

*** HIP JOINT**
KNEE JOINT
*** ANKLE JOINT**

BY DR.SANAA ALSHAARAWY

HIP JOINT

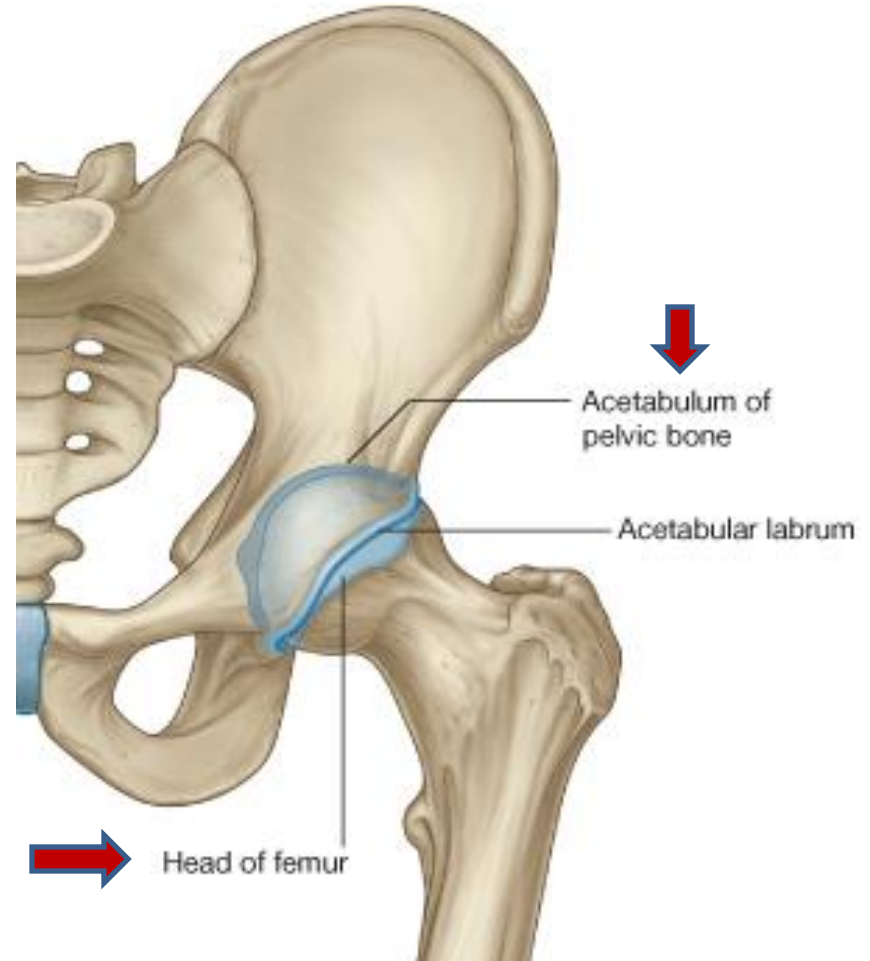
OBJECTIVES

At the end of the lecture, students should be able to:

- *List the type & articular surfaces of hip joint.*
- *Describe the ligaments of hip joints.*
- *Describe movements of hip joint.*

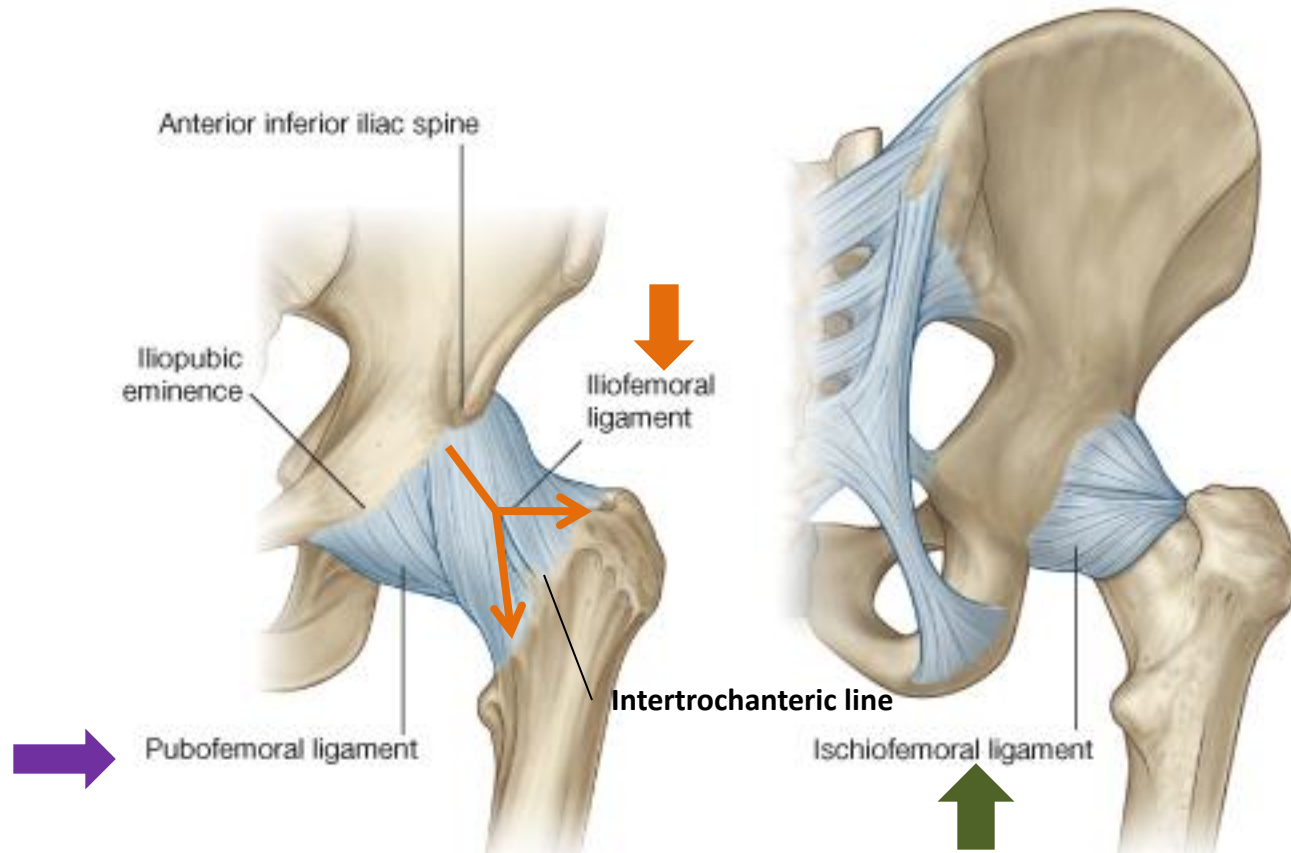
TYPES & ARTICULAR SURFACES

- **TYPE:**
 - It is a synovial, ball & socket joint.
- **ARTICULAR SURFACES:**
 - **Acetabulum of hip (pelvic) bone**
 - **Head of femur.**



