* **Front of the Thigh**
* **Superficial Fascia of the Thigh**
	+ It is differentiated into:
1. Superficial fatty layer: It is thick especially in the medial side.
2. Deep membranous layer: It is firmly attached to the deep fascia of the thigh just below the inguinal ligament.
* The 2 layers are continuous with those of anterior abdominal wall (the membranous reaches only till the umbilicus).
	+ **Cutaneous Nerves**

**1- Femoral branch of genitofemoral nerve (L 1, 2):**

- It is abranch o f the **lumbar plexus**.

- It supplies the skin overlying the femoral triangle.

**2- Lateral cutaneous nerve of the** **thigh** (L 2, 3):

- It is abranch of the **lumbar plexus**.

- It supplies the lateral part of the front of the thigh and gluteal region.

**3- Ilioinguinal nerve (L1).**

- It is abranch of the **lumbar plexus**.

 **- It supplies** skin of the upper part of the medial side of the thigh and external genital organs.

**4- Intermediate cutaneous nerve of the thigh (L 2, 3):**

- It is a branch of **femoral nerve**.

- It supplies the front and the medial side of the thigh.

**5- Medial cutaneous nerve of the thigh (L 2, 3):**

- It is a branch of **femoral nerve**.

- It supplies the front and the medial side of the thigh.

**6- Obturator nerve (**lumbar plexus **L 2, 3),** middle 1/3 of the medial side of the thigh.

* **Superficial inguinal Lymph Nodes**

- Theseare the main lymph nodes of the lower limb.

- They lie in the superficial fascia and are arranged into 2 groups:

**A- Upper (Horizontal) group**:below the inguinal ligament.

**B- Lower (Vertical) group**; around the upper part of the great saphenous vein.

**\*\* Afferent**:

1- From whole of the lower limb.

2- Anterior abdominal wall below the level of the umbilicus.

3- External genital organs **except** testis (to the lumbar lymph nodes) and glans penis (to the deep inguinal lymph nodes).

4- Perineum and Lower part of the anal canal.

5- Fundus of the uterus.

**\*\* Efferent:** They drain into the deep inguinal lymph nodes.

* **Deep Fascia of the Thigh**

**(Fascia lata)**

* Itis very strong fascia surrounding the thigh.
* **Laterally**, it is thickened to form the **iliotibial tract**.
* **Iliotibial Tract**
* **Attachment**
1. **Superiorly**: outer lip of the iliac crest
2. **Inferiorly**, lateral condyle of the Iibia.
* **Nerve supply,** lateral cutaneous nerve of the thigh.
* **Functions**,

1- It receives the **insertion** of superficial 3/4 of gluteus maximus and tensor fasciae latae.

2- It maintains the knee in extended position.

3- Steady the pelvis on the femur during standing.

* **Inguinal (Poupart's) Ligament**
* This is the lower border of the aponeurosis of the external abdominal oblique muscle. The muscle folded upward backwards upon itself.
* **Attachments,**

 - **Laterally** attached to the anterior superior iliac spine.

 - **Medially** to the pubic tubercle.

**\*\* Midpoint of inguinal ligament:** is a point midway between the anterior superior iliac spine and pubic tubercle.

**\*\* Midinguinal point** is a point midway between the anterior superior iliac spine and symphysis pubis.

* **Saphenous Opening**

**\*\* Shape,** an oval opening in the deep fascia of the thigh.

\*\* **Site**, 1.5 inches below and lateral to the pubic tubercle.

**\*\* Size,** this opening is one inch long and half an inch wide.

**\*\* Margins,** superiorly, laterally and inferiorly are sharp and called **falciform margin**. But medially, the margin is smooth.

**\*\* Overlying fascia,** it is closed by a cribriform fascia.

**\*\* Structures passing through the opening**

a- Great saphenous vein.

b- Superficial inguinal arteries

c- Lymph vessels passing from the superficial to the deep lymph nodes.

* **Femoral Triangle**

**\*\* Site,** an inverted triangular space on the front of the upper third of the thigh.

**\*\* Boundaries;**

**1- Base**; inguinal ligament.

**2- Laterally**, medial border of sartorius.

**3- Medially**, medial border of adductor longus.

**4-** **Apex**, the meeting of the medial and lateral borders (continuous below with the adductor canal).

**5-** **Floor**: formed by 4 muscles; arranged from medial to lateral,

1) Adductor longus. 2) Pectineus.

3) Psoas major. 4) iliacus.

**6- Roof**: Skin, superficial fascia and deep fascia.

 **\*\* Contents:**

**1- Femoral vein** and its tributaries.

**2- Femoral artery** and its branches.

**3- Femoral nerve** and its branches.

**4- Femoral sheath**.

5- Great saphenous **vein**.

