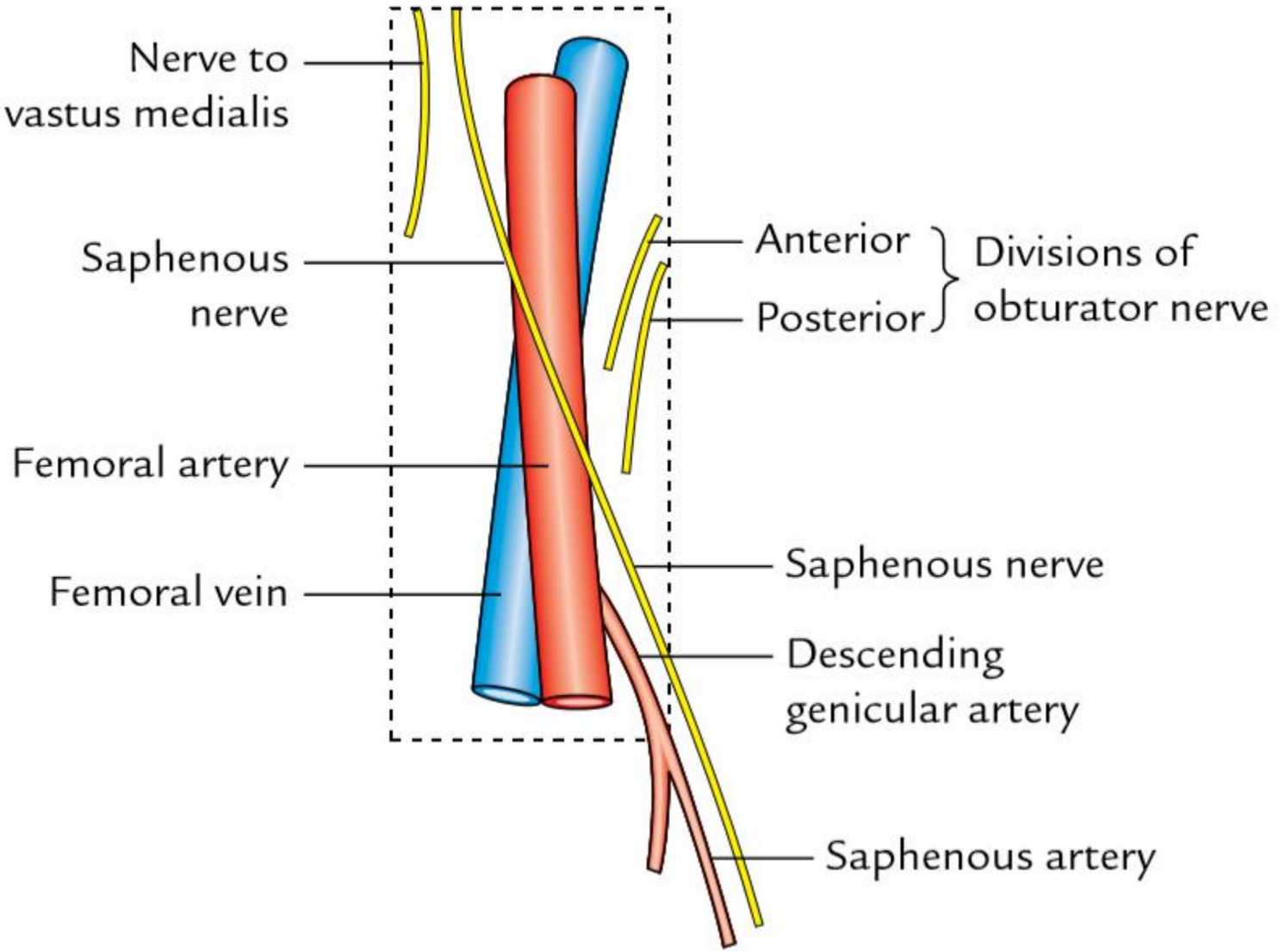


FEMORAL NERVE

-It is the chief nerve of the anterior compartment of the thigh.

-It is the largest branch of the lumbar plexus and arises from the dorsal divisions of the anterior primary rami of L2, L3, L4 nerves.

-It enters the thigh posterior to the inguinal ligament just lateral to the femoral sheath.