LIGAMENTS

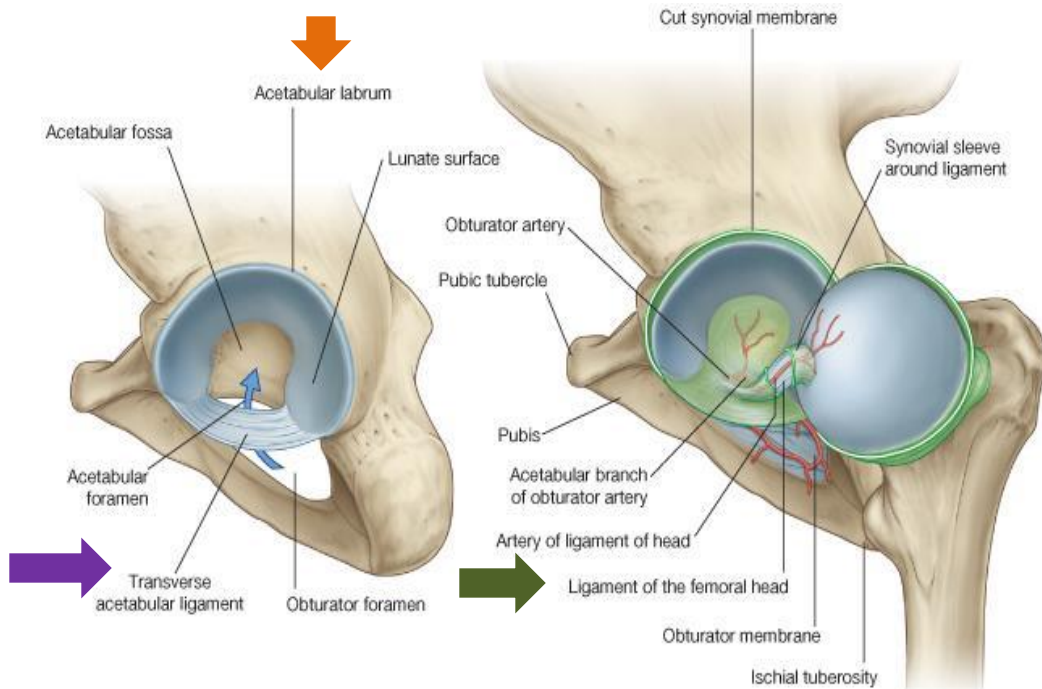
(3 Extracapsular)



- **Iliofemoral ligament:** Y-shaped strong ligament, anterior to joint, limits extension
- **Pubofemoral ligament:** antero-inferior to joint, limits abduction & lateral rotation
- **Ischiofemoral ligament:** posterior to joint, limits medial rotation

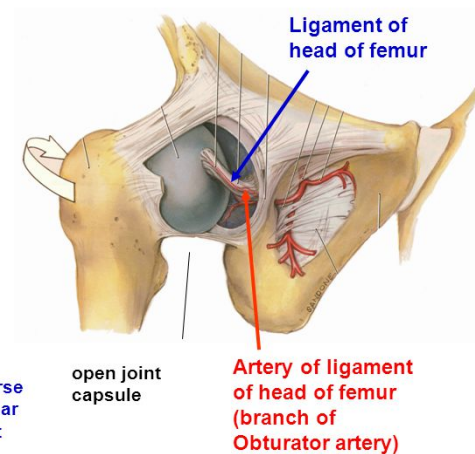
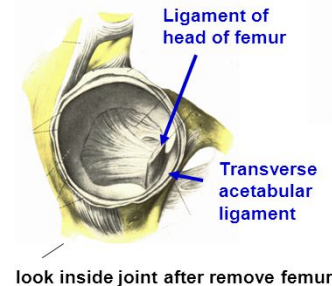
LIGAMENTS

(3 Intracapsular)



HIP JOINT - LIGAMENTS

C. **Ligament of head of femur** - inside joint capsule; attached to head of femur at fovea capitis and to transverse acetabular ligament; transmits **Artery of ligament of head of femur (branch of Obturator artery)**.



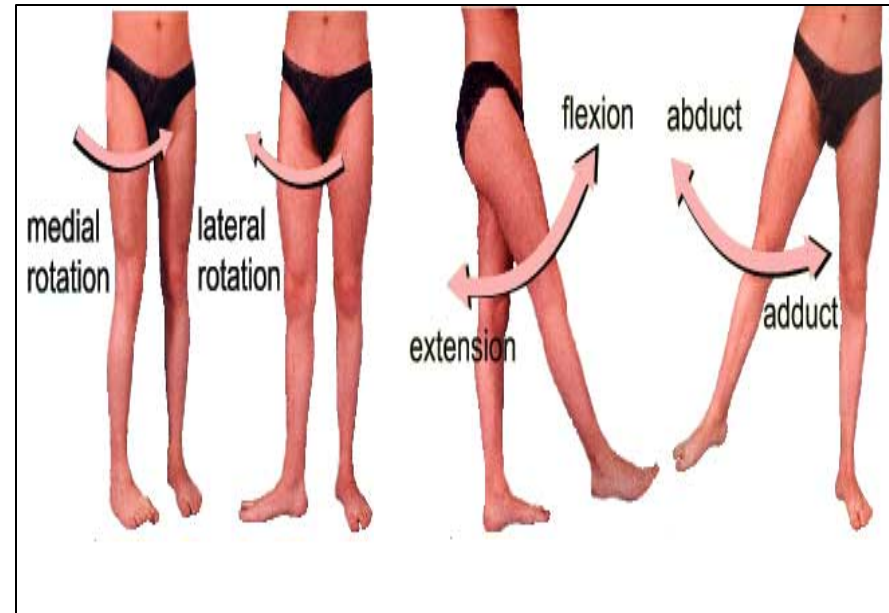
▪ **Acetabular labrum:** fibro-cartilaginous collar attached to margins of acetabulum to increase its depth for better retaining of head of femur (it is completed inferiorly by transverse ligament).

▪ **Transverse acetabular ligament:** converts acetabular notch into foramen (acetabular foramen) through which pass acetabular vessels.

▪ **Ligament of femoral head:** carries vessels to head of femur (branch of obturator artery).

MOVEMENTS

- **FLEXION:** Iliopsoas (mainly), sartorius, pectineus, rectus femoris.
- **EXTENSION:** Hamstrings (mainly), gluteus maximus (powerful extensor).
- **ABDUCTION:** Gluteus medius & minimus, sartorius.
- **ADDUCTION:** Adductors, gracilis.
- **MEDIAL ROTATION:** Gluteus medius & minimus.
- **LATERAL ROTATION:** Gluteus maximus, quadratus femoris, piriformis, obturator externus & internus.



KNEE JOINT

OBJECTIVES

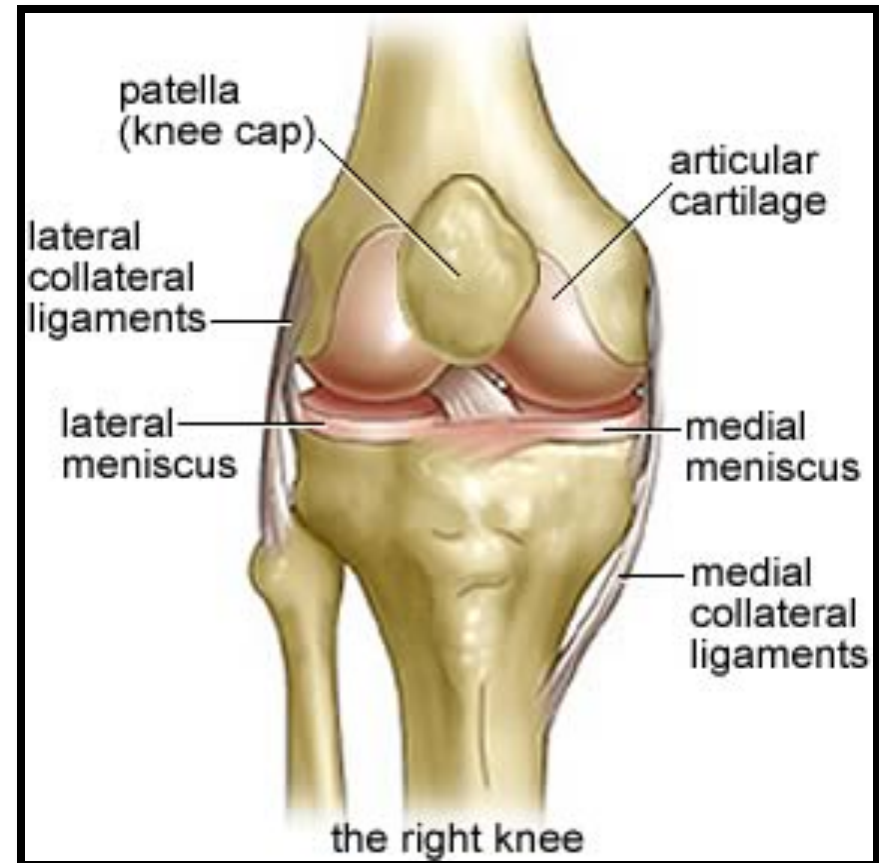
At the end of the lecture, students should be able to:

- *List the type & articular surfaces of knee joint.*
- *Describe the capsule of knee joint, its extra- & intra-capsular ligaments.*
- *List important bursae in relation to knee joint.*
- *Describe movements of knee joint.*

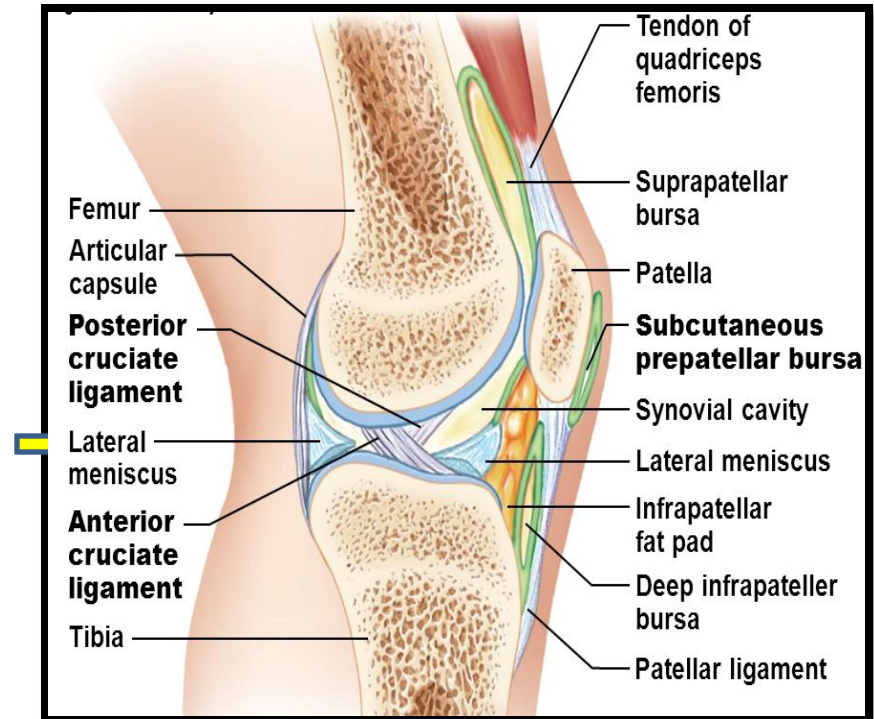
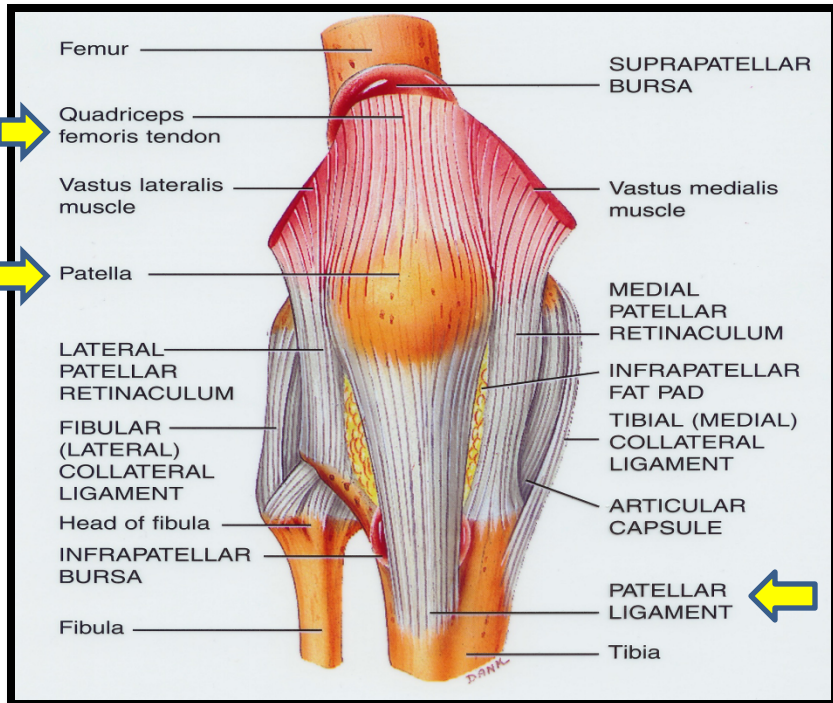
TYPES & ARTICULAR SURFACES

Knee joint is formed of:

- **Three bones.**
- **Three articulations.**
- **Femoro-tibial articulations:**
between the 2 femoral condyles & upper surfaces of the 2 tibial condyles (*Type: synovial, modified hinge*).
- **Femoro-patellar articulations:**
between posterior surface of patella & patellar surface of femur (*Type: synovial, plane*).

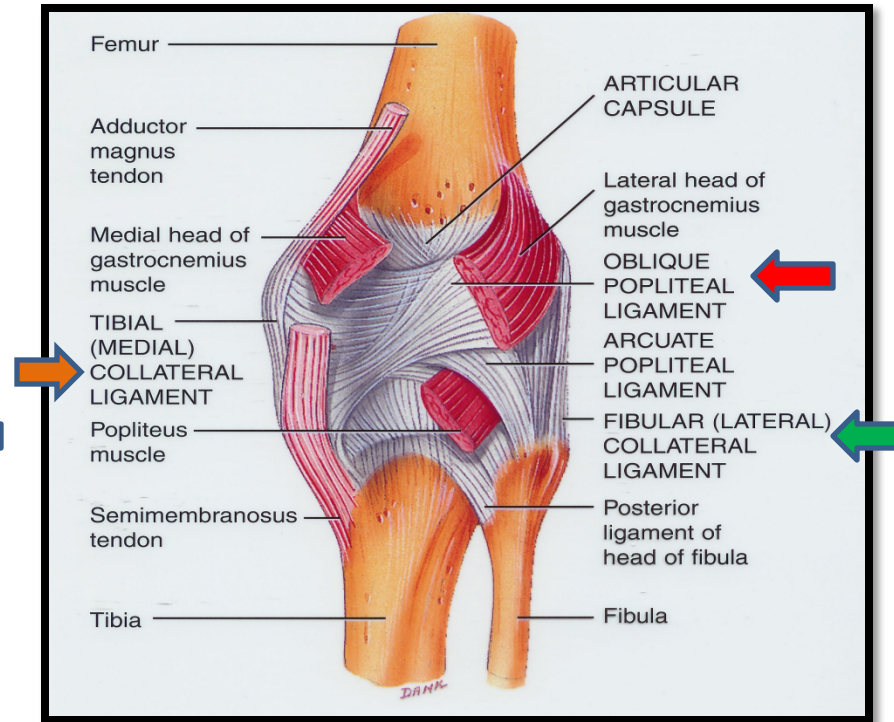
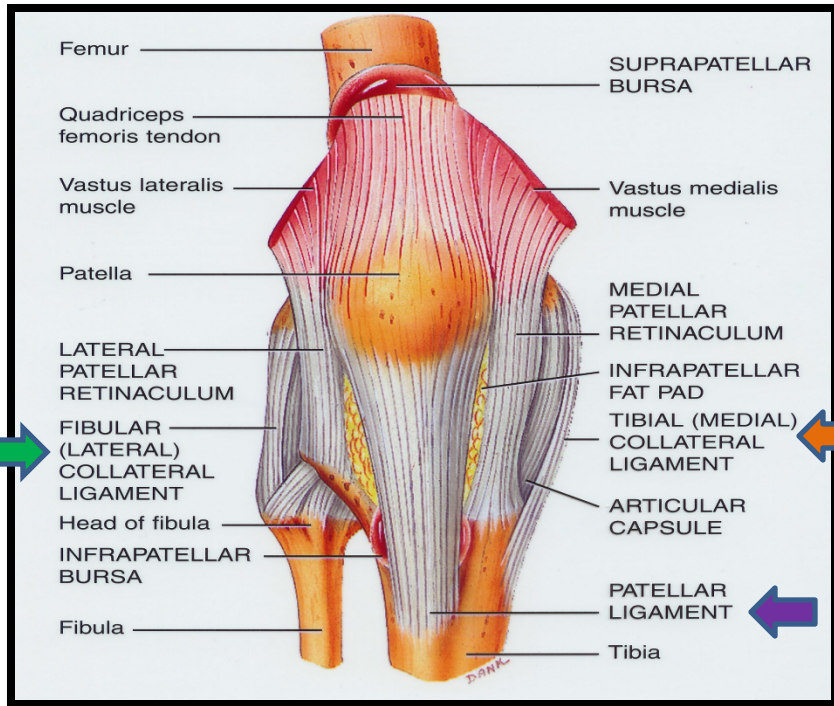


