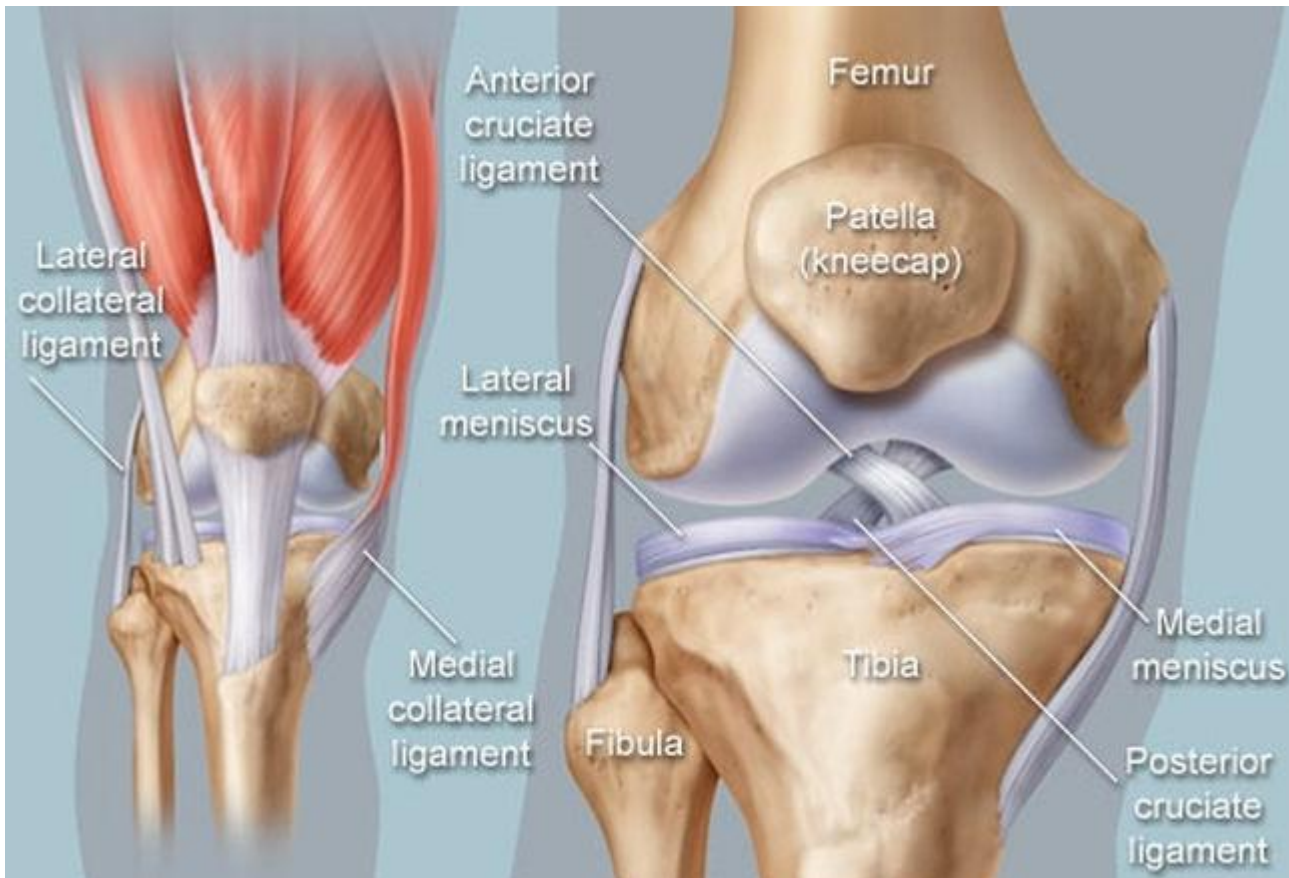


The knee joint is formed by the condyles of femur & tibia, & posterior articular surface of the patella.

It is a compound & complex synovial joint.



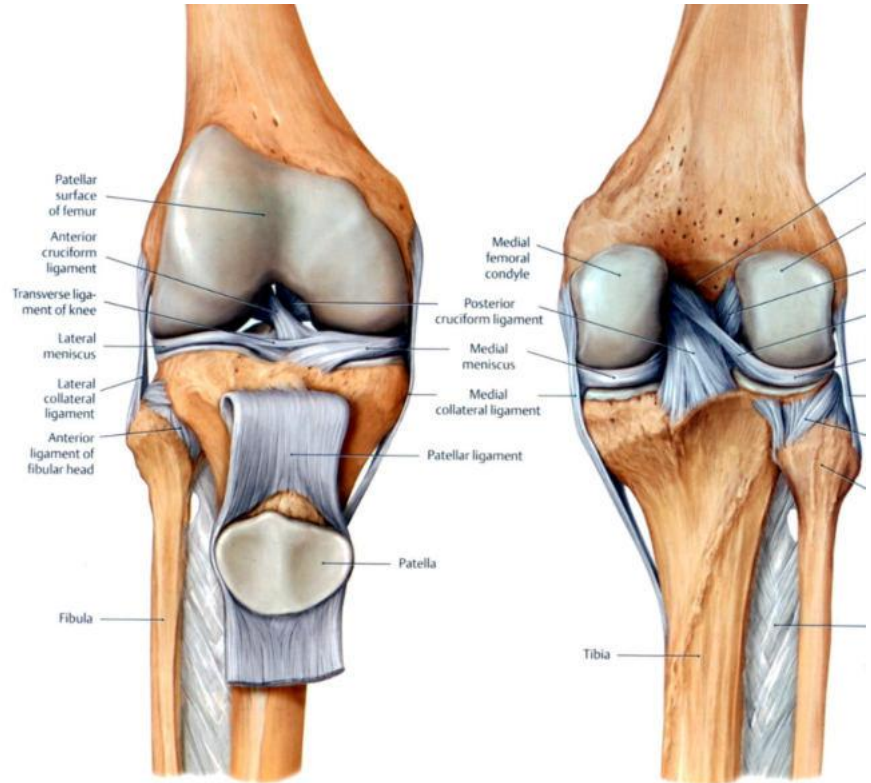
Functionally, the knee joint is a **condylar & modified hinge** joint.

1. **Transverse axis of movement is not fixed**, & moves forward during extension & translates backward in flexion;
2. Along with extension & flexion, there is a **conjunct rotation of femur on tibia(or vice versa)** around a more or less vertical axis.



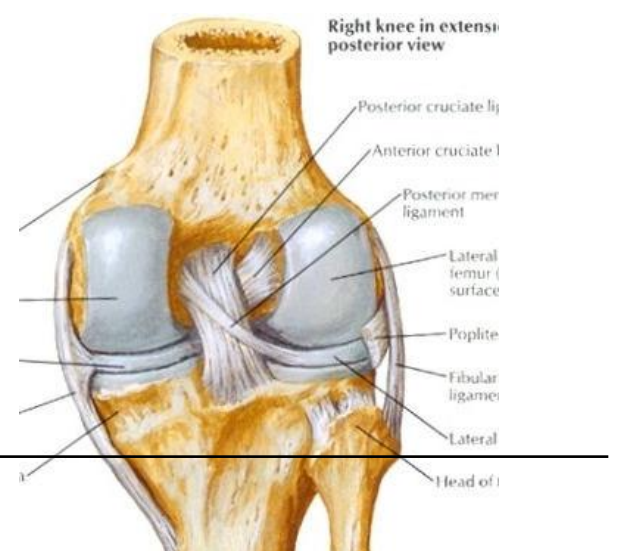
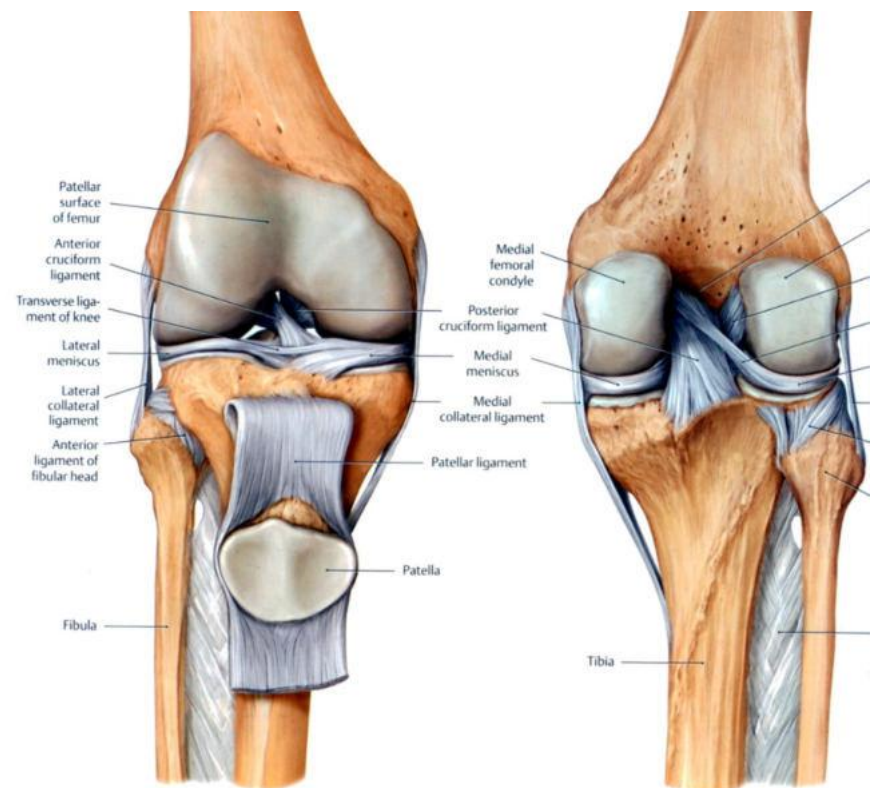
BONES FORMING THE JOINT:

