بسم الله الرحمن الرحيم





Gluteal region

Quiz in the previous lecture

The Gluteal Region

- The gluteal region, or buttock, is bounded:
- superiorly by the iliac crest
- **inferiorly** by the fold of the buttock.

(by the fold of gluteus Maximus muscle)
.medially : by the perineum which is the upper part between
The thighs(related to the coccyx)
. Laterally : by iliotibial tract

The region is largely made up of:

- the gluteal muscles
- a thick layer of superficial fascia.

3muscles : gluteus Maximus, gluteus medius, gluteus minimus IM injection in the upper lateral



The Skin of the Buttock:

- The cutaneous nerves are derived from posterior and anterior rami of spinal nerves, as follows:
- The upper medial quadrant is supplied by the posterior rami of the upper three lumbar nerves and the upper three sacral nerves.
- The upper lateral quadrant is supplied by the lateral branches of the iliohypogastric (L1) and 12th thoracic nerves (anterior rami). 12th thoracic nerves or we call it subcostal



- The lower lateral quadrant is supplied by branches from the lateral cutaneous nerve of the thigh (L2 and 3, anterior rami).
- The lower medial quadrant is supplied by branches from the posterior cutaneous nerve of the thigh (S1, 2, and 3, anterior rami).
- In the midline we have The skin over the coccyx in the floor of the cleft between the buttocks is supplied by small branches of the lower sacral (s4,s5)and coccygeal nerves.



• The lymphatic drainage through vessels drain into the lateral group of the superficial inguinal nodes

The lymphatic drainage is located in the front of the thigh. We have two groups of lymphatic nodes:

- 1) Horizontal group of lymph nodes : from iliac crest downward it drains into the horizontal group and from the umbilicus downward is the same.
- 2) Vertical group of lymph nodes : we have medial side and lateral side. The medial side of the leg and upward drains with the great saphenous vein into the vertical group. The lateral side drains with the saphenous vein into the popliteal lymph nodes which are located in the popliteal fossa.



- The superficial fascia is thick, especially in women
- It is impregnated with large quantities of fat.
- It contributes to the prominence of the buttock.
- The deep fascia is continuous below with the deep fascia, or fascia lata, of the thigh.
- In the gluteal region, it splits to enclose the gluteus maximus muscle
- Above the gluteus maximus it continues as a single layer that covers the outer surface of the gluteus medius and is attached to the iliac crest.



- On the lateral surface of the thigh, the fascia is thickened to form a strong, wide band, the iliotibial tract
- This is attached above to the tubercle of the iliac crest and below to the lateral condyle of the tibia.
- The iliotibial tract forms a sheath for the tensor fasciae latae muscle and receives the greater part of the insertion of the gluteus maximus.



Details mentioned by the doctor regarding this important figure:

- 1) Is the iliac crest of the hip bone
- 2) Gluteus minimus above it the gluteus medius muscle and gluteus Maximus muscle which is the largest one
- 3) The pirformis muscle : it's the key of gluteal region, because there are structures arising from the pelvis through the greater sciatic foreman above the muscle , and other structures below this muscle
- 4) Superior gluteal nerve and artery: they located above the muscle and this nerve nourishes gluteus Medius and minimus and tensor fasciae latae
- 5) Inferior gluteal artery and nerve: they located below the muscle and this nerve nourishes gluteus Maximus muscle only

8)+9)+10)+11)+12) all these muscles are located deep to the gluteus Maximus muscle

13)+14) two important ligaments in the gluteal region. Their names indicates their attachments



They located below The pirformis muscle

Ligaments of the Gluteal Region

- The two important ligaments in the gluteal region are:
- the sacrotuberous
- sacrospinous ligaments.
- The function of these ligaments is to stabilize the sacrum and prevent its rotation at the sacroiliac joint by the weight of the vertebral column.



They convert the greater and small sciatic notches to foramens

Sacrotuberous Ligament

The sacrotuberous
 ligament connects the
 back of the sacrum to
 the ischial tuberosity

Sacrospinous Ligament

 The sacrospinous ligament connects the back of the sacrum to the spine of the ischium



Foramina of the Gluteal Region

- The two important foramina in the gluteal region are:
- the greater sciatic foramen
- the lesser sciatic foramen.