CAPSULE



- Is deficient anteriorly & is replaced by: *quadriceps femoris tendon, patella & ligamentum patellae.*
- Possesses 2 openings: one for popliteus tendon & one for communication with suprapatellar bursa.

EXTRA-CAPSULAR LIGAMENTS



1. **Ligamentum patellae (patellar ligament):** from patella to tibial tuberosity.
2. **Medial (tibial) collateral ligament:** from medial epicondyle of femur to upper part of medial surface of tibia (firmly attached to medial meniscus).
3. **Lateral (fibular) collateral ligament:** from lateral epicondyle of femur to head of fibula (separated from lateral meniscus by popliteus tendon).
4. **Oblique popliteal ligament:** extension of semimembranosus tendon.

INTRA-CAPSULAR LIGAMENTS

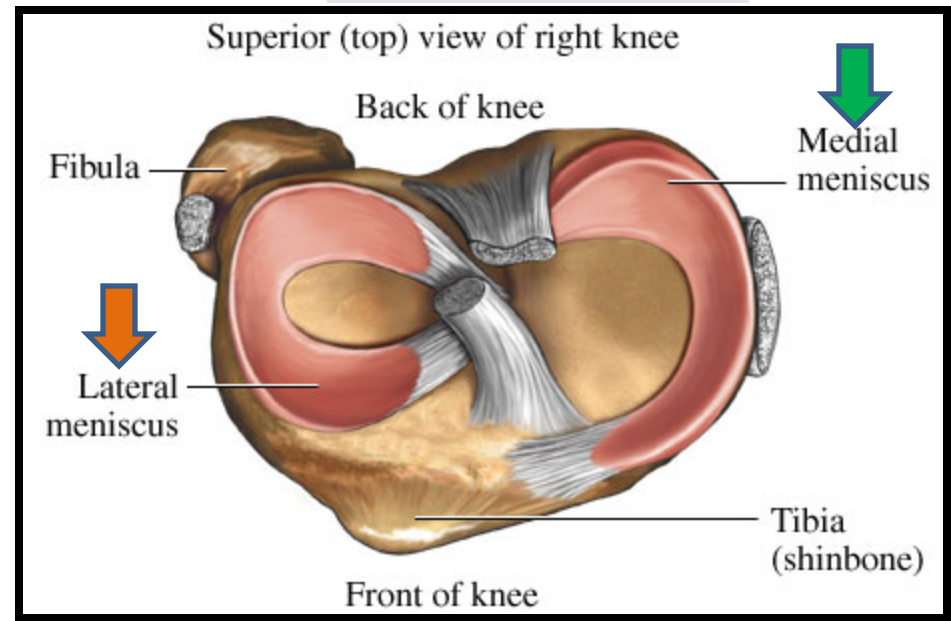
ATTACHMENTS:

- Each meniscus is attached by anterior & posterior horns into **upper surface of tibia**.
- The outer surface of **medial meniscus** is also attached to capsule & medial collateral ligament: so; ***medial meniscus is less mobile & more liable to be injured.***

FUNCTIONS:

- They deepen articular surfaces of tibial condyles.
- They serve as cushions between tibia & femur.

MENISCI



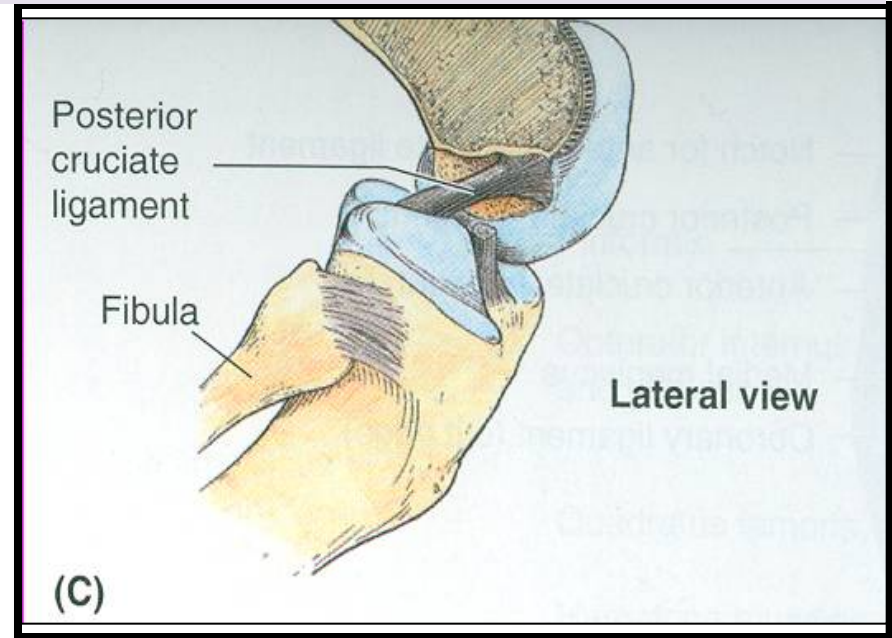
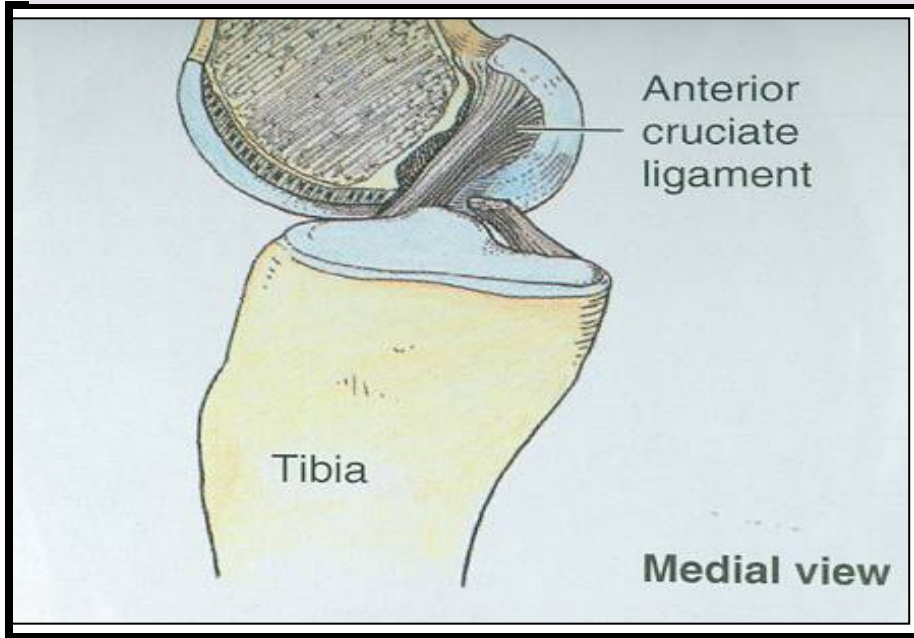
They are 2 C-shaped plates of fibrocartilage.