1. CONDYLES OF FEMUR
2. CONDYLES OF TIBIA
3. ARTICULAR SURFACE OF PATELLA



LIGAMENTS of KNEE JOINT

1. Capsular ligament
2. Synovial membrane
3. Ligamentum patellae
4. Tibial collateral ligamen
5. Fibular collateral ligament
6. Oblique popliteal ligament
7. Arcuate popliteal ligament
8. Medial & lateral menisci



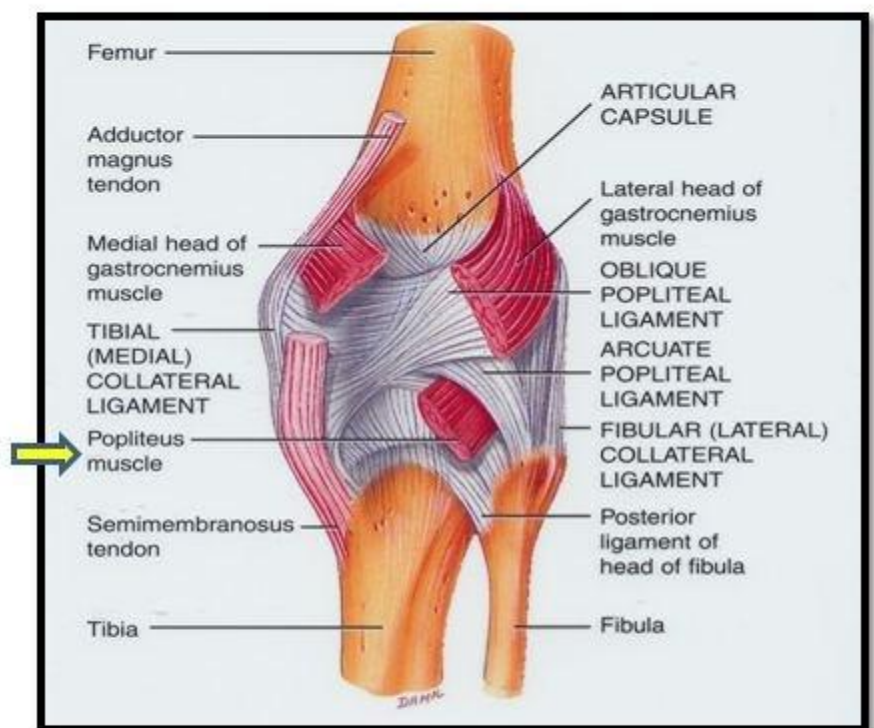
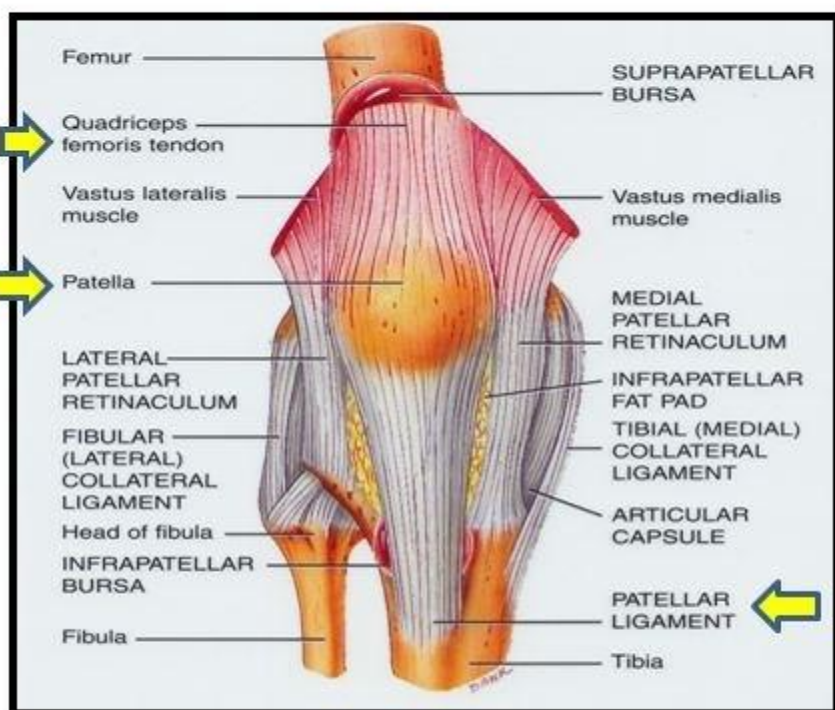
9. Anterior & posterior cruciate ligaments.

10. Coronary ligament

11. Transverse ligament.

12. Menisco - femoral ligaments.

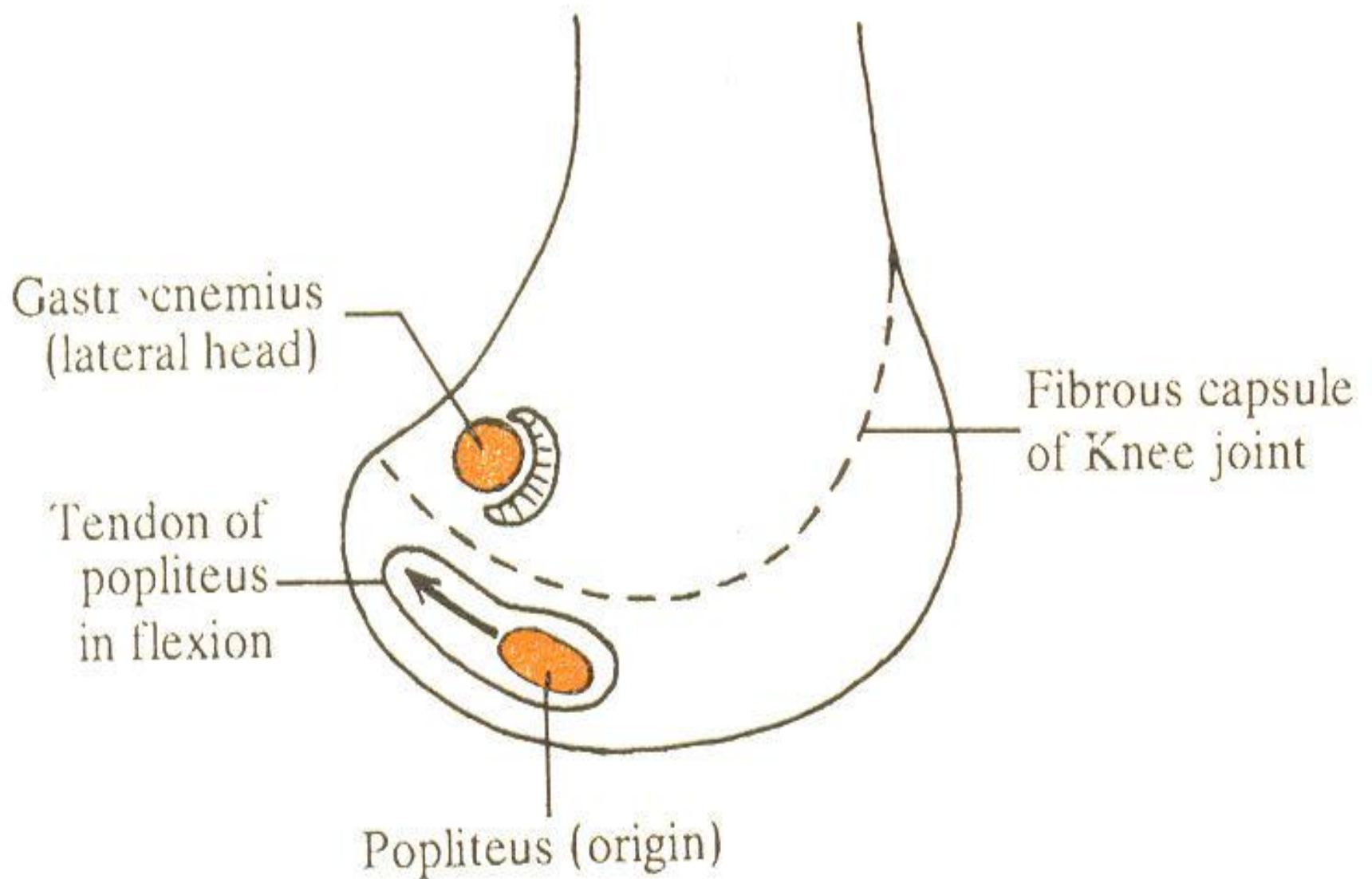
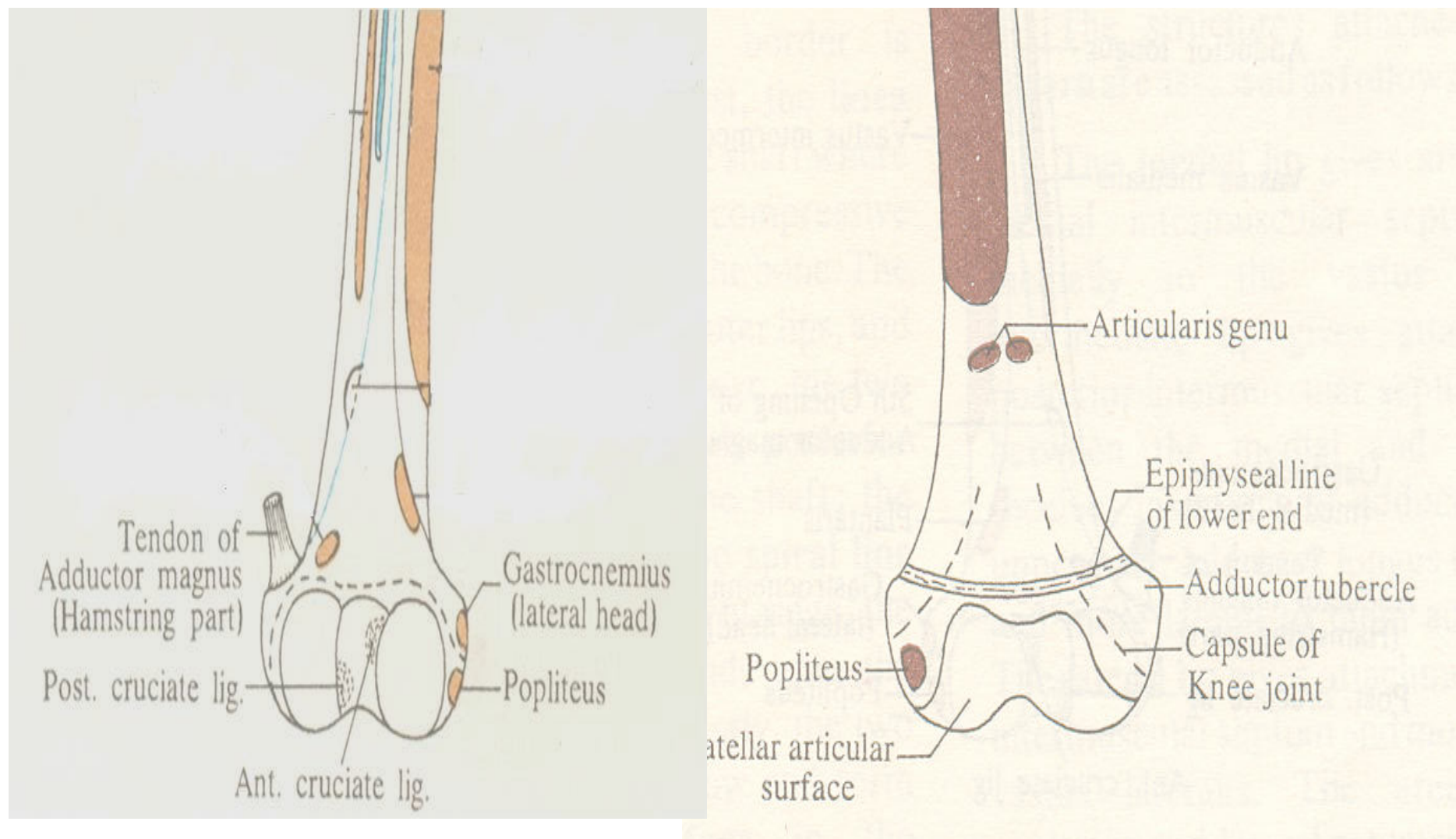
CAPSULE