Greater Sciatic Foramen

- The greater sciatic foramen is formed by the greater sciatic notch of the hip bone and the sacrotuberous and sacrospinous ligaments.
- It provides an exit from the pelvis into the gluteal region.
- The following structures exit the foramen :
- Piriformis
- Sciatic nerve
- Posterior cutaneous nerve of the thigh
- Superior and inferior gluteal nerves
- Nerves to the obturator internus and quadratus femoris
- Pudendal nerve
- Superior and inferior gluteal arteries and veins
- Internal pudendal artery and vein



Lesser Sciatic Foramen

- The lesser sciatic foramen is formed by the lesser sciatic notch of the hip bone and the sacrotuberous and sacrospinous ligaments.
- It provides an entrance into the perineum from the gluteal region.
- Its presence enables nerves and blood vessels that have left the pelvis through the greater sciatic foramen above the pelvic floor to enter the perineum below the pelvic floor.



The following structures pass through the lesser sciatic foramen : All the structures we mentioned before pass through greater sciatic foreman, three of them enter through lesser sciatic foreman

- Tendon of obturator internus muscle
- Nerve to obturator internus
- Pudendal nerve (from sacral plexuses)
- Internal pudendal artery and vein(the artery has branched from internal iliac artery, while the vein in contrast goes to internal iliac vein



Muscles of the Gluteal Region

 The muscles of the gluteal region include the gluteus maximus, the gluteus medius, the gluteus minimus, the tensor fasciae latae, the piriformis, the obturator internus, the superior and inferior gemelli, and the quadratus femoris.

Muscles of the Gluteal Region

Muscle	Origin	Insertion	Nerve Supply	Nerve Rootsa	Action
Gluteus maximus	Outer surface of ilium(hip bone) sacrum, coccyx, sacrotuberous ligament	Iliotibial tract and gluteal tuberosity of femur	Inferior gluteal nerve	L5; S1, 2	Extends and laterally rotates hip joint; through iliotibial tract, it extends knee joint during standing,this muscle is the region where we insert the needles
Gluteus medius	Outer surface of ilium	Lateral surface of greater trochanter of femur	Superior gluteal nerve	L5; S1	Abducts thigh at hip joint; tilts pelvis when walking to permit opposite leg to clear ground
Gluteus minimus	Outer surface of ilium	Anterior surface of greater trochanter of femur	Superior gluteal nerve	L5; S1	Abducts thigh at hip joint; tilts pelvis when walking to permit opposite leg to clear ground
Tensor fasciae latae	lliac crest	Iliotibial tract	Superior gluteal nerve	L4; 5	Assists gluteus maximus in extending the knee joint
Piriformis	Anterior surface of sacrum	Upper border of greater trochanter of femur	First and second sacral nerves	L5; S1, 2	Lateral rotator of thigh at hip joint
Obturator internus	Inner surface of obturator membrane	Upper border of greater trochanter of femur	Sacral plexus	L5; S1	Lateral rotator of thigh at hip joint
Gemellus superior	Spine of ischium	Upper border of greater trochanter of femur	Sacral plexus	L5;S1	Lateral rotator of thigh at hip joint
Gemellus inferior	Ischial tuberosity	Upper border of greater trochanter of femur	Sacral plexus	L5;S1	Lateral rotator of thigh at hip joint
Quadratus femoris	Lateral border of ischial tuberosity	Quadrate tubercle of femur	Sacral plexus	L5;S1	Lateral rotator of thigh at hip joint

The doctor mentioned details about the action of gluteus medius and minimus, tensor fasciae latae : The most important function of them is the abduction the thigh and prevents tilting the pelvis to unsupported side. When we are walking, we raise one leg, then we put it down and raise the other one, we notice that the pelvis remains fixed.because when we raise the right leg ,the gluteus medius and minimus and the tensor fasciae latae muscles will contract in the opposite side.this what prevents the pelvis from dropping

The doctor asked a question if someone raised his right leg and his pelvis has dropped which nerve has a nerve injury?

- Answer: superior gluteal nerve on the left side
- What about if there is injury on the both sides of the superior gluteal nerve?
- مشية البطة The patient will have waddling gate





 The gluteus maximus is the largest muscle in the body.

It lies superficial in the gluteal region and is largely responsible for the prominence of the buttock. (The buttock is where the needle is injected)



• The tensor fasciae latae runs downward and backward to its insertion in the iliotibial tract and thus assists the gluteus maximus muscle in maintaining the knee in the extended position

The piriformis :

- lies partly within the pelvis at its origin.
- It emerges through the greater sciatic foramen to enter the gluteal region.
- Its position serves to separate the superior gluteal vessels and nerves from the inferior gluteal vessels and nerves



Inside the sciatic nerve there is an artery. In the body there are three nerves that have inside them artery (optic nerve, median nerve, sciatic nerve). It means that when we do ligation, you need to close the artery to prevent bleeding.