The **medial** meniscus is **large & oval**.

The **lateral** meniscus is **small & circular**.

INTRA-CAPSULAR LIGAMENTS

ANTERIOR & POSTERIOR CRUCIATE LIGAMENTS



ATTACHMENTS:

Anterior cruciate: from **anterior part** of intercondylar area of tibia to **posterior part of lateral condyle** of femur.

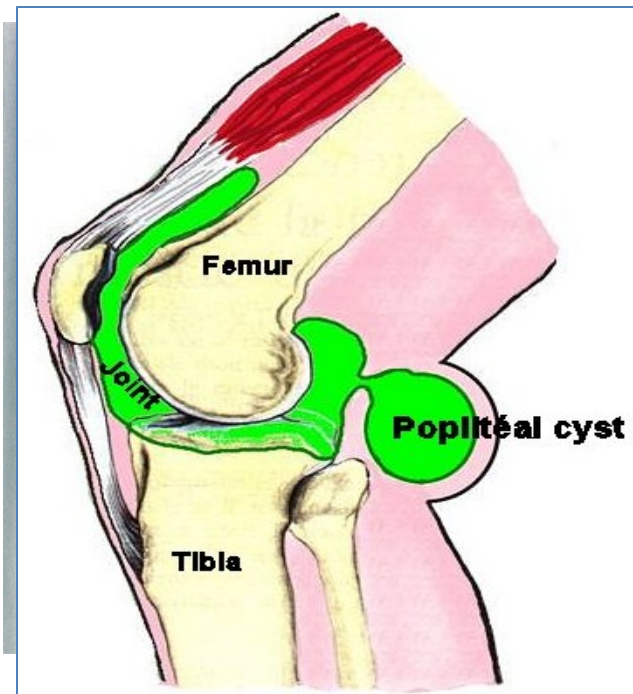
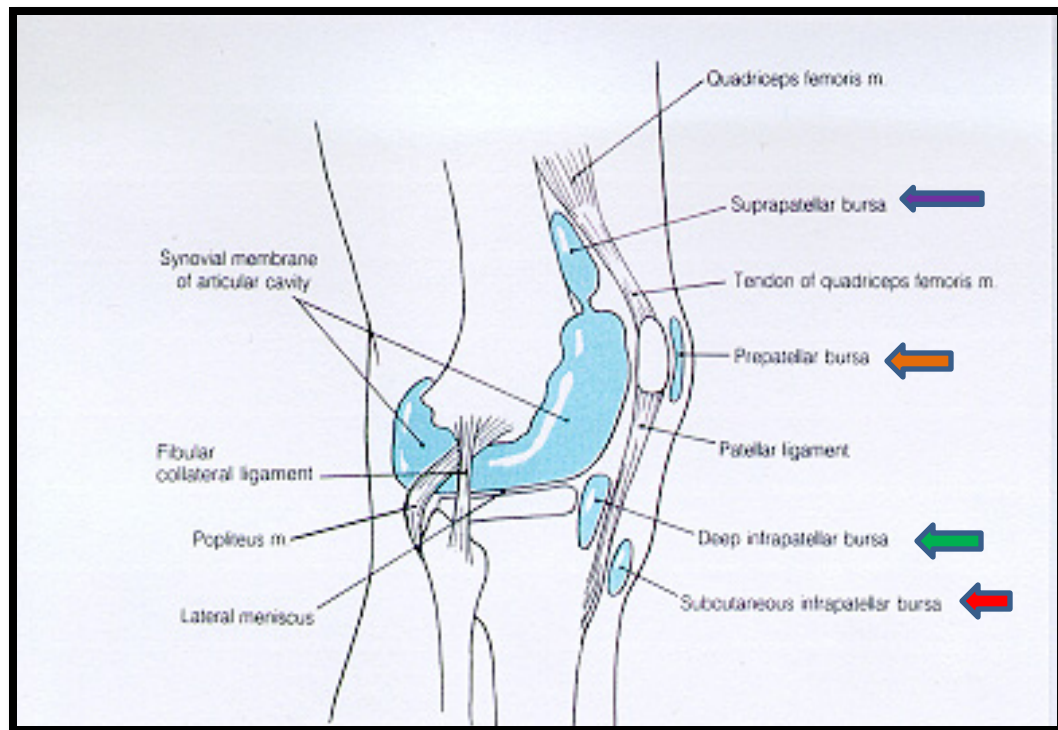
Posterior cruciate: from **posterior part** of intercondylar area of tibia to **anterior part of medial condyle** of femur.

FUNCTIONS:

Anterior cruciate: prevents **posterior** displacement of femur on tibia.

Posterior cruciate: prevents **anterior** displacement of femur on tibia.

IMPORTANT BURSAE RELATED TO KNEE



- **Suprapatellar bursa:** between femur & quadriceps tendon, communicates with synovial membrane of knee joint (Clinical importance?)---It is **commonly inflamed bursa** leads to bursitis.
- **Prepatellar bursa:** between patella & skin.
- **Deep infrapatellar bursa:** between tibia & ligamentum patella.
- **Subcutaneous infrapatellar bursa:** between tibial tuberosity & skin.
- **Popliteal bursa (not shown):** between popliteus tendon & capsule, communicates with synovial membrane of knee joint.

MOVEMENTS

- **FLEXION:**

1. Mainly by hamstring muscles : biceps femoris , semitendinosus & semimembranosus.
2. Assisted by sartorius , gracilis & popliteus.

- **EXTENSION:**

Quadriceps femoris.

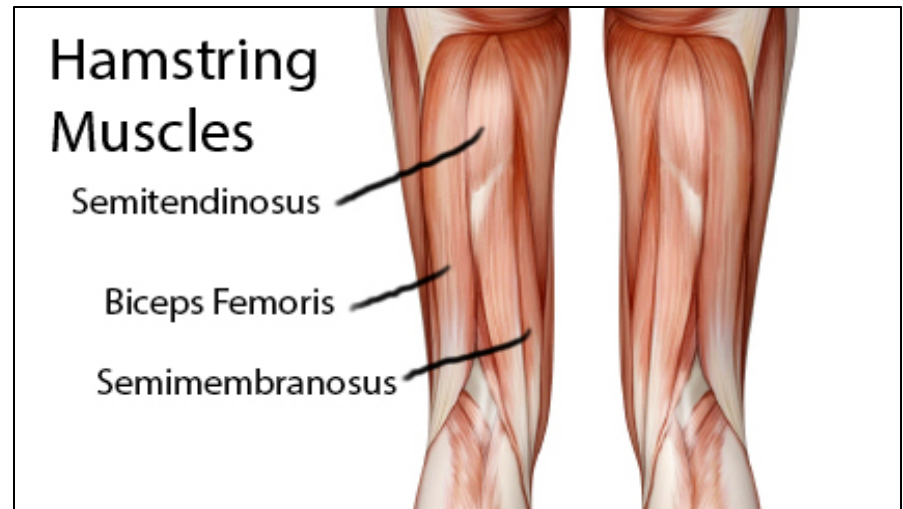
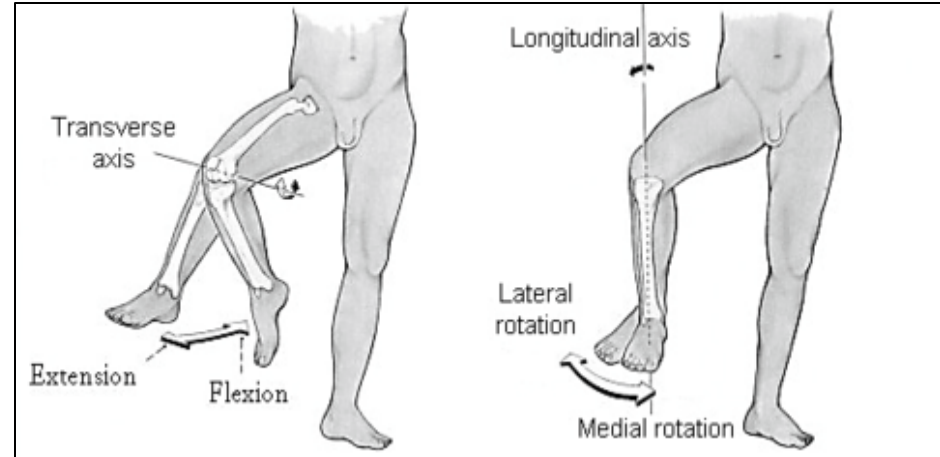
- **ACTIVE ROTATION (PERFORMED WHEN KNEE IS FLEXED) :**

- A) MEDIAL ROTATION:**

1. Mainly by semitendinosus & semimembranosus.
2. Assisted by sartorius & gracilis.

- B) LATERAL ROTATION:**

Biceps femoris.