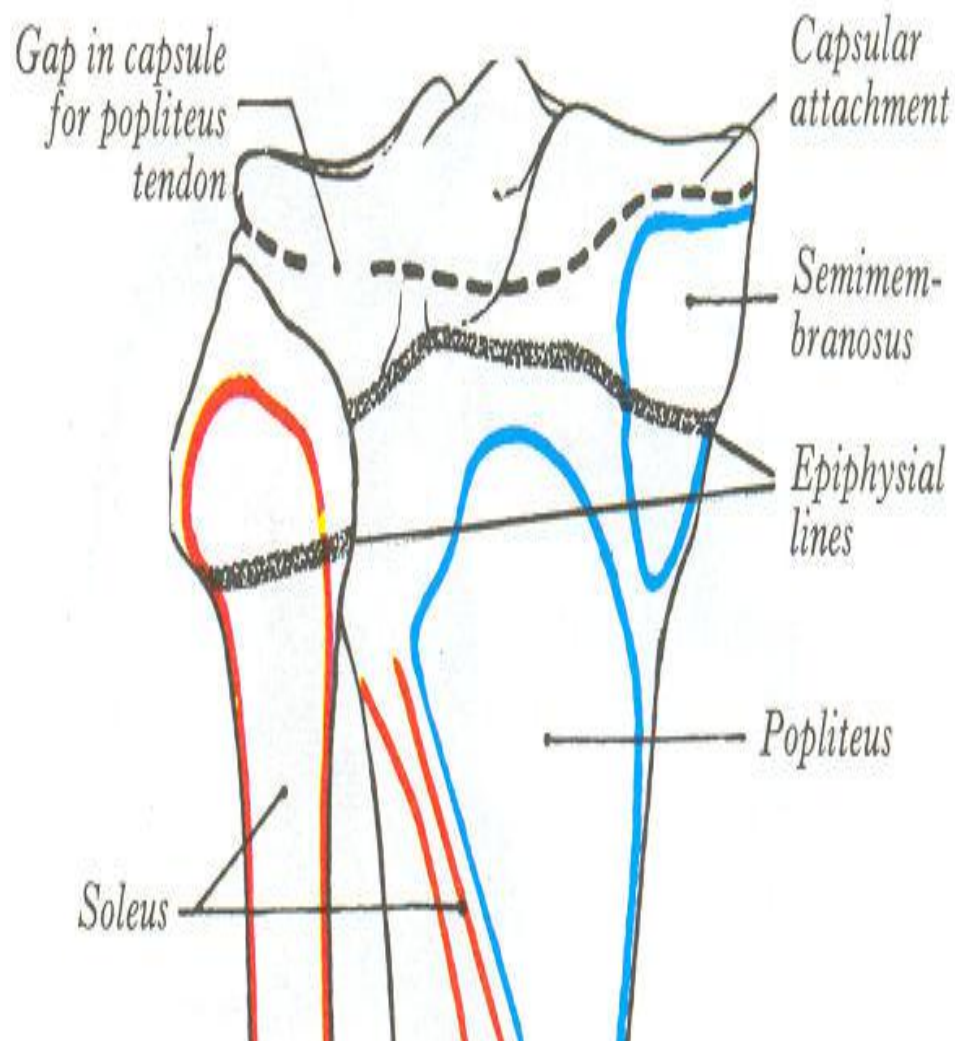
■ Is deficient anteriorly & is replaced by: *quadriceps femoris tendon, patella & ligamentum patellae.*

■ Possesses 2 openings: one for popliteus tendon & one for communication with suprapatellar bursa.

