

LOWER Limb

Gluteal Region OR Buttock

Bounded

Superiorly $\rightarrow$ By iliac crest

Inferiorly $\rightarrow$ By fold of buttock

The Region is largely made up of Gluteal Muscles and thick layer of superficial fascia.

① Bones of The Gluteal Region:

Hip Bone

Ilium, Ischium, Pubis form

The hip Bone. They meet one another at the acetabulum.

Femur

• Articulates above With Acetabulum

$\rightarrow$ form The hip joint

• Articulates below With tibia and

patella $\rightarrow$ form The knee joint

Fractures of neck of femur are common and cause Avascular Necrosis of the head of femur $\rightarrow$ resulting in severe

• Excruciating Pain in hip and Gluteal Region

• Unable to Walk

of femur And Cup-shaped Acetabulum of hip Bone

Articular Surfaces are Covered with Hyaline Cartilage.

- Type Synovial Ball-and-Socket Joint
- Movements Has a Wide Range of movements
 - Flexion ^{Performed}
 - Extension ^{Mainly By Gluteus Maximus}
 - Abduction
 - Adduction
 - Lateral Rotation
 - Medial Rotation
 - Circumduction
- Anastomosis Around Hip Joint ****

Trochanteric Anastomosis

- Provides Main Blood Supply to head of the femur.
- Arteries pass along the femoral Neck beneath the Capsule
- Arteries take part in Anastomosis
 - Superior gluteal, Inferior gluteal Artery
 - Medial femoral Circumflex Artery,
 - Lateral femoral Circumflex Artery

Cruciate Anastomosis

- Situated at the level of lesser trochanter of femur
- Together with trochanteric Anastomosis provides a connection b/w Internal Iliac and femoral Arteries
- Arteries take part
 - Inferior gluteal Artery
 - Medial femoral Circumflex Artery
 - Lateral femoral Circumflex Artery
 - 1st perforating Artery $\rightarrow$ Branch of profunda Artery

Femoral Neck fractures Interfere with and completely interrupt the blood supply from Root of femoral Neck to femoral Head.
Avascular Necrosis of femur head.

Superior Gluteal, Inferior Gluteal Arteries
Branches of Internal Iliac Artery

Most of the blood supply to femur head arising mostly from Medial femoral Circumflex Artery.

• Sacrospinous Ligament

Connects the back of Sacrum to the Ischial Tuberosity

• Sacrospinous Ligament

Connects the back of Sacrum to the Spine of Ischium

The function of these Ligaments is to stabilize the Sacrum, prevent its rotation at Sacroiliac Joint by weight of Vertebral Column.

④ Foramina of the Gluteal Region:

• Greater Sciatic foramen

- formed by the Greater Sciatic Notch of hip bone and Sacrotuberous, Sacrospinous Ligaments
- provides Exit from pelvis into Gluteal region
- Structures exit the foramen
 - Piriformis
 - Sciatic Nerve
 - Posterior Cutaneous Nerve of Thigh
 - Superior and Inferior gluteal Nerves
 - Nerves to Obturator Internus and Quadratus femoris
 - Pudendal Nerve / Supplies Structures in the perineum

• Lesser Sciatic Foramen

- formed by the lesser sciatic notch of hip bone and Sacrospinous, Sacrotuberous Ligaments.
- Provides an Entrance into perineum from gluteal Region
- Structures pass Through Foramen
 - Tendon of Obturator Internus M
 - Nerve to Obturator Internus
 - pudendal Nerve
 - Internal pudendal Artery and Vein

⑤ Muscles of Gluteal Region:

- Gluteus Maximus → Largest M in the body
 - Main Extensor and laterally Rotator of hip joint
 - Extends Knee joint
 - Help in Climbing up of Stairs and in standing from sitting position

Nerve Supply → Inferior gluteal Nerve/L

↓
When Injured

- Weakened Hip Extension
- Difficulty rising from a sitting or Climbing Stairs

Gluteus maximus ideal for I/M injection.
 Inj. should be given well forward on
 upper Outer Quadrant of the buttock,
 To avoid injury to underlying Sciatic Nerve