MOVEMENTS (cont'd)

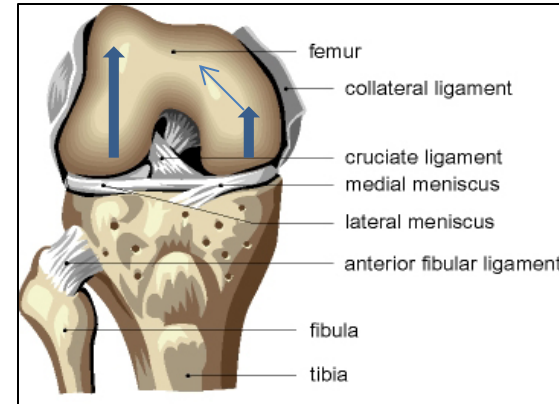
■ INACTIVE (DEPENDANT) ROTATION :

A) LOCKING OF KNEE:

- Slight Lateral rotation of tibia (or medial rotation of femur due to the shape of condyles), at the end of extension
- Results mainly by tension of **anterior cruciate ligament**.
- In locked knee, all ligaments become tight.

B) UNLOCKING OF KNEE:

- Medial rotation of tibia (lateral rotation of femur), at the beginning of flexion.
- Performed by **Popliteus** to relax ligaments & allow easy flexion.



Locking

- During last 30 degrees of extension
- Medial rotation of femur
- Helped by quadriceps femoris (mainly vastus medialis)
- As standing at attention
- The ligaments are taut

Unlocking

- During initial stages of flexion
- Lateral rotation of femur
- Helped by popliteus
- As standing at ease
- The ligaments are relaxed

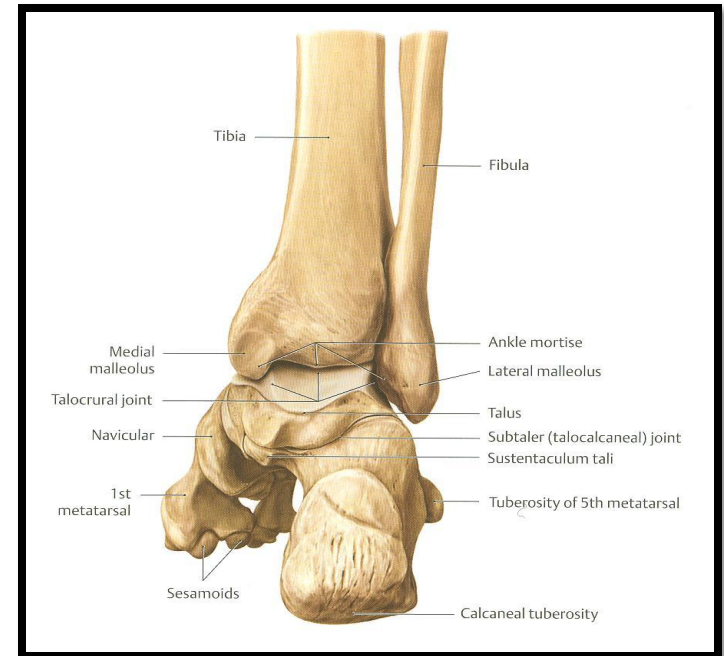
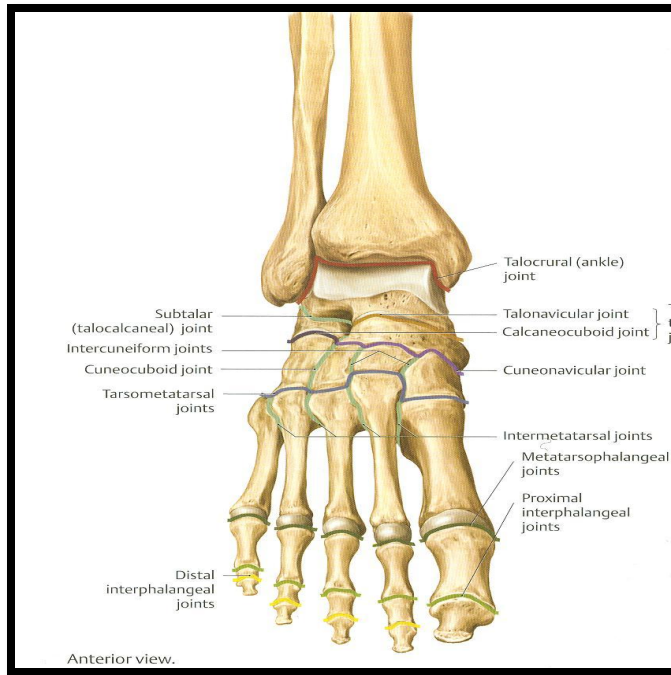
ANKLE JOINT

OBJECTIVES

At the end of the lecture, students should be able to:

- *List the type & articular surfaces of ankle joint.*
- *Describe the ligaments of ankle joints.*
- *Describe movements of ankle joint.*
- *Apply Hilton's law about nerve supply of joints.*

TYPES & ARTICULAR SURFACES



■ TYPE:

It is a **synovial, hinge joint.**

■ ARTICULAR SURFACES:

UPPER:

A socket formed by: the **lower end of tibia, medial malleolus & lateral malleolus.**

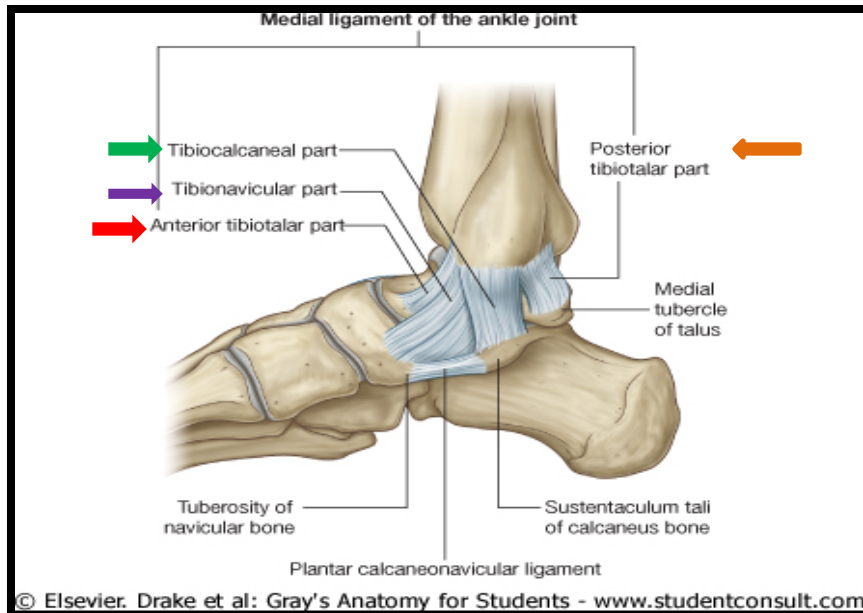
LOWER:

Body of talus.