Proximal attachment of capsule

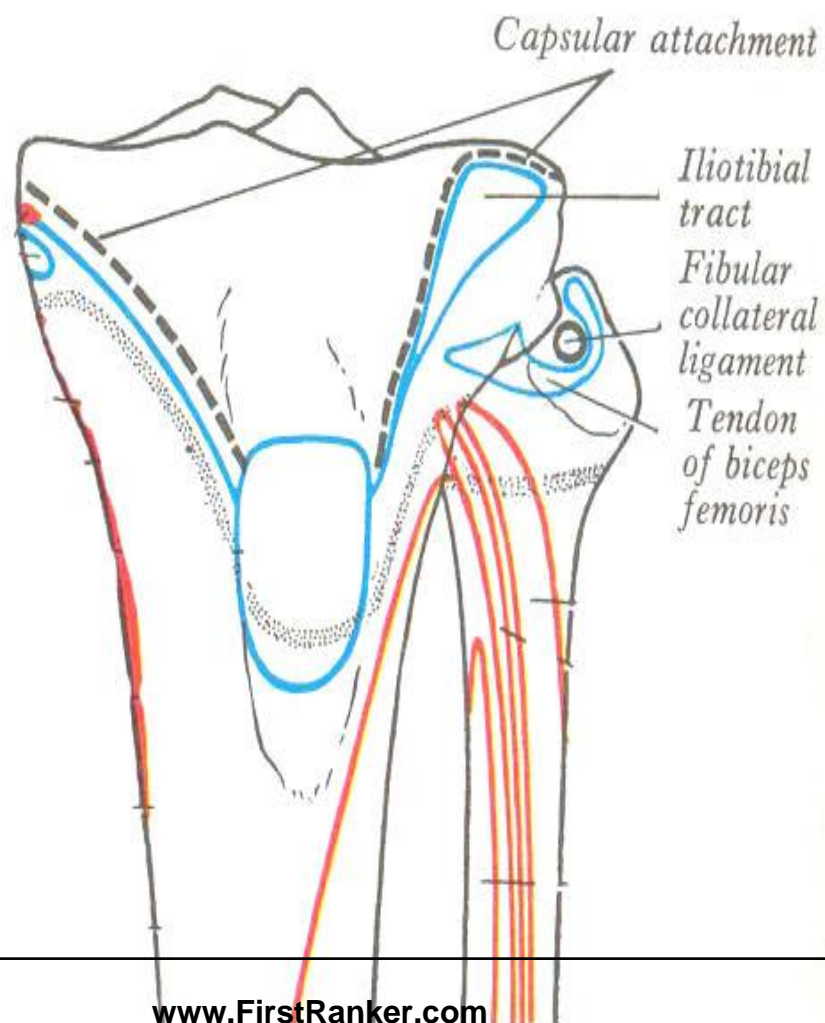


Posteriorly (1 gap) for passage of TENDON OF POPLITEUS

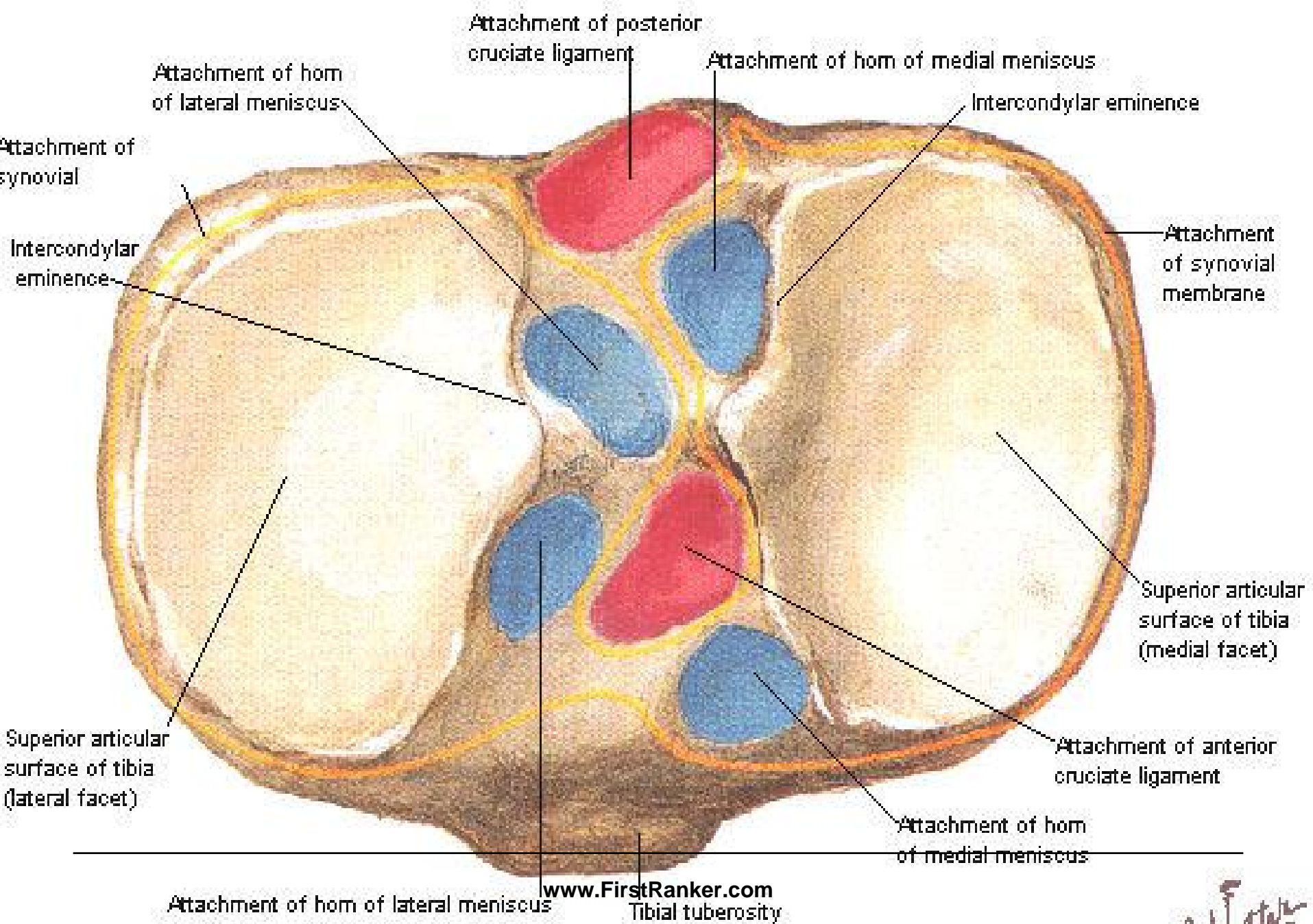
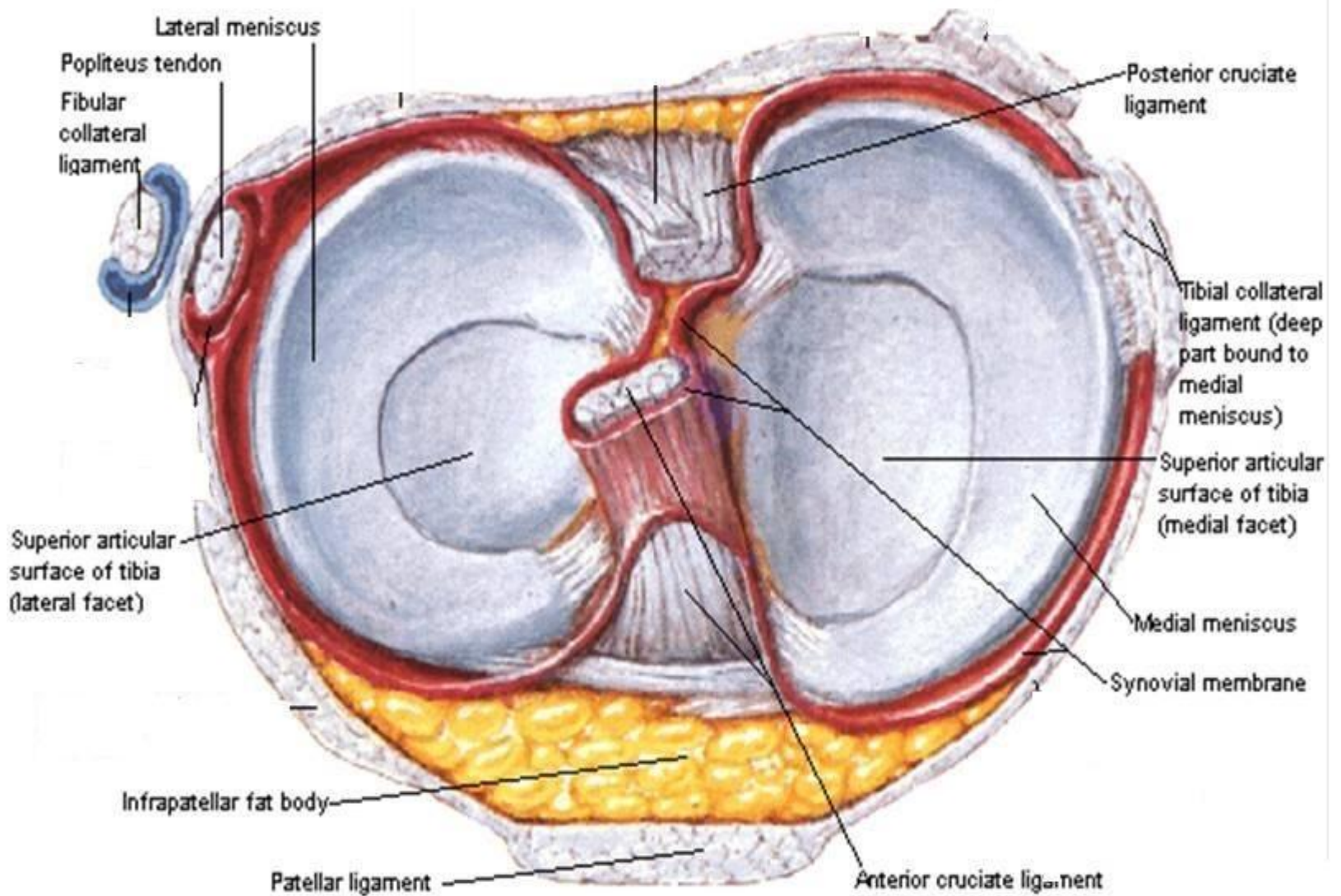


Distal attachment of capsule

Anteriorly (1 gap)