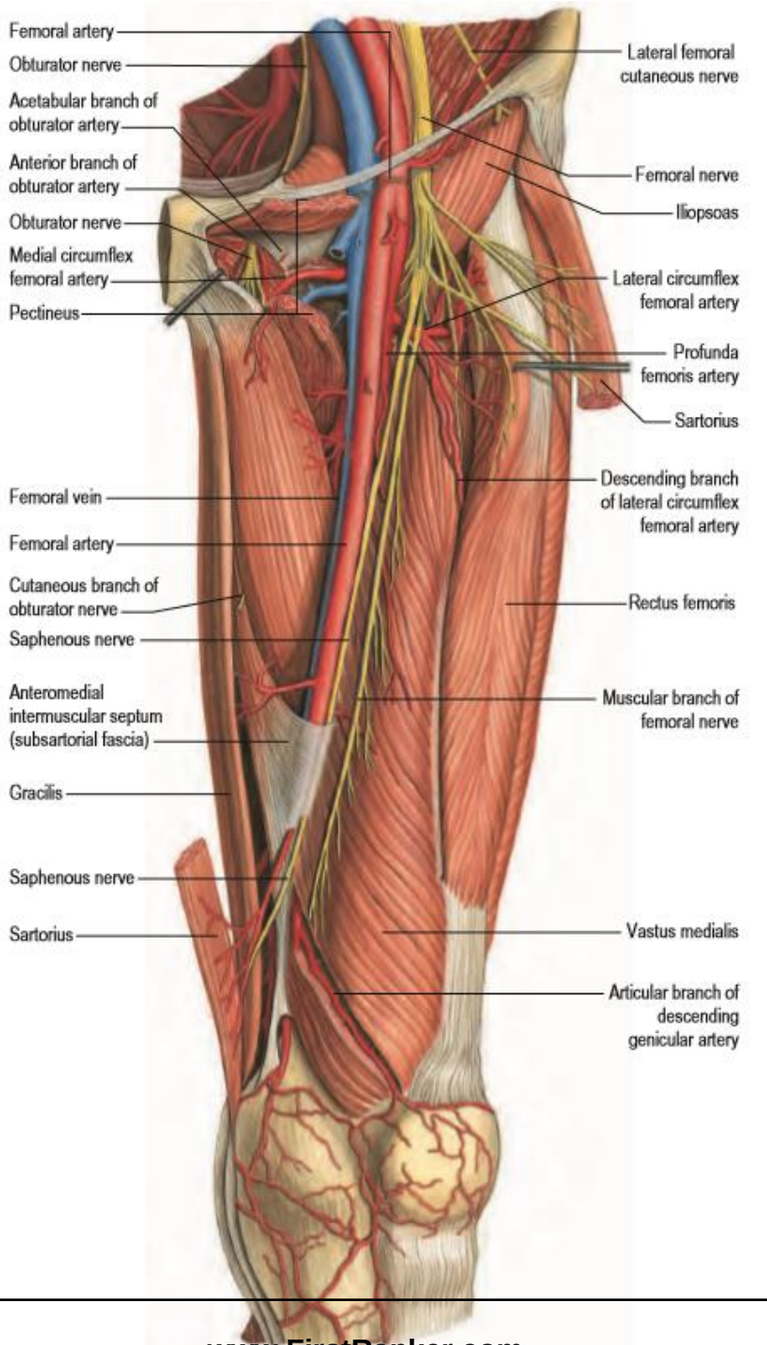
-About 2 cm below the inguinal ligament it divides into anterior and posterior divisions which are separated by the lateral circumflex femoral artery.

Anterior division: It gives off two cutaneous branches and one muscular branch:

1)The cutaneous nerves are: (a) medial cutaneous nerve of the thigh and (b) intermediate cutaneous nerve of the thigh.

2)The muscular branch supplies the sartorius.

Posterior division: It gives off one cutaneous branch, the saphenous nerve, and four muscular branches to supply the quadriceps femoris.