LIGAMENTS

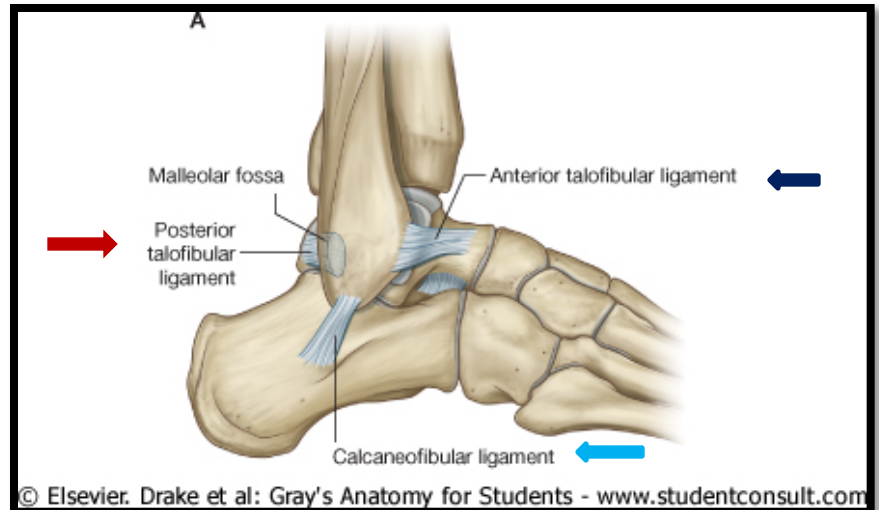
MEDIAL (DELTOID) LIGAMENT:

- A strong triangular ligament.
- **Apex:** attached to medial malleolus.
- **Base:** subdivided into 4 parts:
 1. **Anterior tibiotalar part.**
 2. Tibionavicular part.
 3. Tibiocalcaneal part.
 4. **Posterior tibiotalar part.**



LATERAL LIGAMENT:

- Composed of 3 separate ligaments.
- **Anterior talofibular ligament.**
- **Calcaneofibular ligament.**
- **Posterior talofibular ligament.**



MOVEMENTS

DORSIFLEXION:

- Performed by muscles of anterior compartment of leg (*tibialis anterior*, *extensor hallucis longus*, *extensor digitorum longus* & *peroneus tertius*).

PLANTERFLEXION:

- Initiated by soleus.
- Maintained by gastrocnemius.
- Assisted by other muscles in posterior compartment of leg (*tibialis posterior*, *flexor digitorum longus* & *flexor hallucis longus*) + muscles of lateral compartment of leg (*peroneus longus* & *peroneus brevis*).

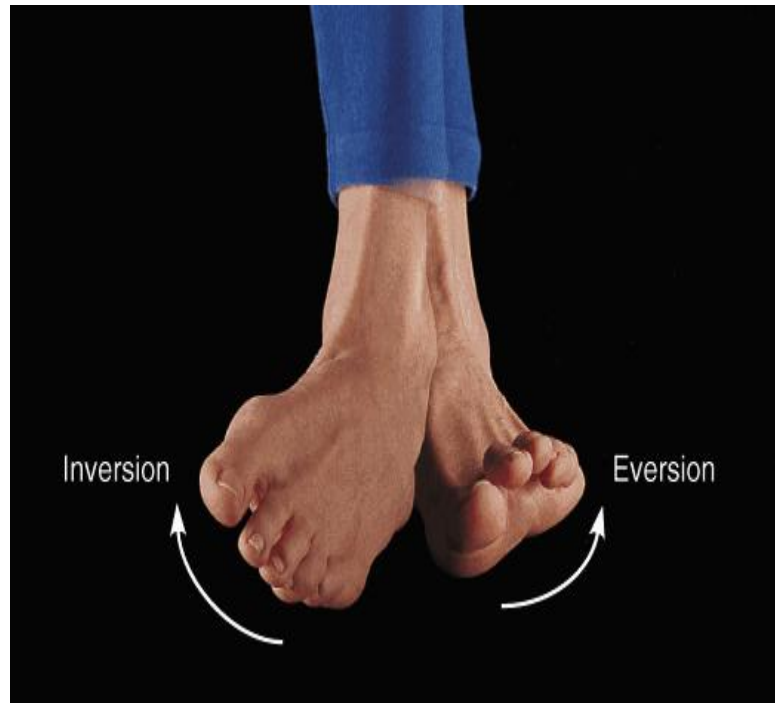


N.B.

❑ **INVERSION & EVERSION MOVEMENTS occur at the talo-calcaneo-navicular joint.**

MUSCLES PERFORM INVERSION :

- Tibialis anterior.
- Tibialis posterior.



MUSCLES PERFORM EVERSION :

- Peroneus longus.
- Peroneus brevis.
- Peroneus tertius.

NERVE SUPPLY

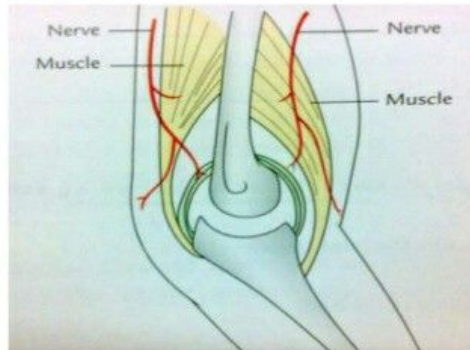
REMEMBER HILTON'S LAW:

“The joint is supplied by **branches** from **nerves supplying muscles acting on it**”.

NERVE SUPPLY

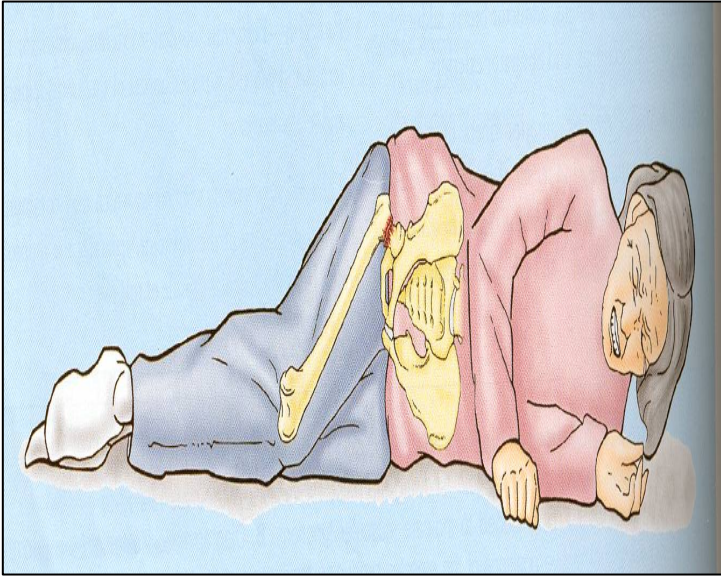
- **HILTON'S LAW**

The nerves supplying the joint capsule also supply the muscles regulating the movement of the jt & skin over the joint.