REFLECTION OF SYNOVIAL MEMBRANE

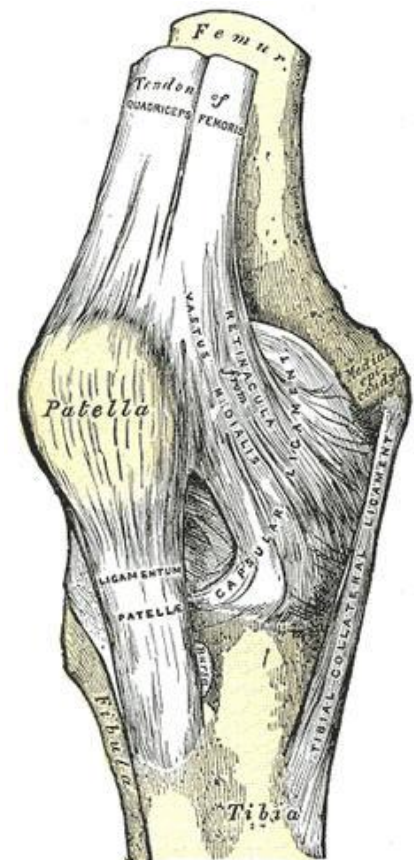
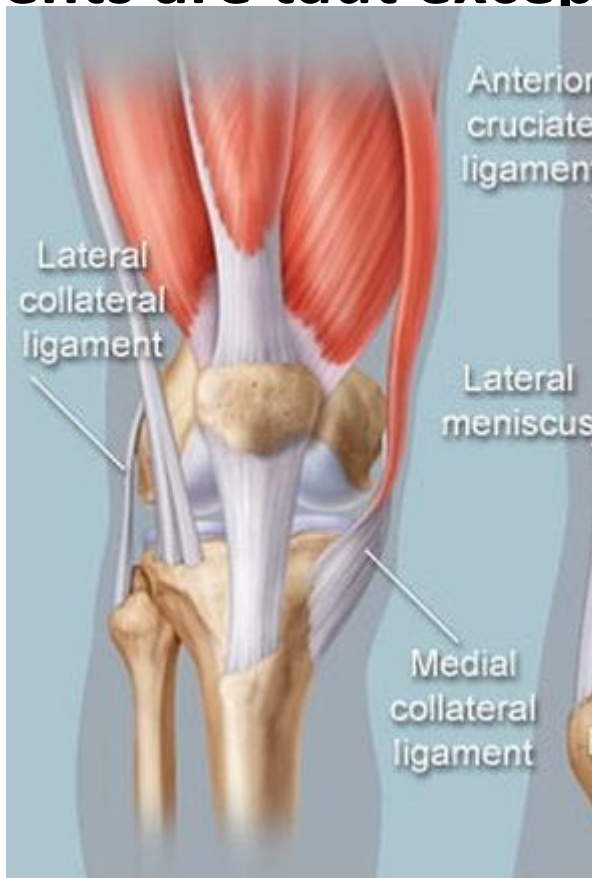


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LIGAMENTUM PATELLAE

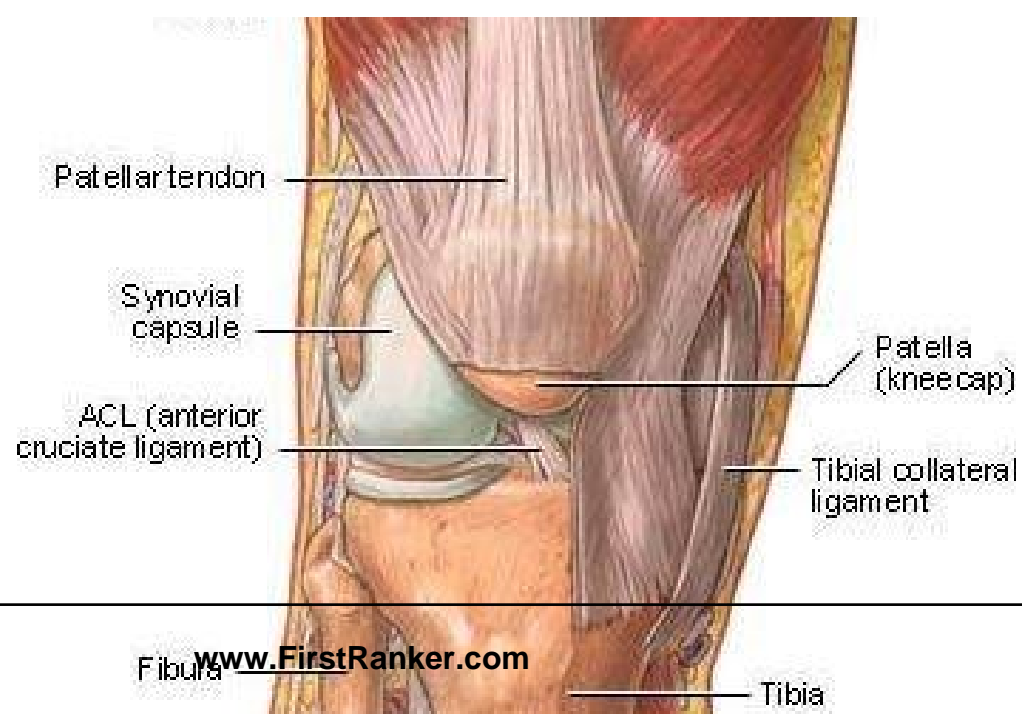
It is derived from the tendon of quadriceps femoris & extends from the apex of patella to the upper part of the tubercle of tibia.

When the knee joint is locked at the end of extension , all ligaments are taut except the ligamentum patellae.



TIBIAL COLLATERAL LIGAMENT

The ligament consist of superficial & deep part . Both part are attached above to the medial epicondyle of femur. The superficial part extends downward & forward as a flattened band & is attached to the medial condyle & upper part of medial border of shaft of tibia along a rough strip of bone.



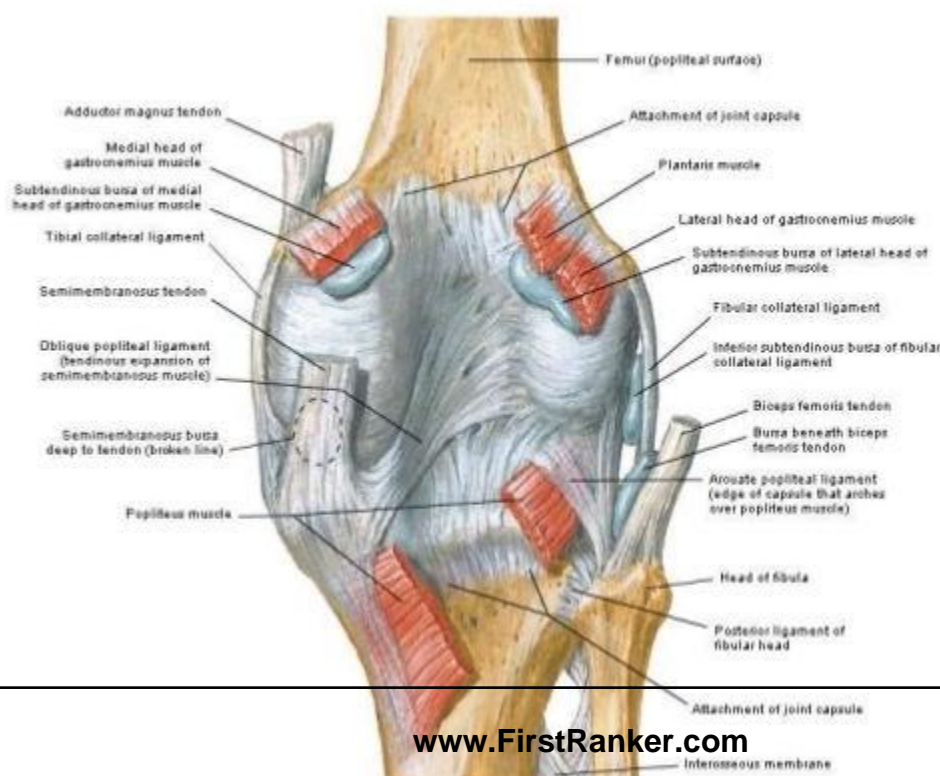
FIBULAR COLLATERAL LIGAMENT

It extends from lateral epicondyle of femur to the head of fibula close to its styloid process.