Sciatic Nerve

- Branch of Sacral plexus / L_4, L_5, S_1, S_2, S_3
- Largest Nerve In The Body
- Consist of Tibial and Common peroneal Nerves bound together w/ fascia
- Usually gives no branches in The gluteal Region

Gluteus Medius, Gluteus Minimus:

- Abducts Thigh at Hip Joint
- Tilts pelvis when Walking to permit opposite leg to clear ground / Stabilizers of pelvis during Walk
- Medial Rotators of Thigh at hip Joint

Nerve Supply $\longrightarrow$ Superior Gluteal Nerve / L_4, L_5, S_1
 $\downarrow$
 When Injured / damaged
 $\downarrow$
 Paralysis of Gluteus medius, Minimus

Presentation • Waddling Gait
"Trendelenburg's Sign" / Gait

- Weakness of / in Abduction of Hip

$\longrightarrow$ Patient Cannot Keep pelvis level when Standing on one leg

Superficial Veins

Great and Small Saphenous Veins

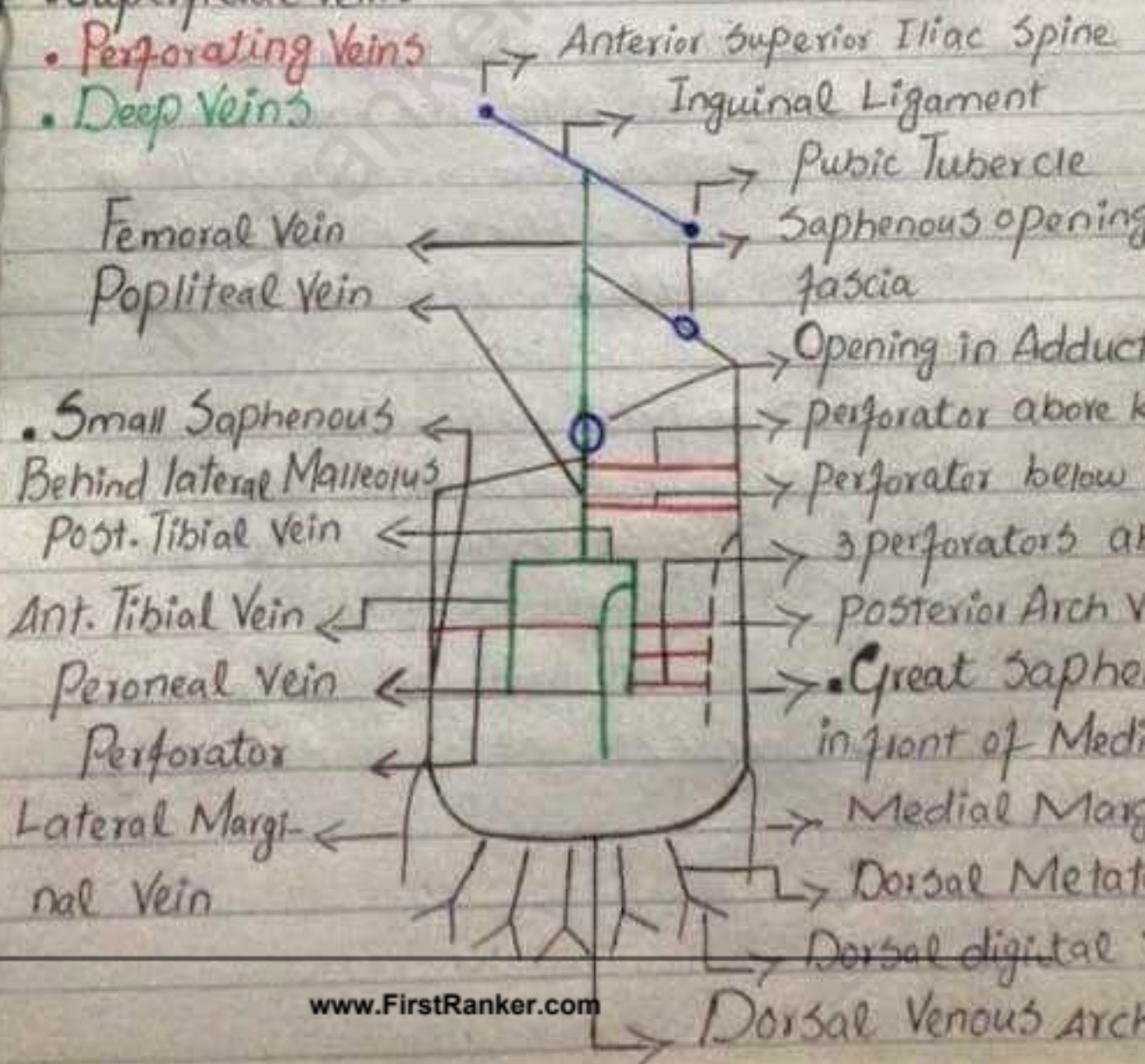
Deep VeinsAnterior and posterior Tibial Veins
Popliteal Vein
Femoral VeinPerforating Veins