- The obturator internus is a fan-shaped muscle that lies within the pelvis at its origin.
- It emerges through the lesser sciatic foramen to enter the gluteal region.
- The tendon is joined by the superior and inferior gemelli and is inserted into the greater trochanter of the femur.

The doctor in this slide just said that the obturator internus is located on the inner surface of obturator foreman And it has nerve supply to the obturator internus

- Three bursae are usually associated with the gluteus maximus:
- between the tendon of insertion and the greater trochanter
- between the tendon of insertion and the vastus lateralis
- overlying the ischial tuberosity.

The bursae makes secretion for the lubrication (to prevent the inflammation of the tendon "tendinitis")

Clinical Notes

Gluteus Maximus and Intramuscular Injections

- The gluteus maximus is a large, thick muscle with coarse fasciculi that can be easily separated without damage.
- The great thickness of this muscle makes it ideal for intramuscular injections.
- To avoid injury to the underlying sciatic nerve, the injection should be given well forward **on the upper outer quadrant of the buttock.**

Gluteus Maximus and Bursitis

- Bursitis, or <u>inflammation of a bursa</u>, can be caused by acute or chronic trauma.
- An inflamed bursa becomes distended with excessive amounts of fluid and can be <u>extremely painful and limitation in movement</u>.
- The bursae associated with the gluteus maximus are prone to inflammation.

Nerves of the Gluteal Region

Sciatic Nerve

- The sciatic nerve, a branch of the sacral plexus (L4 and 5; S1, 2, and 3) lumbosacral origin.
- emerges from the pelvis through the lower part of the greater sciatic foramen
- It is the largest nerve in the body and consists of the tibial and common peroneal nerves bound together with fascia
- The nerve appears below the piriformis muscle and curves downward and laterally, lying successively on the root of the ischial spine, the superior gemellus, the obturator internus, the inferior gemellus, and the quadratus femoris to reach the back of the adductor magnus muscle (it is covered by gluteus maximus-sup. And biceps femoris and semitendinosus -nf.)



Sciatic nerve.....cont

 It is related posteriorly to the posterior cutaneous nerve of the thigh and the gluteus maximus. It leaves the buttock region by passing deep to the long head of the biceps femoris to enter the back of the thigh

The sciatic nerve branches at the mid post. Surface of the thighLong head Branches: of the bicens fem

- 1. Tibial nerve: crosses the popliteal fossa sup. To inf. Angle
- 2. Common peroneal nerve:

Deviates laterally under the cover of **Biceps femoris**.



Occasionally, the
 common peroneal
 nerve leaves the
 sciatic nerve high in
 the pelvis and appears
 in the gluteal region by
 passing above or
 through the piriformis
 muscle.

Tibial n. through the piriformis Common peroneal below is.

 The sciatic nerve usually gives no branches in the gluteal region.



Posterior Cutaneous Nerve of the Thigh

- The posterior cutaneous nerve of the thigh, a branch of the sacral plexus
- enters the gluteal region through the lower part of the greater sciatic foramen below the piriformis muscle
- It passes downward on the posterior surface of the sciatic nerve and runs down the back of the thigh beneath the deep fascia. In the popliteal fossa it supplies the skin



Branches:

- Gluteal branches to the skin over the lower medial quadrant of the buttock
- Perineal branch to the skin of the back of the scrotum or labium majus
- Cutaneous branches to the back of the thigh and the upper part of the leg (sup. Part of popliteal fossa)





KEN HUB

Superior gluteal nerve

Common fibular division of sciatic nerve

Inferior gluteal nerve

Tibial division of sciatic

Sciatic nerve

Common fibular nerve

Superficial fibular nerve

Lateral calcaneal branch

Lateral dorsal cutaneous

Superior Gluteal Nerve

- The superior gluteal nerve, a branch of the sacral plexus
- leaves the pelvis through the upper part of the greater sciatic foramen above the piriformis
- It runs forward between the gluteus medius and minimus, supplies both, and ends by supplying the tensor fasciae latae.



Prevents tilting of pelvis on the unsupported side.