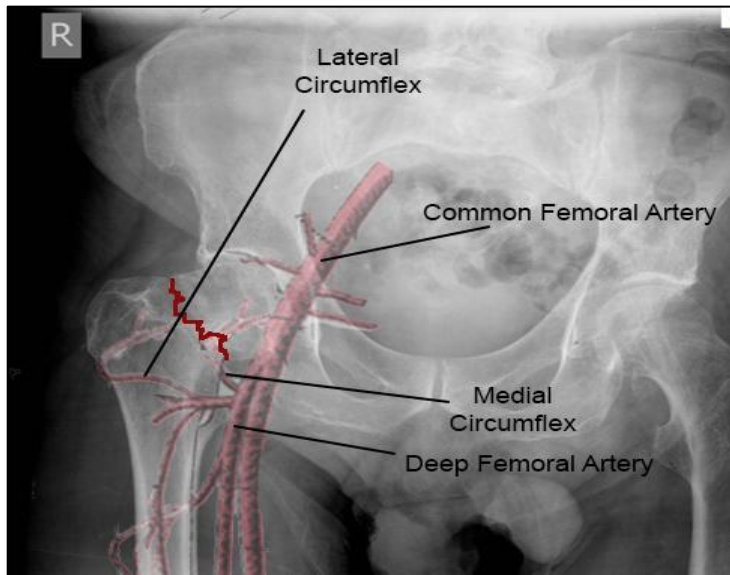


THANK YOU

Fracture neck of the femur



- It is common after age of (60) years especially in women because of **Osteoporosis**.
- It results in **a vascular necrosis** of the head of femur.
- Blood supply to femoral head; Mainly is **medial femoral circumflex**.
- **Displacement of femoral neck fracture will disrupt the blood supply and cause an intracapsular hematoma**



DISLOCATION OF HIP JOINT

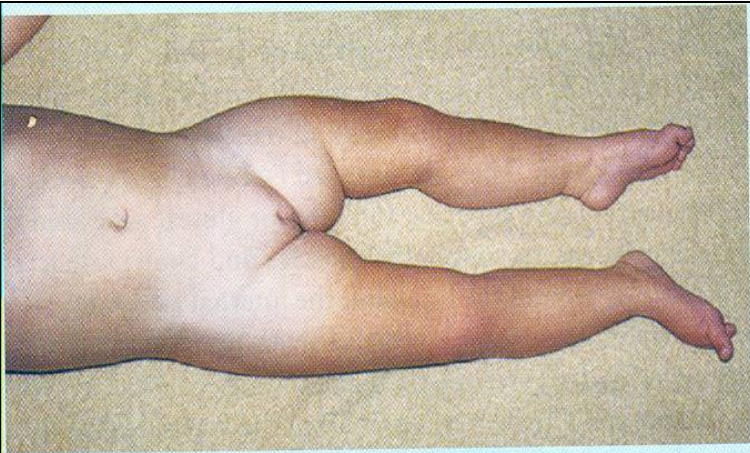
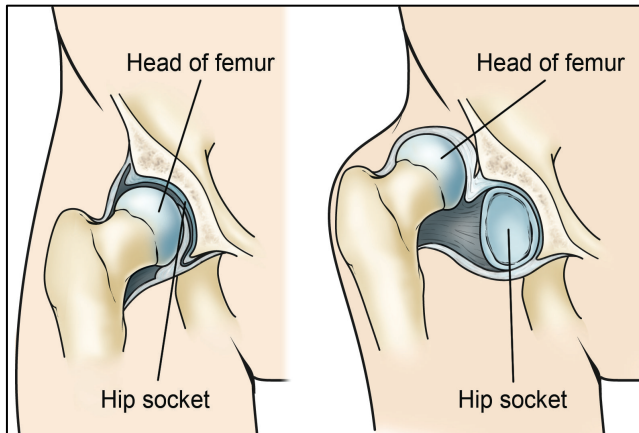
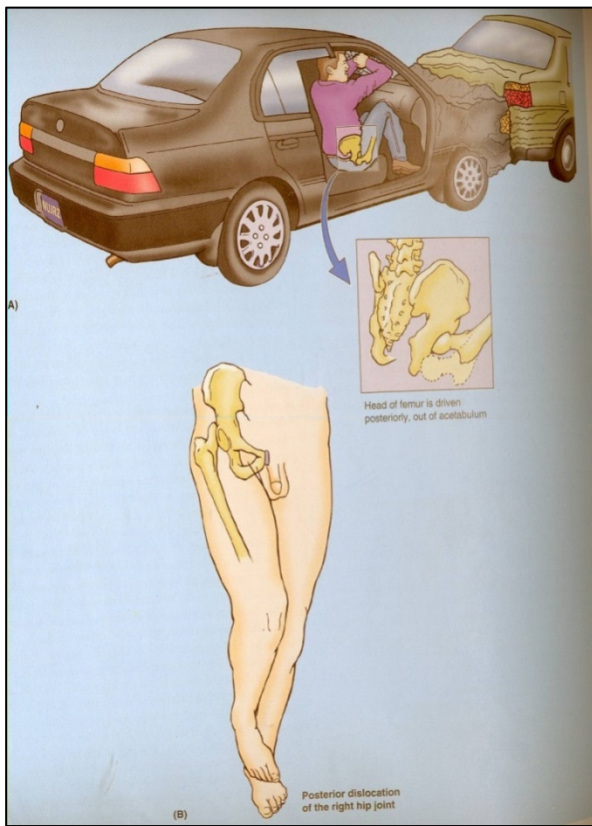


Figure 15.16 Congenital dislocation of left hip – note the extra skin creases in the upper thigh

- **CONGENITAL**
- More common in girls and associated with **inability** to adduct the thigh.
- **The upper lip of the acetabulum fails to develop adequately.**
- **The head of the femur rides up out of the acetabulum onto the gluteal surface of the ileum.**



- **TRAUMATIC Hip Dislocation:**
- It is common in motor vehicle accidents when the thigh is flexed and adducted.
- The dislocated head is displaced **posteriorly** to lie on the posterior surface of the ileum.
- In posterior dislocation the **sciatic nerve** is liable to be injured.

Knee joint injury

1. Meniscal tears :

- These pieces of cartilage can tear suddenly during sporting activities; **With a sudden meniscus tear**, a pop may be heard or felt in the knee. They may also tear slowly due to aging (**degenerative meniscus tear**).

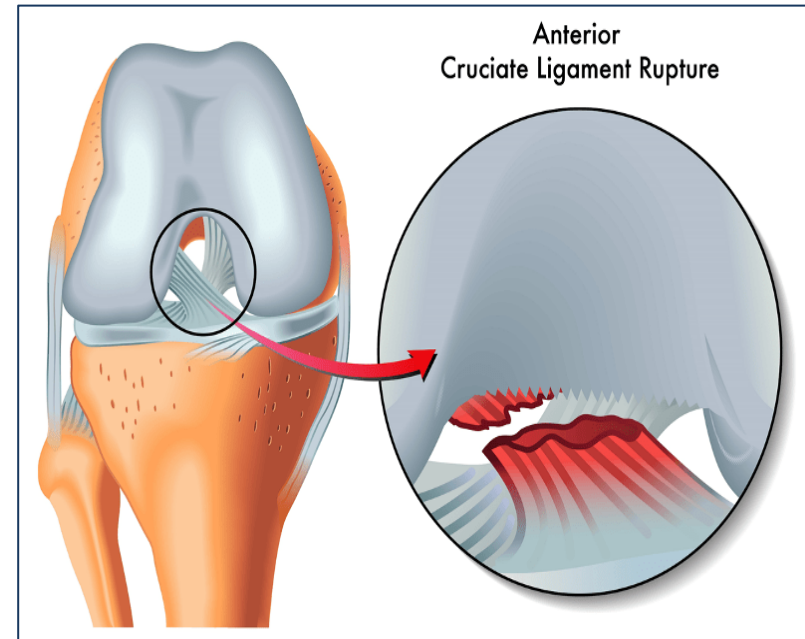
2. Anterior cruciate ligament injuries :

- Injuries to the ACL can be **serious and require surgery**.
- A grade 1 sprain is a mild injury to the ACL, while a grade 3 refers to a complete tear.

Causes : sports as in **Football**; Improperly landing from a **jump** or **quickly changing the direction**.

3. Posterior cruciate ligament injuries :

- An injury to the posterior cruciate **requires powerful force while the knee is in a bent position**.
- This happens **when someone falls hard onto a bent knee** or is in an **accident**.



What are Kinds of Ankle Injuries?

- **Ankle injuries are** Sprains, Strains, and Fracture; That affect **bone, ligament, or tendon.**
- **A sprain** is a common sports injury, but can also happen any time a sudden twist displaces the ankle joint.
- **A sprain** is the term that describes damage to **ligaments** when they are stretched beyond their normal range of motion. It ranged from mild to a complete tear or rupture.
- **A strain** refers to damage to **muscles and tendons** as a result of being pulled or stretched too far.
- **A fracture** describes a break in one or more of the **bones** in the ankle joint.

