



- Hip bone & femur:

- **Hip bone:**
 - ✓ Containing acetabulum which is occupied by more than half of the femoral head.
 - ✓ Formed by 3 bones: ilium, ischium and pubis which are separated by cartilage during childhood. They will be completely fused between 20-25 years of age.
 - ✓ Acetabulum:
 - ❖ Acetabulum labrum (connective tissue) making it more deep.
 - ❖ The articulating part is C-shaped covered with hyaline cartilage.
 - ❖ It has a central non-articulating part.
 - ✓ Obturator foramen: it is covered by obturator membrane and obturator artery (branch from internal iliac artery) and nerve (L2-L4) are passing through it.
- **Femur (thickest, longest bone in the body so it can bear weight):**
 - ✓ Head of the femur: spherical and large. It is covered with hyaline cartilage except for a central part known as the fovea for the ligament of femoral head.
 - ✓ Neck of the femur: it is long and ending by greater and lesser trochanters which are connected by intertrochanteric line anteriorly and intertrochanteric crest posteriorly.
 - ✓ Angle of inclination: 126 degrees (average in adults). This angle is decreasing in females because of their wider pelvis (+ femurs are directed more obliquely).
 - ✓ Posterior aspect of the femur: the double-edged linea aspera is found forming the medial and lateral supracondylar ridges near the distal end of the femur.
 - ✓ Shenton's line: it is a smooth continuous line from the upper border of obturator foramen to the lower border of the neck of femur. If the continuity is lost in radiograph → this indicated the presence of fracture or dislocation of the hip joint.

- Hip joint:

- **Type:** synovial ball-and-socket joint.
- **Articular surfaces:** head of the femur and the lunated C-shaped articular surface of the acetabulum of hip bone.
- **Fibrous capsule:** extending from the bony margin of acetabulum to the intertrochanteric line anteriorly, but covering only 2/3 of femoral neck posteriorly.
- **Synovial membrane:** a closed sac containing synovial fluid and lining all non-articulating surfaces inside the fibrous capsule of the joint.
- **Ligaments:**
 - ✓ Iliofemoral: y-shaped – preventing hyperextension of the hip joint.
 - ✓ Pubofemoral: preventing over-abduction of hip joint.
 - ✓ Ischiofemoral: can be seen from the posterior aspect – weak ligament.
- **Stability and movements:**
 - ✓ Hip joint is stable (the acetabulum is covering more than half of the femoral head).
 - ✓ Movements are relatively limited. Types of movements are:
 - ❖ Flexion-extension.
 - ❖ Abduction-adduction.
 - ❖ Lateral and medial rotations.
 - ❖ Circumduction.
- **Vasculature and innervation:**
 - ✓ Arterial supply:
 - ❖ Retinacular arteries coming from medial and lateral circumflex arteries.



- ❖ Acetabular branch of obturator artery going through the pit for the ligament of femoral head.

- Muscles of the thigh:

- **Anterior thigh muscles (all of them are innervated by the femoral nerve L2-L4 except for psoas major which is innervated by the lumbar nerve):**

- ✓ Pectineus: extending from the superior ramus of the pubis to the pectineal line on the femur. It causes: adduction, flexion and medial rotation.
- ✓ Sartorius: extending from the anterior superior iliac spine to the supero-medial aspect of the tibia. It causes abduction, flexion and lateral rotation.
- ✓ Iliopsoas muscle which is composed of:
 - ❖ Psoas major: extending from T12-L5 vertebrae to the lesser trochanter of the femur.
 - ❖ Iliacus: extending from iliac crest and iliac fossa to the lesser trochanter of the femur.

Note: both of them will cause flexion of the thigh and maintain posture. Psoas major will cause lumbar lordosis and compensatory thoracic kyphosis of the vertebral column during standing.
- ✓ Quadriceps femoris:
 - ❖ Rectus femoris: originating from the anterior inferior iliac spine. It causes flexion of the thigh and extension of the leg at knee joint. Its ability to extend the knee is limited when the thigh is flexed.
 - ❖ Vastus lateralis: originating from the greater trochanter and lateral lip of linea aspera.
 - ❖ Vastus medialis: originating from intertrochanteric line and medial lip of linea aspera.
 - ❖ Vastus intermedius: originating from anterior and lateral aspects of the femur bone.

Note: all of these 4 muscles will merge to form the quadriceps tendon in which the patella will be embedded and then will continue as the patellar ligament to inset in the tibial tuberosity.

- **Medial thigh muscles (they are adductor muscles causing adduction of the thigh. All of them are innervated by obturator nerve except for the hamstring part of adductor magnus):**

- ✓ Adductor longus.
- ✓ Adductor brevis: which is found deep to pectineus and adductor longus muscles.
- ✓ Adductor magnus: with 2 parts (adductor part which is innervated by obturator nerve and hamstring part which is innervated by the tibial division of sciatic nerve).
- ✓ Gracilis: because of its minor function it can be removed and used in transplantation surgeries.
- ✓ Obturator externus.

- **Posterior thigh muscles (their main function is to extend the thigh and flex the knee. All of them are innervated by the tibial division of sciatic nerve):**

- ✓ Biceps femoris with its long and short heads.
 - ✓ Semi-tendinosus.
 - ✓ Semi-membranosus.
- Note:** the ability of these muscles to flex the knee is limited when the thigh is fully extended. The opposite is true.

- Muscles of the gluteal region: they are classified to:

- **Superficial muscles which include:**

- ✓ Gluteus maximus: causing extension of the thigh and lateral rotation. Its outer-lateral quadrant is a preferred site for intramuscular injections (large area for distribution of the drug).
- ✓ Gluteus medius and gluteus minimus: they cause abduction and medial rotation of the thigh.



- **Deep muscles which cause lateral rotation of the thigh and include:**
 - ✓ Piriformis.
 - ✓ Obturator internus.
 - ✓ Superior and inferior gemelli.
 - ✓ Quadratus femoris.
- **Femoral triangle:**
 - **Boundaries:**
 - ✓ Superior: inguinal ligament.
 - ✓ Lateral: Sartorius.
 - ✓ Medial: adductor longus.
 - **Contents:**
 - ✓ Femoral artery: a continuation of external iliac artery → passing through the femoral triangle lateral to the femoral vein and surrounded by femoral sheath → giving a branch named “profunda artery of femur”.
 - ✓ Femoral vein: passing through femoral triangle and surrounded by femoral sheath. Note: femoral canal is medial to femoral vein allowing it to expand when there is increased venous return.
 - ✓ Femoral nerve (L2-L4): passing through femoral triangle outside the femoral sheath.
- **Greater and lesser sciatic foramina:**
 - The sacrotuberous and sacrospinous ligaments convert the sciatic notches in the hip bones into the greater and lesser sciatic foramina.
 - **Greater sciatic foramen:** passageway for structures entering or leaving the pelvis.
 - **Lesser sciatic foramen:** passageway for structures entering or leaving the perineum.
- **Sciatic nerve:** it is the largest part of the sacral plexus. It is exiting the pelvis through the greater sciatic foramen and passing posteriorly in the mid-point between greater trochanter and ischial tuberosity. It lies on adductor magnus during its passage. When it reaches the distal third of the thigh it will bifurcate to tibial and common fibular divisions.
- **Trendelenburg test:** when a person is asked to stand on one leg, the gluteus medius and minimus normally contract as soon as the contralateral foot leaves the floor, preventing tipping of the pelvis to the unsupported site. When a person with a lesion of the superior gluteal nerve is asked to stand on one leg, the pelvis descends on the unsupported side, indicating that gluteus medius on the contralateral side is weak or non-functional.