Communicating Vessels that run between superficial and deep veins. They possess valves that are arranged to prevent the flow of blood from deep to superficial veins / Varicose Veins

• Superficial Veins

• Perforating Veins

• Deep Veins



Commonly Occurs In The Superficial Veins of lower limb. Varicose Veins have many Causes Including

- Hereditary Weakness of Vein Walls
- Incompetent Valves of perforating Vein
- Elevated Intraabdominal pressure
D/T Multiple pregnancies,
Abdominal tumors
- Thrombophlebitis of deep Veins

Arterial Supply Of Lower Limb:

• Femoral Artery

Origin → Continuation of External iliac Artery at Mid-Inguinal Point

Location → Anterior Compartment of Thigh

Termination → At Adductor Hiatus in Adductor Magnus Muscle

Branches →

- Superficial
- Superficial Circumflex Artery
- Superficial epigastric Artery
- Superficial external pudendal

Deep

- Profunda femoris / large Artery
- Deep external pudendal Artery

- Branches:
- Medial femoral Circumflex Artery → Supply
 - Head of femur and
 - Gives off Muscular branches in Medial Compartment of Thigh
 - Lateral femoral Circumflex Artery →
 - Perforating Arteries (four) → Supplies Posterior Compartment of Thigh

• Popliteal Artery

- Origin → Continuation of femoral Artery at Adductor hiatus in Adductor Magnus Muscle
- Location → Popliteal fossa
- Termination → At the level of lower border of popliteus Muscle by dividing into Anterior and posterior Tibial Arteries
- Supplies → Knee Joint

• Anterior Tibial Artery

Smaller Terminal Branch of popliteal Artery

- Location → Ant. Compartment of leg / Courses with deep peroneal Nerve in Ant. Compartment of leg

Termination → terminated as Dorsalis Pedis Artery

pedis Artery → pulse on
Dorsum of foot lateral to extensor
hallucis longus Tendon; used to
note quality of blood supply to foot.

• Posterior Tibial Artery

Larger Terminal Branch of popliteal Artery

Location → Courses with tibial Nerve
in posterior Compartment of
leg. Passes Post. to Medial Malleolus

Termination → Terminated by dividing
into Medial and lateral
plantar Arteries

Branches → • Fibular Artery → supply
lateral Compartment of leg
• Plantar Arterial Arch
• Medial plantar Artery
• Lateral plantar Artery

→ Great Saphenous Vein
Used for Coronary
Artery Bypass Surgery.

• The iliac Crest → useful
Landmark in determining
The proper location for
a spinal tap.

