Muscles of the lower limb

Generally the lower limb is divided into compartments according to the different anatomical positions of the muscle groups which will allow these groups of muscle to do their wanted action, and these compartments are usually innervated by the same nerves for the purpose of coordinated movements or actions.

Anyway before we get in studying the different compartments of the lower limb, we will mention the fascia that’s encircle these compartments:

At the thigh level there is the fascia lata which will start to thickening at the lateral border forming the illiotibial tract “which extend from the ilium toward the tibia”, and later on we will mention another part of this fascia and it is called the (saphenous opening) where the superficial long great saphenous vein will pass and drain its content in to the femoral vein.

Where as at the leg level there is another fascia which is called the crural fascia (we will talk about it later on).

Regard the blood supply of the lower limb it is mainly done by the femoral artery (which will enter the thigh from behind and inferior to the inguinal ligament) which will give a branch that will supply the deeper part of the thigh which is the “profunda femoris artery” then when it goes down it will become the popliteal artery which will branches and supply the leg part of the lower limb.

About the venous drainage as we mentioned the great saphenous vein “which is one of the longest vein in the body and it is used commonly in the coronary bypass surgery” will pass medial along the way up, and at the posterior surface there is the small saphenous vein which will drain the posterior part of the leg mainly which will later on drain in to the popliteal vein.

The innervation of the lower limb is mainly by the sacral plexus but there is also a lumber plexuses which will gives rise of two important nerves (the femoral nerve and the obturator nerve) which will innervates the anterior compartment and medial compartment of the thigh respectively.

Let’s get started....

The thigh: we can divide the thigh in to three compartments anterior, posterior and medial compartments.

The anterior compartment contains two types of muscle according to their actions: flexors of the hip (which is the muscles that cross the hip joint) and extensors of the knee (cross the knee joint) and they are both innervated by the femoral nerve.

The flexors of the hip include:

1- Pectineus m.: small muscle that orginates from the superior rami of the pubic bone and insert on the pectineal line (just inferior to lesser trochanter), it can act as an flexor of the hip but its action as an adductor is bigger (some books list it one of the adductor muscles) but we list it in this lecture as a flexor since that it is innervated by the femoral nerve just like other flexor muscle.

2- Iliopsoas m.: it is a made up by two muscles (iliacus m and psoas major m) and as we know that the psoas major is originated from the lumber vertebra, where as the iliacus from the ilium then they both will insert on the lesser trochanter. “This muscle is considered the main flexor of the hip “.
3- Sartorius m: one of the longest muscle of the entire body and the most superficial of the anterior muscles, it goes from the superior anterior iliac spine down to the medial border of the tibia (so it cross the hip and knee joint). It is called "tailor’s muscle" too. Its action is a little complicated but we can remember it as the muscle that helps us to do " قعدة الرجل " or " فوق رجل "... it flexes the hip and the knee and can do some lateral rotation and abduction of the hip as well.

Extensor of the knee:

1- Quadriceps femoris: "quad means four" this muscle is made from 4 muscles from different origin but they will unite as a single tendon and connect with the patellar tendon which will finally insert at the tibia tuberosity.

These 4 muscles are: The vastus medialis, the vastus intermedius and vastus lateralis (all of these 3 muscle will orginates from the femur) and above or just superficial to the vastus intermedius the forth muscle which is the rectus femoris (the only muscle that orginates from and cross the hip joint so it will be able to flex the hip as well)

Little note: articularies genu is a deep muscle close to the vastus intermedius and it will help the stabilizing of the knee joint "we will take about it later on", another point is the iliopsoas muscle is not entirely innervated by the femoral nerve it has little different innervation

The medial compartment: which include a group of muscles called "adductor group " which preform the adduction movement of the thigh and include (in addition to the pectenial muscle)

1- Adductor longus: the most anterior muscle of the medial compartment and nearly at the same level of the pectineus just inferior to it so they complete each other. Originates from the pubic body and insert inferior to the pectineus at the middle third of the linea aspera.