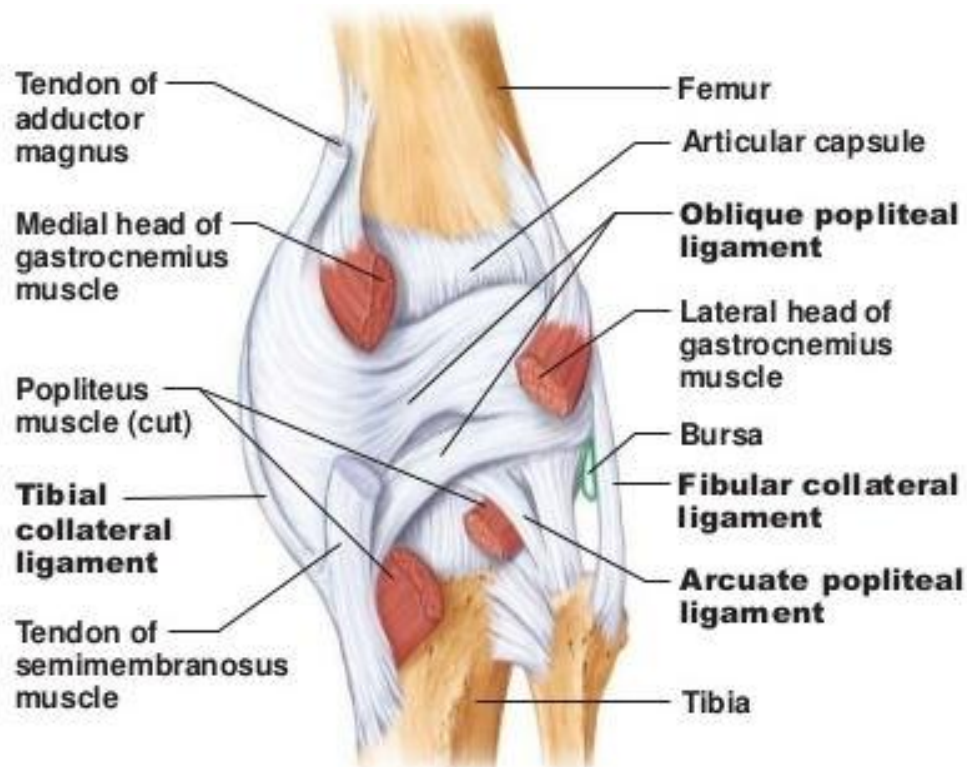
OBLIQUE POPLITEAL LIGAMENT

It is an expansion derived from the insertion of semimembranosus & extend from the posterior surface of medial condyle of tibia to the lateral part of intercondylar line of femur.



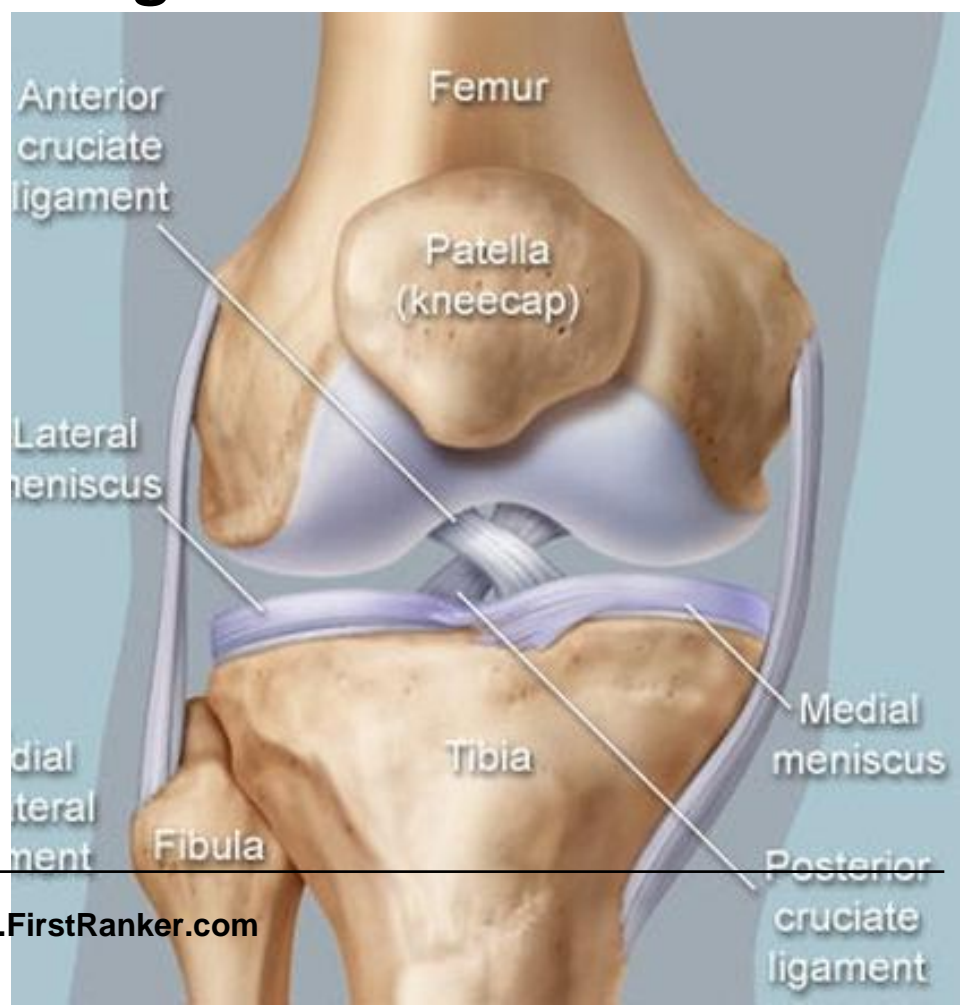
ARCUATE LIGAMENT

It forms a Y-shaped band .The stem is fixed to the styloid process of head of fibula. The posterior band is attached to the lateral condyle of tibia & anterior band is attached to the lateral condyle of femur.



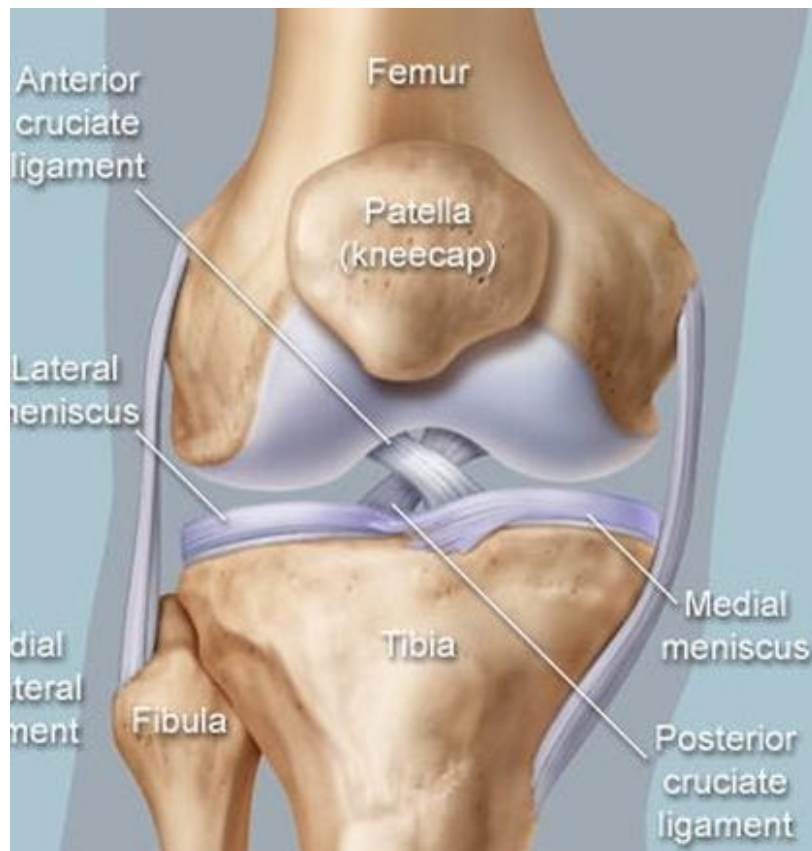
CRUCIATE LIGAMENT

The anterior & posterior cruciate ligaments are intracapsular but extrasynovial. They are named as anterior & posterior according to their tibial attachment.



CORONARY LIGAMENT: These are parts of capsule that provide attachment to peripheral margins of medial and lateral menisci.

TRANSVERSE LIGAMENT: It connect the anterior horn of medial meniscus to the anterior margin of lateral meniscus.