Lymphatics

- Superficial runs along Superficial Veins
- Deep runs along Deep Veins

Lymph Nodes

Left lumbar trunk

Cysterni Chyli →

Left Lumbar Nodes

Left Sub

Common Iliac lymph Nodes

External Iliac lymph Nodes

* Lymphatics of Glans Penis Drains into Deep
Deep Inguinal Lymph Node

Superficial Inguinal
Lymph Node

Popliteal
Lymph Node

• Superficial Horizontal

Receive Superficial
 Lymph Vessels from

- Anterior Abd wall
- below the level of
- Umbilicus

• Vertical

Receive Superficial
 lymph vessels from

- Buttock
- Thigh
- Medial side of leg
- Dorsal Foot

Receive Superficial
 Lymph Vessels

Next Page

- ↓
- Perineum
 - Urethra
 - External genitalia of Both Sex / except testes and Glans penis

External Genitalia

→ Skin of penis
→ Scrotum
→ Lower $\frac{1}{3}$ rd of Vagina

- Anal canal below pectinate line / Distal $\frac{1}{3}$ rd of anal canal
 - Back below the level of Iliac crests (lateral Nodes of Horizontal Group)
- * Testes lymphatics Drains into Para Aortic Lymph Nodes.

iliohypogastric Nerve

ilioinguinal Nerve

Genitofemoral Nerve (L₂, L₃)

Lateral femoral
Cutaneous Nerve
of Thigh / L₂, L₃

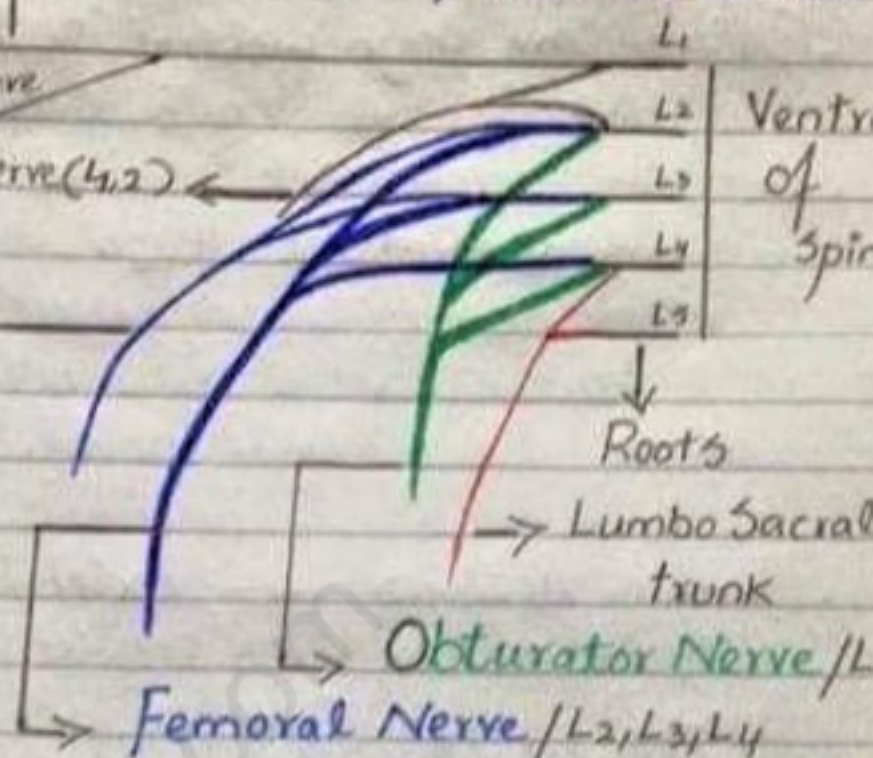
- Located Behind lateral end of Inguinal ligament
- Supply Skin of lateral aspect of Thigh

Clinical Importance

Compressed during pregnancy due to change in posture

features → Numbness, paresthesia, tingling sensation on lateral aspect of Thigh

Anterior Division
Posterior Division



• Total 31 Spinal Nerve

C₁ Spinal Nerve → Pure Motor, L₁ spinal Nerve → Sensory and Remaining 29 Spinal Nerves are Mixed Nerves.

- Posterior Branch of lumbar plexus (L2, 3, 4)
- Enters The Thigh Lateral to femoral Artery and femoral Sheath, behind Inguinal lig
 - Supplies All The Muscles of Anterior Compartment of Thigh

Note That femoral Nerve does not enter The Thigh Within The femoral Sheath.