Trendelenburg test indicates/tests weakness of the gluteus medius muscle during unilateral weight-bearing. The patient stands on one leg for 30s without leaning to one side, the examiner observes the pelvis if it stays level then it's normal, if the pelvis is tilted/drops then the test is positive.

Tilting is on the unsupported side. Eg: tilting to the left -> injury to right and vice versa.

Inferior Gluteal Nerve

- The inferior gluteal nerve, a branch of the sacral plexus, leaves the pelvis through the lower part of the greater sciatic foramen below the piriformis
- It supplies the gluteus maximus muscle.

Nerve to the Quadratus Femoris

- A branch of the sacral plexus, the nerve to the quadratus femoris leaves the pelvis through the lower part of the greater sciatic foramen
- It ends by supplying the quadratus femoris and the inferior gemellus



Pudendal Nerve and the Nerve to the Obturator Internus

- Branches of the sacral plexus, the pudendal nerve, and nerve to the obturator internus leave the pelvis through the lower part of the greater sciatic foramen, below the piriformis
- They cross the ischial spine with the internal pudendal artery and <u>immediately re-</u> <u>enter the pelvis through the</u> <u>lesser sciatic foramen</u>; they then lie in the ischiorectal fossa
- The pudendal nerve supplies structures in the perineum.
- The nerve to the obturator internus supplies the obturator internus muscle on its pelvic surface.



Tibial Nerve (medial popliteal nerve)

- The larger terminal branch of the sciatic nerve
- the tibial nerve arises in the lower third of the thigh.
- •
- It runs downward through the popliteal fossa, lying first on the lateral side of the popliteal artery, then posterior to it, and finally medial to it
- The popliteal vein lies between the nerve and the artery throughout its course.
- The nerve enters the posterior compartment of the leg by passing beneath the soleus muscle.

Structures:

Initially called popliteal Sup: (M->L): artery, vein , then nerve. Inf: (M->L): nerve, vein, then artery



Popliteal artery:

When it reaches the lower boarder of popliteus muscle (post. Comp. Of the leg) it divides into Ant. Tibial -> penetrates the interosseous membrane and goes for the ant comp of the leg, and Post. Tibial artery for the post comp of the leg.

Tibial nerve:

Supplies the surrounding muscles <u>except</u> short head of biceps, it takes the supply from the common peroneal. At the lower boarder of popliteus it becomes post tibial -> post comp

Cont to the next page for its branches



Branches of tibial nerve

Cutaneous:

- The sural nerve descends between the two heads of the gastrocnemius muscle and is usually joined by the sural communicating branch of the common peroneal nerve
- Back of the leg to the lateral side of foot and the lateral toes as well.
- Numerous small branches arise from the sural nerve to supply the skin of the calf and the back of the leg.
- The sural nerve accompanies the small saphenous vein behind the lateral malleolus and is distributed to the skin along the lateral border of the foot and the lateral side of the little toe.
- A communicating branch:

Connects the common peroneal to the tibial nerve's medial sural cutaneous, both of them combined give me the sural nerve.

Muscular branches supply both heads of the gastrocnemius and the plantaris, soleus, and popliteus (muscles of the calf)

• Articular branches supply the knee joint(3 genicular nerve, sup, middle & inf medial genicular nerve)



Common Peroneal Nerve

- The smaller terminal branch of the sciatic nerve
- the common peroneal nerve arises in the lower third of the thigh.
- It runs downward through the popliteal fossa, closely following the medial border of the biceps muscle and supplies the its short head.
- It leaves the fossa by crossing superficially the lateral head of the gastrocnemius muscle.
- It then passes behind the head of the fibula, winds laterally around the neck of the bone, pierces the peroneus longus muscle, and divides **into two terminal branches**:
- the <u>superficial</u> peroneal nerve (musculocutaneous nerve -> lateral side; 2 muscles, 2 skin: ant surface and dorsum of the foot.) and the <u>deep</u> peroneal nerve (ant tibial nerve=deep-> ant comp of the leg) As the nerve lies on the lateral aspect of the neck of the fibula, it is subcutaneous and can easily be rolled against the bone.

Semimembranosus ends at the medial condyle of femur and gives an oblique popliteal ligament, ends at the floor of popliteal fossa as a membrane.



Branches:

Cutaneous:

- The sural communicating branch runs downward and joins the sural nerve.
- The lateral cutaneous nerve of the calf supplies the skin on the lateral side of the back of the leg
- Muscular branch to the short head of the biceps femoris muscle, which arises high up in the popliteal fossa

Articular branches to the knee joint from the lateral side.