6- Profunda femoris **artery**.

**7- Fascia:** - Fascia transversalis. - Fascia iliaca.

 **8-** **Lymph nodes:** superficial and deep inguinal lymph nodes.

 **10-** Collection of **fat.**

* **Femoral Sheath**

- It is a fascial sheath surrounding the upper part of the femoral vessels.

**\*\* Shape;** It is a funnel-shaped. Its medial part is much shorter.

**\*\* Formation;** the sheath has anterior and posterior walls.

 - **Anterior wall** is a fascia transversalis**.**

 **- Posterior wall** is a fascia iliaca.

**\*\* Compartments:** It is divided by 2 septa into 3 compartments.

**A- Lateral** **compartment**:transmits the femoral artery and femoral branch of the genitofemoral nerve.

**B- Intermediate** **compartment**:transmits the femoral vein.

**C- Medial compartment**: **called femoral canal**.

* **Femoral canal**

\*\* **Definition**; It is the shortest medial compartment of the femoral sheath.

\*\* **Long**, half an inch.

\*\* **Superiorly** (**base**), it has an abdominal opening called **femoral ring.**

* **Femoral ring**

- It is the base of the femoral canal

**\*\* Sex Differences of the** ring: It is **wider in female** than male and so the femoral hernia is more common in female than male.

**\*\* Contents of the femoral canal;** It is relatively empty and it contains,

 1- Loose areoler **fatty** tissue.

 2- Lymph node of Cloquet.

**\*\* Functions (clinical importance) of femoral canal;**

1. Itaccommodates the distension of the femoral vein during increase venous return from the lower limb as during running.
2. It transmits the lymphatic from the lower limb to the external iliac lymph nodes.

**\*\* Surgical importance**; the site for the passage of **femoral hernia**.

* **Femoral hernia**

\*\* **Definition**; abnormal protrusion of any abdominal contents through the femoral ring (weak part in the abdominal wall) to the femoral canal.

**\*\* Sex Differences,** Femoral hernia is **more common in** **females** because

 1) The femoral ring is wider in females.

 2) Narrow blood vessels in females.

 3) Weak muscle of anterior abdominal wall.

 4) Repeated exposure to strains in childbearing.

**\*\* Clinical features;**

1- **Line of descent:**

a- It descends **vertically** **downwards** in the femoral canal.

b- Then, **forwards** through the saphenous opening.

c- **Then, upwards and laterally** towards the anterior superior iliac spine? Because

- Saphenous opening in the deep fascia of the thigh.

- The deep fascia of the thigh is firmly attached to the membranous layer of the superficial fascia just below the inguinal ligament.

**2- Line of reduction:** the hernia is reduced in an opposite direction to the line of descend.

**3- Surgical importance of the hernia**

**a- Why** **it is a dangerous hernia**? Because It is liable to obstruction by the sharp margin of the lacunar ligament.

**b- Why must be care during surgical interference?** Because abnormal obturator artery (in about 20% of subjects) descends behind the lacunar ligament thus it is liable to injury during repair of the hernia.

* **Femoral Nerve**

**\*\* Origin:** The femoral nerve is a branch of the lumbar plexus (dorsal divisions of the ventral rami L 2, 3 & 4).

**\*\* Course and relations:**

- The nerve is formed inside the psoas major muscle then leaving it through its lateral border.

- It descends in the groove between the psoas major and iliacus.

- It is lateral to the femoral artery outside the femoral sheath.

- One inch below the inguinal ligament, it ends by two divisions (anterior and posterior).

**\*\* Branches**

1. **Muscular branches:**
	1. **Ilacus muscle** in the abdomen**.**
	2. Lateral 1/2 of pectineus in the thigh.
	3. Sartorius muscle.
	4. Quadriceps femoris muscles. Articularis genu muscle (from nerve to vastus intermedius).

**B- Articular branches**

1- to the hip joint (from nerve to rectus femoris).

2- to the knee joint (from branches to 3 vasti).

**C- Cutenous branches:**

 **1- Medial cutaneus nerve** of the thighto the medial part of the thigh.

 **2- Intermediate cutaneus nerve** of the thighto the front part of the thigh.

 **3- Saphenous nerve (L3 & 4) from posterior division.**

**- I**t is the longest cutaneous nerve in the body.

- It descends lateral to the femoral artery in the femoral triangle.

- In the adductor canal, it crosses infront of the artery from lateral to medial.

- At the lower end of the canal, it pierces the roof of the canal to become subcutaneous.