- Primary Actions $\rightarrow$ Extend Knee

Muscles Of Ant. Compartment Of Thigh:

• IlioPsoas Muscle

Main Flexor of thigh at hip Joint

• Sartorius Muscle

• All Muscles Innervated by Femoral Nerve

• Pectineus Muscle

• All Muscles are Flexors of Thigh at Hip Joint

• Quadriceps Femoris

4 Muscles

Rectus femoris

Vastus Medialis

|| Intermedius

|| Lateralis

Femoral Nerve Injury →

- Weakened hip Flexion
- Weakened Knee Extension
- Sensory loss on anterior Thigh, Medial foot

Obturator Nerve:

- Branch of Lumbar plexus (L2, 3, 4) Anterior Division
- Supplies Muscles of Medial Compartment of Thigh
- Primary Actions → Adduct Thigh, Medial Rotate Thigh

Muscles of Medial Compartment Of Thigh:

- Gracilis
- Adductor Longus
- Adductor Brevi
- Adductor Magnus
 - Adductor portion
 - Hamstring portion
- Obturator Externus

- All Muscles are Adductors of Thigh at Hip Joint Except

- Sensory loss on Medial thigh

Femoral Triangle

A depression below the fold of the Groin
in the upper part of Thigh

Boundaries:

- Base $\longrightarrow$ Inguinal ligament
- Lateral Border $\longrightarrow$ Sartorius Muscle
- Medial Border $\longrightarrow$ Adductor Longus Muscle
- Apex $\longrightarrow$ Downward & Medially
- Roof $\longrightarrow$ Skin, Superficial and Deep fascia
- Floor $\longrightarrow$ Muscles (Medial to Lateral)
 - Adductor Longus
 - Pectineus
 - Iliopsoas

Contents:

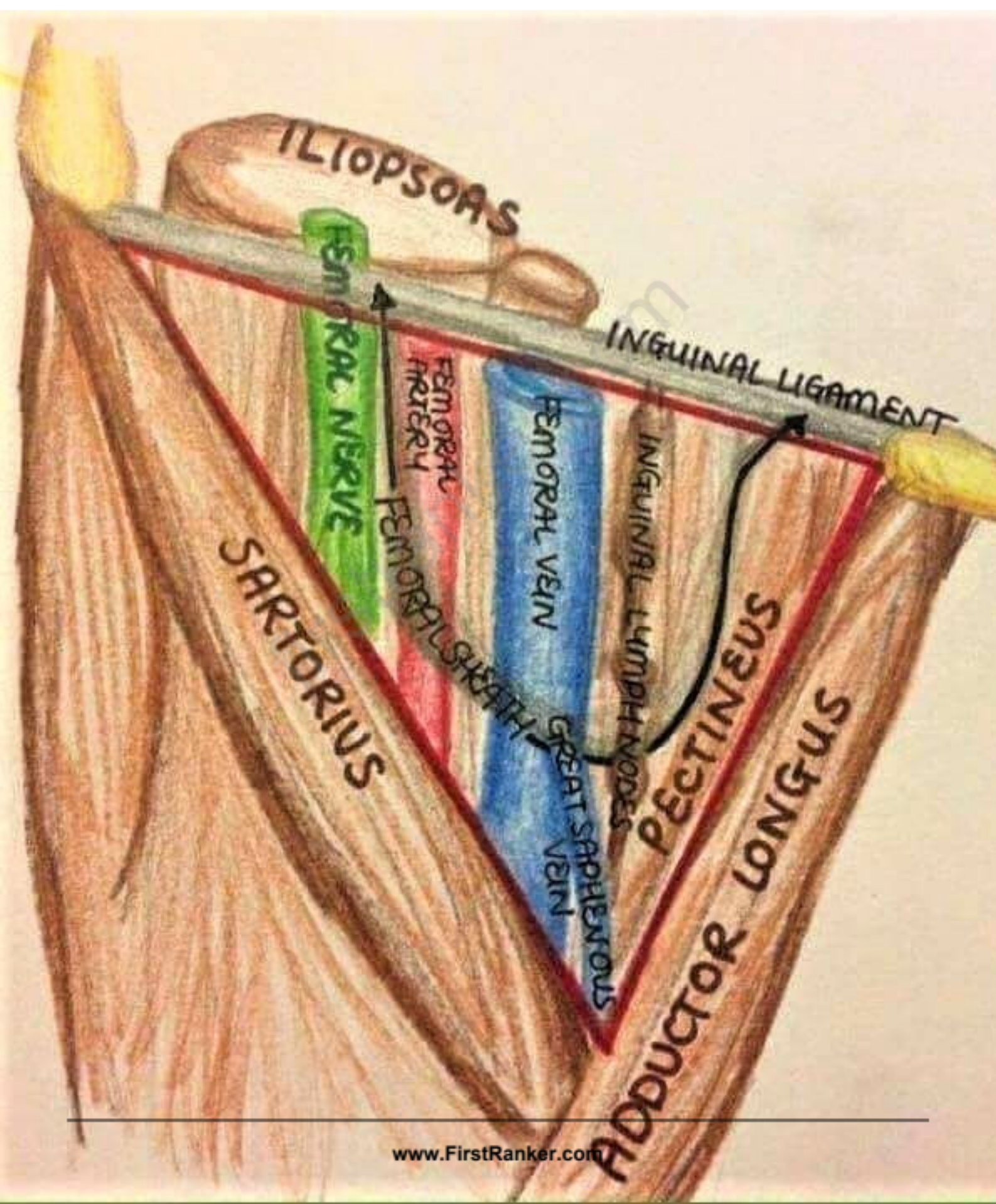
- Femoral Nerve
- Femoral Artery
- Femoral Vein, Femoral Canal
- Horizontal Group of Superficial Inguinal lymph Nodes
- Great Saphenous Vein Joins The femoral Vein