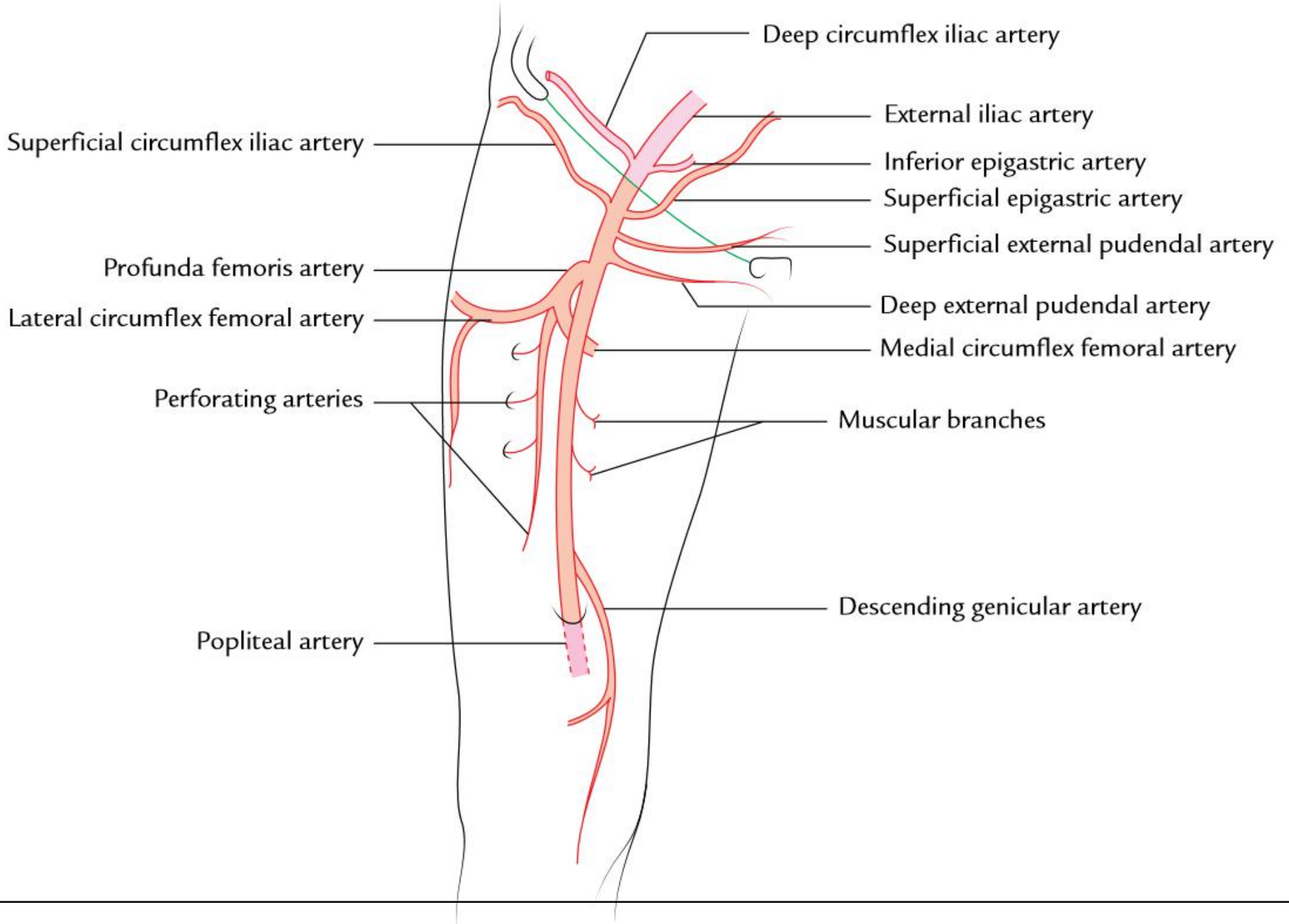
FEMORAL ARTERY

-It is the chief artery of the lower limb.

-It is the continuation of external iliac artery and enters the femoral triangle behind the inguinal ligament at the midinguinal point.

-It runs downward and medially successively through the femoral triangle and adductor canal.

-At the lower end of the adductor canal (i.e., at the junction of middle one-third and lower one-third of the thigh), it leaves the thigh through the adductor hiatus (a tendinous opening in the adductor magnus) to enter the popliteal fossa where it continues as the popliteal artery.



BRANCHES

In the femoral triangle:

1)Three superficial branches: Superficial epigastric artery, superficial external pudendal artery, and superficial circumflex iliac artery.

2)Three deep branches: Profunda femoris artery, deep external pudendal artery, and muscular branches.

In the adductor canal:

1)Muscular branches.

2)Descending genicular artery.

FEMORAL VEIN

-The femoral vein is the upward continuation of the popliteal vein at the adductor hiatus.

-Thus, it begins at the lower end of the adductor canal, ascends in adductor canal, and enters the femoral triangle, where after traversing the intermediate compartment of the femoral sheath it continues as the external iliac vein behind the inguinal ligament medial to the midinguinal point.

Tributaries

1.Great saphenous vein (longest tributary).

2. Profunda femoris vein.

3. Medial and lateral circumflex femoral veins.

4. Deep external pudendal vein.

5. Direct muscular tributaries.

THANK YOU….