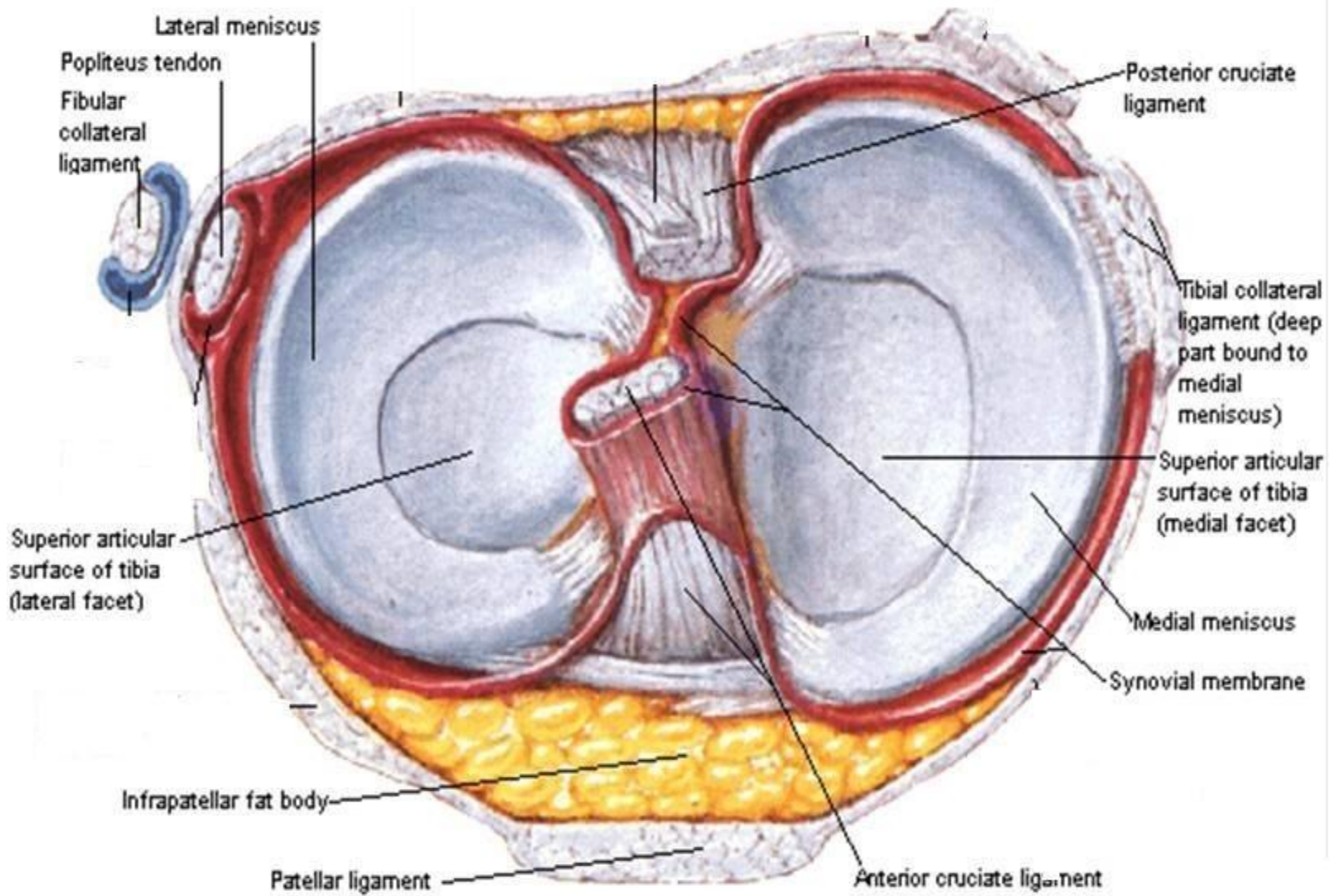


MEDIAL & LATERAL MENISCI

They are composed of fibro-cartilage. Each meniscus divides the condylar part of the joint into menisco-femoral & menisco-tibial compartments.

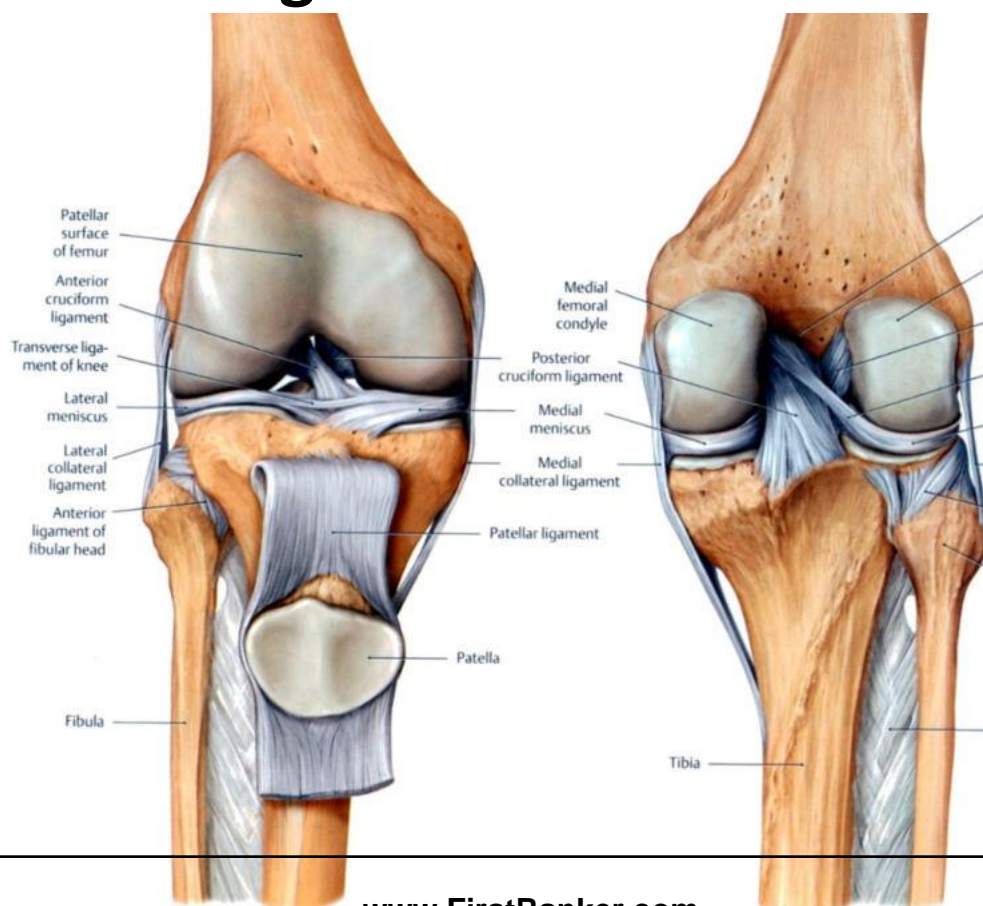
Function of the menisci-

1. They increase the concavity of tibial condyles for the better adaptation with femoral condyles.
2. They maintain a potential joint space for flushing of synovial fluid to provide nutrition to the articular cartilage.
3. Menisci act as shock absorber.
4. Menisci help in the complex mechanism of gliding & angular movements.
5. Peripheral attached part of the menisci is vascular & gets nutrition from the capsular arteries.



MENISCO-FEMORAL LIGAMENT

The posterior horn of lateral meniscus is connected to the medial condyle of femur by anterior & posterior menisco-femoral ligaments.