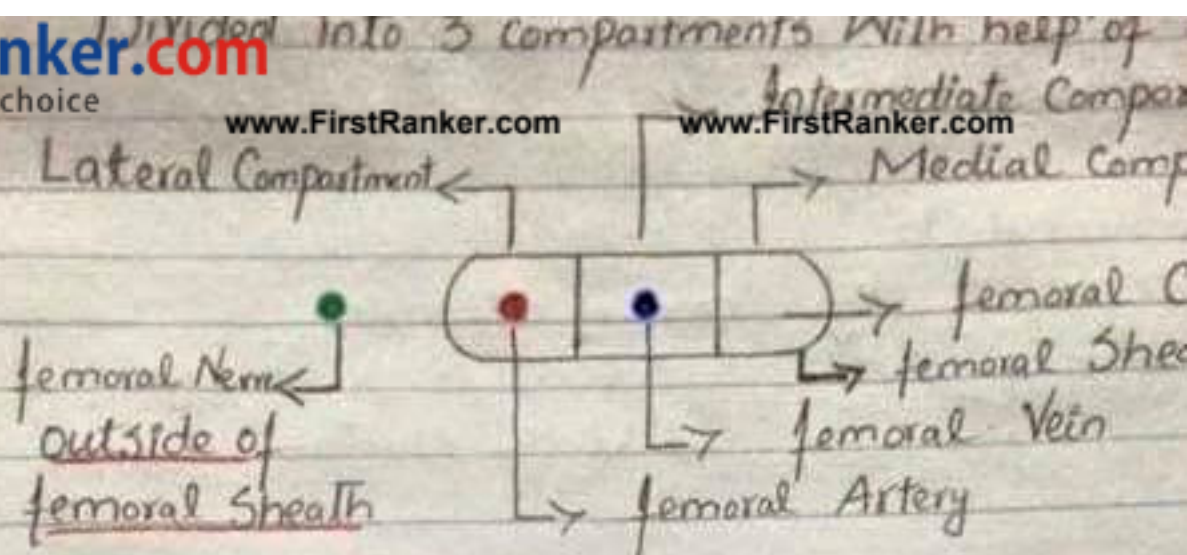
Femoral Sheath:

Formed by downward Extension of

Fascia Transversalis Anteriorly and

iliac fascia posteriorly in Ant. aspect of upper th





Femoral Canal:

Medial Compartment of femoral Sheath in femoral triangle

Contents:

Pad of fat

Deep Inguinal lymph Nodes / Rosenm

Clinical Importance:

femoral hernia may Descend down through this canal into anterior of upper thigh

Adductor Canal / Subsartorial / Hunter's

Intermuscular Cleft Situated Beneath

The Sartorius Muscle, in the Middle of the thigh immediately distal to Apex of femoral triangle

- Bounded Laterally by Vastus Medialis
- " Posteriorly by Adductor longus and Adductor Magnus Muscle

peroneal Nerve divides in proximal leg into Superficial and Deep peroneal Nerves

Sciatic Nerve:

- Often damaged following posterior hip dislocation.
- Complete Sciatic Nerve lesion Results in Sensory and Motor deficits in the posterior compartment of thigh and all functions below the knee
- Features of Sciatic Nerve Injury →
 - Weakened Extension of Thigh
 - Loss of flexion of Knee
 - Sensory loss on the post. Thigh and leg (except Medial side) and foot
 - Loss of All functions below the knee

Tibial Nerve:

- Larger terminal Branch of Sciatic Nerve (L₄, L₅, S₁, S₂, S₃) Anterior Division
- Supplies Muscles of post. Compartment of thigh
All Muscles of post. Compartment of leg
Plantar Muscles of foot, *Sole skin
- Primary Actions
 - Flex Knee
 - Extend Thigh
 - Plantar flex foot (S₁-2)
 - Flex Digits
 - Inversion*

→ Help in Walking on tip of toe.

- Weakness in Knee flexion
- Weakness in plantar flexion
- Weakened Inversion
- Sensory loss of leg (except Medial) and plantar foot

Common Peroneal Nerve:

- Smaller Terminal Branch of Sciatic (L₄, L₅, S₁, S₂) posterior Division
- Supply Short head of Biceps femoris
- Primary Action → Flex knee
- Crosses Lateral aspect of knee at the * Neck of fibula Where it is the most frequently damaged Nerve of the lower limb
- 2 terminal Branches → arises lateral Side of Neck of fibula

① Superficial Peroneal Nerve:

- Supply • All Muscles of lateral Compartment of leg
- Skin overlying Dorsum
- Primary Action → Eversion of

② Deep Peroneal Nerve:

- Supply • All Muscles of Anterior Compartment of leg which are active in Walking on Heel
- Skin of space b/w 1st and 2nd digit

• InVersion

- Common Peroneal Nerve Injury | Neck of fibula produces a Combination of deficits of lesion of Deep and Superficial Nerves...

Features of

deep peroneal Nerve Injury

- Loss of Dorsiflexion / foot Drop
- Loss of extension of digitis
- Weakened InVersion
- Sensory loss limited to skin of 1st Web Space b/w Great toe and 2nd toes.

Features of

Superficial peroneal Nerve Injury

- Loss of Eversion of foot
- Sensory loss on lateral surface of leg and dorsum of foot

Sensory Innervation of Lower Leg and Foot:

- Superficial Peroneal Nerve → Dorsum of foot, Medial Side of big toe, Adjacent sides of 2nd, 3rd, 4th and 5th toes
- Deep peroneal Nerve → 1st Dorsal Web Space
- Lateral and Medial plantar Branches of tibial Nerve → Sole of foot
- Sural Nerve / Combination of both peroneal and tibial branches → post. leg and Lateral Side of foot
- Saphenous Nerve → Medial leg and Medial foot

Articulation

Above are the Rounded Condyles of
 Below are the Condyles of tibia and
 Their Cartilaginous Menisci.
 In front is the articulation b/w
 lower end of femur and the patella.

Articular Surfaces of femur, Tibia, patella
Covered With Hyaline Cartilage.