- It descends on the medial side of the knee joint **hand breadth** behind the patella.

- The nerve descends on the medial side of the leg with the great saphenous vein, infront of the medial malleolus, then infront of the extensor retinaculum to the dorsum of the foot.

- It **ends** opposite the metatarso-phalangeal joint of the big toe.

**Branches:**

**-** Infrapatellar branch to the skin over the patella.

**- It supplies the skin** ofthe medial side of the leg and medial side of the dorsum of the foot**.**

* **Muscles of the anterior compartment**

**1- Sartorius**

- It is the longest muscle of the body and it may be **absent**.

**\*\* Origin:** from the anterior superior iliac spine.

**\*\* Insertion:** into the upper part of the medial surface of the tibia (SGS).

**\*\* Nerve supply:** anterior division of the femoral nerve.

**\*\* Actions:**

 a- Flexion, abduction and lateral rotation of the thigh.

 b- Medial rotation of the flexed leg.

*N.B;* Putting the lower limb in the classical cross leg position (tailor position*)*

**2- Quadriceps Femoris**

- This is formed of 4 heads that have a common insertion into the patella.

**\*\* Origin** - The 4 heads of the quadriceps are:

**1- Rectus femoris;** It arises by two heads:

 **a- Straight head** from the anterior inferior iliac spine.

 **b- Reflected head** from an impression just above the acetabulum.

**2- Vastus lateralis:** arises by a linear origin from

 1- Upper part of the intertrochanteric line.

 2- Root of the greater trochanter.

 3- Lateral margin of the gluteal tuberosity.

 4- Lateral lip of the linea aspera.

 5- Lateral supracondylar line.

**3- Vastus medialis:** also arises by a linear origin from

 1- Lower part of the Intertrochanteric line.

 2- Spiral line.

 3- Medial lip of the lina aspera.

 4- Medial supracondylar line.

**4- Vastus intermedius,** from the upper 3/4 of the anterior and lateral surfaces of the shaft of the femur.

**\*\* Insertion into:**

- The base, borders and anterior surface of the patella.

- Tibial tuberosity through Ligamentum patellae.

**\*\* Nerve supply:** from the femoral nerve.

**\*\* Actions:**

 1- The quadriceps is the extensor of the knee joint.

 2- The rectus femoris helps in flexion of the hip joint.

**3- Articularis genu muscle**

**\*\* Origin**, from the lower part of the anterior surface of the femur.

**\*\* Insertion,** into the synovial membrane of the knee joint.

**\*\* Nerve supply,** from the nerves supplying the vastus intermedius.

**\*\* Action,** It pulls the synovial membrane up during extension of the knee joint to prevent its damage between the bones.

**4- Psoas major**

**\*\* Origin** a- transverse process of all lumbar vertebrae.

b- Sides of the bodies of last thoracic and all lumbar vertebrae and the discs in between.

c- Tendinous arch over the lumbar vessels.

**\*\* Insertion**:- into the lesser trochanter of the femur.

**\*\* Nerve supply** from the lumbar plexus.

**\*\* Action,** 1- main flexor of the hip joint and lateral rotation.

 2- Flexion of the trunk.

**5- Iliacus**

**\*\* Origin,** from the iliac fossa, and upper part of the ala of the sacrum.

**\*\* Insertion,** with the psoas major into the lesser trochanter.

**\*\* Nerve supply,** femoral nerve.

**\*\* Action,** as the psoas major.

|  |
| --- |
| **\*\* Applied anatomy;** In cases of fracture of the neck of the femur, the distal fragment rotated laterally by the iliopsoas. |

* **Medial Side of the Thigh**

**- The muscles arranged into 3 layers:**

* + - The 1st layer is adductor longus and pectinus.
		- The 2nd layer adductor brevis.
		- The 3rd layer adductor magus and onbturator externus.
		- Strap muscle (gracilis) lies medial to the above 3 layers.

**\*\* All these muscles**

* + - **Arise from** the pubis except ischial part of the adductor magnus (ischium).
		- **Inserted in** the back of the femur except gracilis muscle (tibia).
		- **Action:** adduction, flexion and lateral rotation of the thigh.
		- **They prevent** lateral tilting of the hip bone when standing on none leg, so they are active in supporting the limb during walking.
		- **Supplied by** obturator nerve except ischial part of adductor mangnus (sciatic nerve) and lateral 1/2 of peectinus (femoral nerve).