2- Adductor brevis: This is deep to pectinus and the adductor longus. Originates from the inferior rami of the pubis and insert at the linea aspera as well.

3- Adductor magnus: which is huge muscle that lies most posteriorly, it can be divided in to adductor part and hamstring part (which will do exactly the same of the hamstring muscles which lies at the posterior compartment and it will be innervated from the same nerve as the hamstring muscle which is the sciatic nerve). Its origin is a U shaped and the posterior part of it will gives the origin of the hamstring part, the insertion is unique in a way where part of the tendon will insert at the medial supracondylar line and another tendon "which is the hamstring part tendon" will insert at the adductor tubercle which is at the medial epicondyle between these two tendons is the adductor hiatus (which act as a passage way to the vital nerve and vessels to pass posteriorly to the popliteal region) other tendons will insert at the linea aspera and gluteal tuberosity " all over the femur ".

4- Gracilis m: most medial and superficial it crosses the hip and the knee joint, it will come from the pubis down to the medial surface of tibia

5- Obturator externus: like the pectinal muscle it is not major adductor but it is innervated by the obturator nerve just like the other muscle, from the name amplifies it comes from the obturator foramen and insert at the trochantric fossa "posterior border of the femur". Its action is simply lateral rotation.
Femoral triangle: it is a triangular depression surrounded by the superficial thigh muscle just inferior to the inguinal ligament which act as a passage way to the vital structure to pass through

The femoral triangle is bounded:

Superiorly: inguinal ligament, medially: adductor longus, laterally: sartorius, floor: pectineus and iliopsoas muscles

Its content (from lateral to medial):

The femoral nerve and the femoral sheath contents which is (femoral artery then femoral vein and most mediaill the lymphatic vessels)

## femoral sheath is a continuation of two fascia (transversalis fascia anteriorly, iliaca fascia posteriorly) which will form a canal which is the femoral canal and down this canal there is opening called femoral ring as we mention it before as the saphenous opening.

Adductor or subsartorial canal: this canal starts at the end of the femoral triangle and ends at the adductor hiatus and it act as a bypass for some vital structures down to the popliteal region but at a deeper level (deep to the sartorius muscle)


Its content is a continuation of the femoral triangle content:

- The femoral artery: and it will give a deeper branch which will leave this canal and goes deep to the adductor longus, this branch is called the profunda femoris (we have talked about it at the beginning of the lecture)
- The femoral vein
- The femoral nerve: where this will become branches to innervate the anterior compartment, one of these branches will give rise to the saphenous nerve (from its name it indicates that this nerve will leave this canal too and go along beside the great saphenous vein” he loves this vein company ”)

## Saphenous nerve is a cutaneous “sensory” not motor branch of the femoral nerve.

Last thing we will take about is the gluteal region....

The gluteal muscles can be divided in to two groups one is superficial and the other is deep group muscle.

The superficial muscles: which contain (from deep to superficial):

- Gluteus minimus
- Gluteus medius
- Gluteus maximus

These 3 will originate mainly from the gluteal line on the posterior surface of ilium and they will insert on the femur bone. Their action is mainly extensor and abductor.
#there is one more muscle of the superficial layer but it goes more laterally and from the illotibial tract fascia “mentioned previously” this muscle is the tenser fascialata

The deep layer: their action mainly is lateral rotation of the femur and they include:

- **Piriformis m**: it originates from the sacrum and insert at the greater trochanter (and it exit the pelvic region by the great sciatic foramen)
- **Obturator internus**: origin from obturator foramen (and exit throw the lesser sciatic foramen) and insert like at the greater trochanter.
- **Superior, inferior gamellus and quadratus femoris**: they will originate from the ischium and insert on the greater trochanter and on the intertrochanteric line respectively.

#Sorting these muscle from superior to inferior ( piriformis , superior gamellus , obturator internus , inferior gamellus , quadratus femoris )

Best of luck

Done by: wael abu-anzeh