Type:

Joint B/W Femur and Tibia $\rightarrow$ Synovial

Joint of Hinge Variety

Joint B/W patella and femur $\rightarrow$ Synovial

Joint of plane gliding Variety

Knee Joint is a Weight-Bearing Joint and
Stability of joint depends on Muscles (Quad
femoris and hamstring Muscles) that cross
the joint. The strength of Knee Joint depends
on the strength of the ligaments that
bind femur to Tibia.

Ligaments:

Extracapsular

• Lateral / Fibular Collateral

Cordlike and is attached above to lateral
 Condyle of femur and below to head of
 fibula. Prevents Medial displacement
of tibia under the femur

and is attached above to
below to Medial Condyle of femur and
Surface of shaft of Tibia

Firmly attached to Edge of the Medial Meniscus

Both Collateral ligaments are taut w^d Knee extension

- Ligamentum patellae
- Oblique popliteal ligament

Intracapsular

- Anterior Cruciate ligament / ACL:

ACL is attached to Anterior Intercondylar area of Tibia and passes upward, ^{Back}ward and laterally to be attached to the posterior part of the Medial Surface of lateral femoral Condyle

* ACL → prevents posterior displacement of femur on Tibia

With The Knee Joint Flexed → ACL prevents the Tibia from being pulled Anteriorly

• ACL Resists Hyperextension.

- Posterior Cruciate ligament / PCL:

PCL is attached to posterior Intercondylar area of Tibia and passes upward, forward and Medially to be attached to the Anterior part of lateral surface of Medial femoral Condyle

* PCL → prevents Anterior displacement of femur on the tibia

With The Knee Joint Flexed → PCL prevents the Tibia from being pulled posteriorly

→ Shaped Sheets of fibrocartilage
→ Serve as Cushions b/w two bones
(femur and Tibia)

→ Serve as Shock Absorbers

Four ligaments — Medial Collateral
Lateral Collateral
ACL
PCL

are Commonly Injured in the Knee.

- Most frequently Injured Ligament in the body → ACL
- Most frequently Torn Ligament at the Knee is → Tibial / Medial Collateral
Commonly seen following lateral trauma to the knee

Movements of Knee Joint :

- Flexion
- Extension
- Medial Rotation
- Lateral Rotation

Common Knee Injuries :

3 Most Commonly Injured Structures at the Knee are

- Tibial (Medial) Collateral
- Medial Meniscus
- ACL

Saphenous Nerve : Branch of femoral Nerve

- Location → Medial aspect of Knee Joint
- Sensory Innervation → Medial leg and Medial foot
- Injury → Injection in Knee Joint

Largest Sesamoid Bone (bone that develops within the tendon of Quadriceps femoris Muscle in front of the Knee Joint)

Tibia:

Large Weight bearing Medial bone of the leg

Fibula:

Slender Lateral Bone of the leg

Bones of the foot:

Tarsal Bones:

Calcaneum → • Largest bone of foot
• forms prominence of heel

* Talus → Only articulates with the tibia and fibula at Ankle Joint

3 Cuneiform → Small - Wedged shaped
Medial, Intermediate, lateral

Navicular

Cuboid

Metatarsal Bones:

- 1st three attached w/d 3 Cuneiform Bones
- 4th, 5th attached w/d Cuboid

Phalanges:

Each toe has 3 phalanges Except Big toe

Ankle Joint:Articulation:

B/W lower end of tibia, The two malleoli, and the body of the talus

Articular Surfaces are Covered with Hyaline Cartilages.

Type:

Synovial Hinge Joint

Movements:

- Dorsiflexion → toes pointing up
- Plantar flexion → toes pointing down

The movements of Inversion, Everson take place at the Tarsal Joints and Not at Ankle Joint.

Anterior talofibular / Lateral (Collateral) lig of Ankle is frequently Damaged.

Foot Proper:

Six layers in Foot Proper

4 layers are Muscular

2 layers are Neurovascular

1 _____ Muscular

2 _____ Neurovascular

3 _____

4 _____

5 _____

6 _____