* **Pectineus**

**\*\* Origin:** from the pectineal surface of the superior pubic ramus.

**\*\* Insertion:** Into the upper 1/2 of the line between the lesser trochanter and Iinea aspera.

**\*\* Nerve supply:** femoral nerve (lateral 1/2) and obturator nerve (medial 1/2).

**\*\* Actions:** adduction, flexion and lateral rotation of the thigh.

* **Adductor Longus**

**\*\* Origin:** by a rounded tendon from the body of the pubis just below the pubic tubercle.

**\*\* Insertion:** intothelinea aspera.

**\*\* Nerve supply:** anterior branch of obturator nerve.

**\*\* Actions:** adduction, flexion and lateral rotation of the thigh.

* **Adductor Brevis**

**\*\* Origin:** from the body of the pubis and inferior pubic ramus below the origin of adductor longus.

**\*\* Insertion:** into the lower 1/2 of the line between the lesser trochanter and lina aspera, extending to the upper part of the linea aspera.

**\*\* Nerve supply:** anterior branch of obturator nerve.

**\*\* Actions,** adduction, flexion and lateral rotation of the thigh.

* **Adductor Magnus**

**\*\* Origin:**

**1- The pubic part** from the inferior pubic ramus.

**2- Ischial part** from the ischial ramus and lateral part of the lower area of ischial tuberosity.

**\*\* Insertion:**

**1- The pubic** part into

1) The medial margin of the gluteal tuberosity.

2) The linea aspera.

3) Upper part of the medial supracondylar line.

**2- The ischial part** into the lower part of the medial supracondylar line and adductor tubercle.

**\*\* Nerve supply:**

 1- The **pubic** part, by the posterior branch of obturator nerve.

 2- The **ischial** part, by the sciatic nerve.

**\*\* Actions:**

 1- The **pubic** part, adduction, flexion and lateral rotation of the thigh.

 2- The **ischial** part, adduction, extension, and medial rotation of the thigh.

* **Gracilis**

**\*\* Origin:** from the lower 1/2 of the body of the pubis and inferior pubic ramus.

**\*\* Insertion:** into the upper part of the medial surface of tibia behind the sartorius (S.G.S).

**\*\* Nerve supply:** anterior branch of obturator nerve.

**\*\* Actions:**

 1- Adduction, flexion and lateral rotation of the thigh.

 2- Flexion and medial rotation of the flexed leg.

* **Obturator Externus**

**\*\* Origin:** from the outer margin of the obturator foramen and the outer surface of the obturator membrane

**\*\* Insertion:** into the trochanteric fossa of the greater trochanter.

**\*\* Nerve supply:** posterior branch of obturator nerve.

**\*\* Actions:** Adduction and lateral rotation of the thigh.

* **Obturator Nerve**

**\*\* Beginning:** branch of the lumbar plexus inside the psoas major muscle in the abdomen.

**\*\* Roots:** from the ventral divisions of the ventral rami of L 2, 3 and 4.

**\*\* Course and relations in the thigh:**

- The nerve is formed inside the psoas major muscle then leaving it through its medial border.

- It reaches the thigh by passing through the obturator canal with the obturator vessels.

**\*\* Branches;**

**1- Anterior branch:** gives the following branches:

1) **Muscular** branches to the adductor longus, adductor brevis, gracilis and medial 1/2 of pectinus.

2) **Articular** branch to the hip Joint.

3) **Cutanous** branch to the skin of the middle 1/3 of the medial side of the thigh.

**4) Vascular branches** to the wall of the femoral artery.

**2- Posterior branch**: gives the following branches:

1) **Muscular** branches to the pubic part of adductor magnus and obturator externus.

2) **Articular** branch to the knee joint.

* **Adductor Canal**

(Subsartorial or Hunter’s) canal

**\*\* Site (**surface anatomy**):** It is an intermuscular tunnel in the middle 1/3 of the medial part of the thigh.

**\*\* Beginning**, at the apex of the femoral triangle.

**\*\* End,** at the opening in the adductor magnus.

**\*\* Shape,** The canal is triangular in cross section.

**\*\* Boundaries:**

**1-** **Posterior wall (floor);** Adductor longus and adductor magnus.

**2- Antero-lateral wall:** vastus medialis.

**3-**  **Antero-medial wall (roof):**

1- Fibrous sheath between the vastus medialis and adductor longus.

2- Sartorius muscle

 **\*\* Contents:**

**1-** **Femoral artery** that continues as popliteal artery**.**

**2- Femoral vein**.

**3- Saphenous nerve** crosses in front of the femoral artery from lateral to medial side.

**4- Saphenous artery** from femoral or descending genicular artery.

**5- Descending genicular artery**; from the femoral artery.

**6- Nerve to vastus medialis**.

**7- Lymph vessels**.