Clinical Notes

Common Peroneal Nerve Injury

In case of injury where would there be loss of sensation? Ant surface of the leg and dorsum of the foot.

• The common peroneal nerve is extremely vulnerable to injury as it winds **around the neck of the fibula**. At this site, it is exposed to direct trauma or is involved in fractures of the upper part of the fibula. Injury to the common peroneal nerve causes **footdrop**.

Because it supplies the ant comp that does dorsiflexion or extension at the ankle joint.

*any muscle named tibialis does inversion *any muscle named peroneus does eversion



Arteries of the Gluteal Region

Superior Gluteal Artery:

- The superior gluteal artery is a branch from the internal iliac artery and enters the gluteal region through the upper part of the greater sciatic foramen above the piriformis
- It divides into branches that are distributed throughout the gluteal region.

Another reason for using the upper lateral quadrant for semitendinosus IM injections is that it's highly vascularized, and before injection, the injector suctions the syringe to ensure it's not penetrating an artery, after all it's IM injection not IA.



Inferior Gluteal Artery

- The inferior gluteal artery is a branch of the internal iliac artery and enters the gluteal region through the lower part of the greater sciatic foramen, below the piriformis
- It divides into numerous branches that are distributed throughout the gluteal region.



The Trochanteric Anastomosis

- The trochanteric anastomosis provides the main blood supply to the head of the femur around the great trochanater. The nutrient arteries pass along the neck of femur beneath the capsule
- The following arteries take part in the anastomosis:
- the superior gluteal artery Internal
- the inferior gluteal artery | iliac A
- the medial femoral circumflex artery, and the lateral femoral circumflex artery.
 Profunda femoris

This image summarizes the anastomosis beautifully, look at it (different than the one the DR used)

HIP JOINT 3

Strong ++

CAPSULE

Anterior: Covers whole neck to intertrochanteric line Posterior: Covers neck half way to intertrochanteric crest Reflects: Back as retinaculum which carries the blood supply



2 ANASTOMOSES

Trochanteric (at greater trochanter): Descending superior gluteal Inferior gluteal Ascending branches of medial & lateral circumflex femoral

Cruciate (at lesser trochanter):

Transverse branches of medial & lateral circumflex femoral Descending branch of inferior gluteal Ascending branch of 1st perforating artery

Mnemonic:

(femoral

A)

Upper anastomosis does not receive branch from lowest artery, lower anastomosis does not receive branch from highest artery.

The Cruciate Anastomosis

• The cruciate anastomosis is situated at the level of **the lesser trochanter** of the femur and, together with the trochanteric anastomosis, provides a connection between the internal iliac and the femoral arteries.

The following arteries take part in the anastomosis:

- the inferior gluteal artery
- the medial femoral circumflex artery
- the lateral femoral circumflex artery
- the first perforating artery, a branch of the profunda artery.



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Clinical Notes

• Arterial Anastomoses and Femoral Artery

Occlusion Temporary occlusion usually while moving the anastomosis ensures maintained blood flow

 The importance of the trochanteric and cruciate anastomoses in femoral artery occlusion is important to maintained the blood supply to the lower limb



For any feedback, scan the code or click on it.

Corrections from previous versions:

Versions	Slide # and Place of Error	Before Correction	After Correction
V0 → V1	41	"upper medial"	"upper lateral"
V1 → V2			

رسالة من الفريق العلمي:

الرسول الله صلى الله عليه وسلم سمع رجلاً يقول: اللهم إنى أسألك بأنى أشهد أنك أنت الله، لا إله إلا أنت، الأحد الصمد، الذي لم يلد ولم يولد، ولم يكن له كفواً أحد، فقال: والذي نفسى بيده، لقد سأل الله باسمه الأعظم، الذي إذا دُعى به أجاب، وإذا سئل به أعطى اللَّهُمَّ نَجّ أهل غزة مِنَ الفقر والجوع والخوف، اللَّهُمَّ اشف جَريحهم وارْحَم شهيدهم واحفَظ ذريتهم وَاجْبُر مَنْ انْكَسَرَ مِنْهُم، اللَّهُمَّ إِنَّ الأبواب قد أُغلِقَتْ في وجوههم وبَقى بابك المفتوح، فَارْزُقْهُم مِنْ كَرَمك فَرَجًا قَرِيبًا وَنَصْرًا يُزَلُّزِلُ الطِّغاة، يا قَوِيُّ يا عَزِيز.