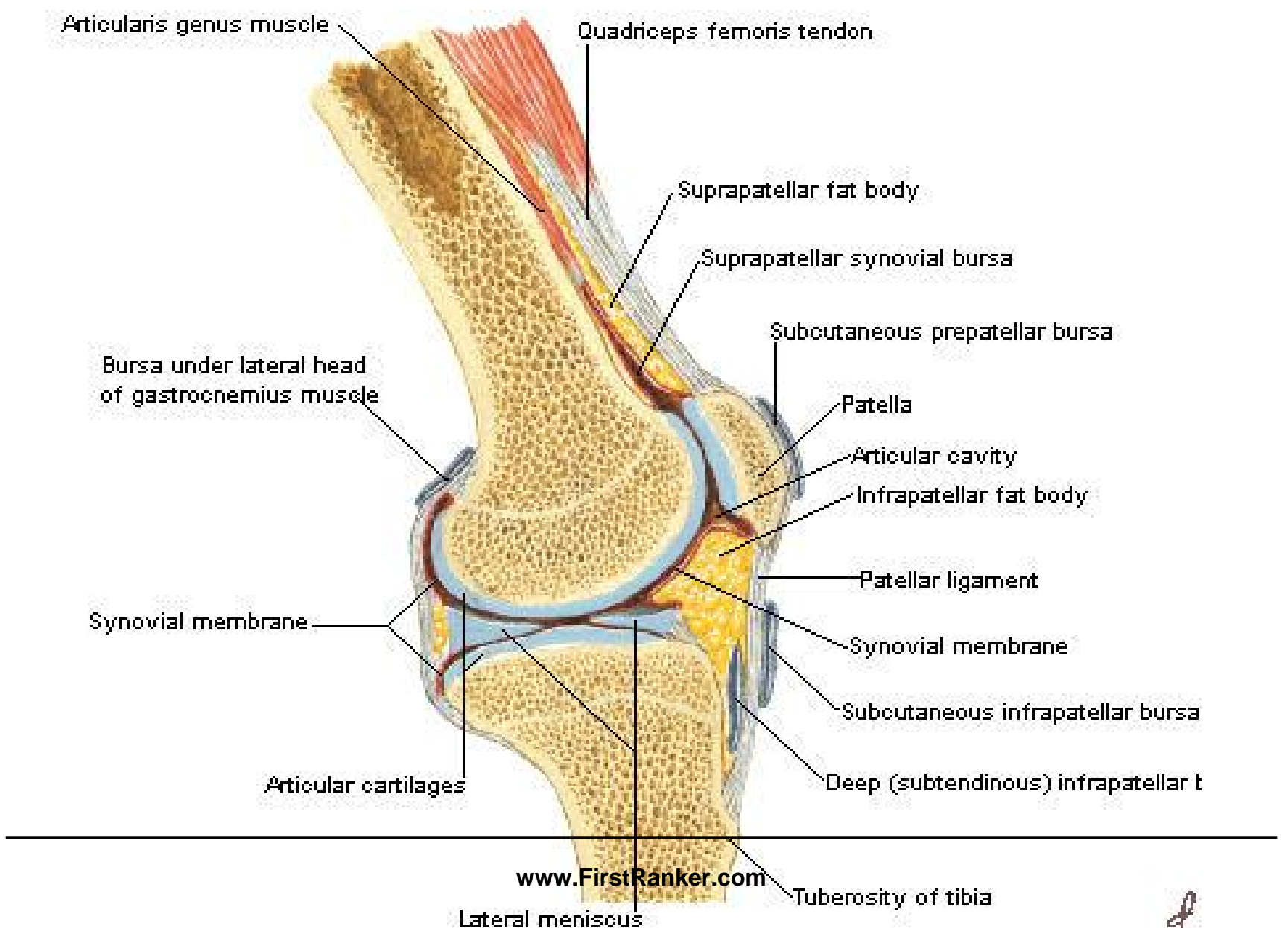


BURSAE AROUND KNEE JOINT

Anteriorly

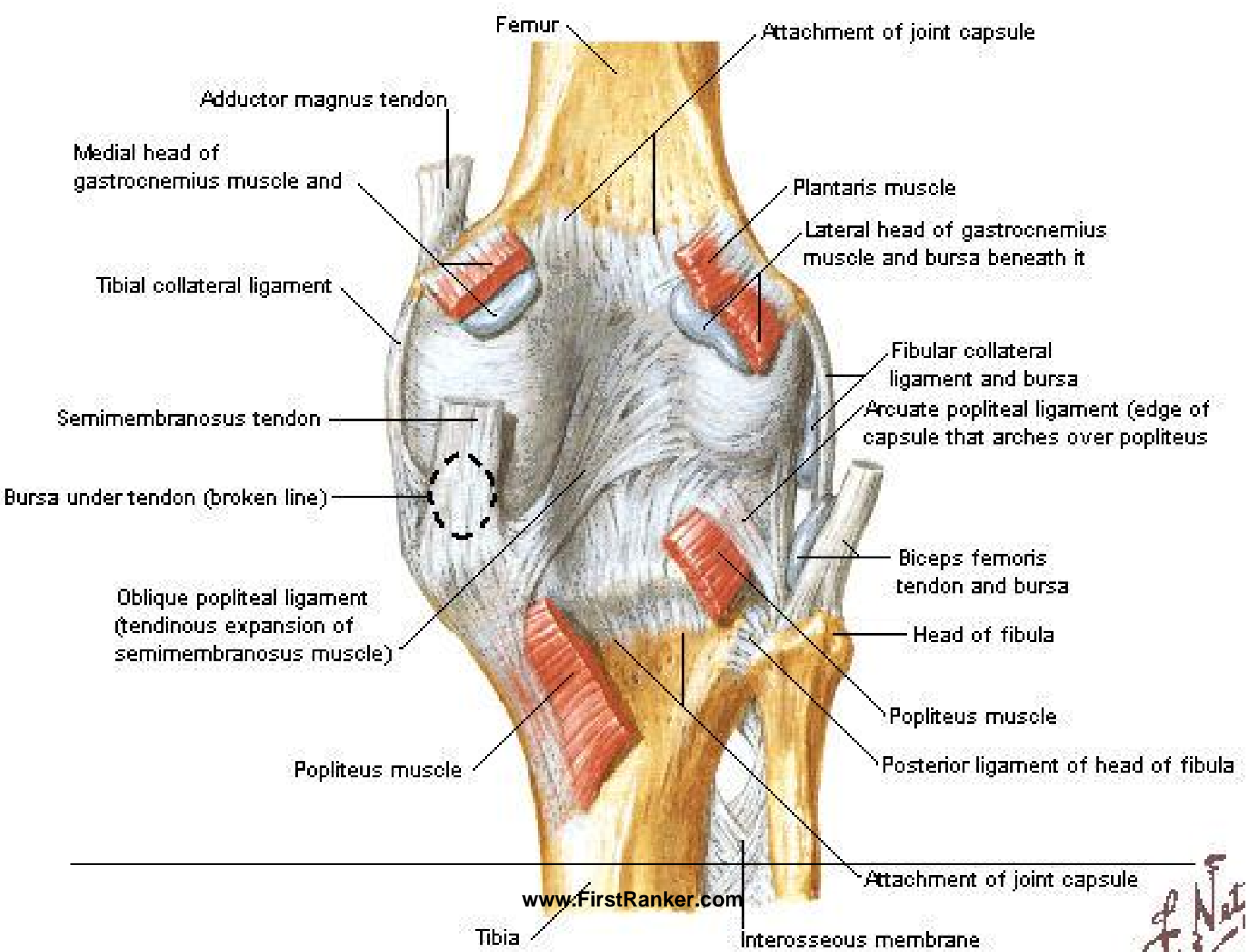
1. Subcutaneous pre - patellar bursa.
(*inflammation causes House maid knee*).
2. Subcutaneous infra- patellar bursa
(*inflammation causes Clergy-mans knee*)
3. Deep infra-patellar bursa
4. Supra-patellar bursa (Communicates with the joint cavity.)

BURSA AROUND KNEE JOINT



Laterally :

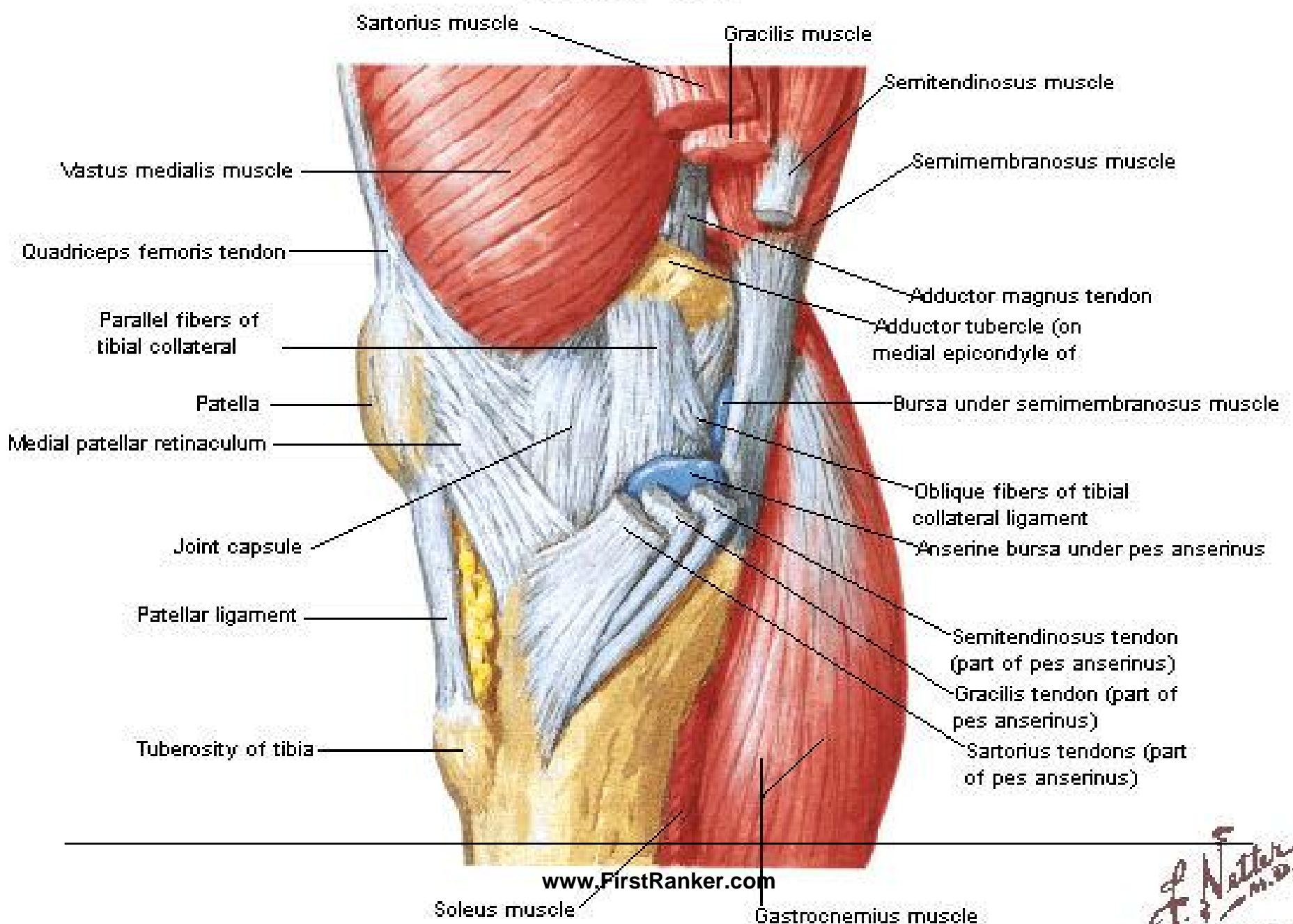
- Between lateral head of gastrocnemius & the capsule
- Between tendon of biceps femoris & fibular collateral ligament.
- Between fibular collateral ligament & tendon of popliteus muscle
- Between tendon of popliteus & lateral condyle of tibia (communicates with joint cavity).



Medially

1. Medial head of gastrocnemius & the capsule (communicates with joint cavity)
2. Superficial part of tibial collateral ligament sartorius, gracilis & semitendinosus.
3. Superficial & deep part of tibial collateral ligament.
4. Semi-membranosus & medial condyle of tibia (may communicate with joint cavity)

Medial View



RELATIONS OF KNEE JOINT

Anteriorly- Quadriceps femoris

Antero-medially- medial patellar retinaculum

Antero-laterally- lateral patellar retinaculum & iliotibial tract

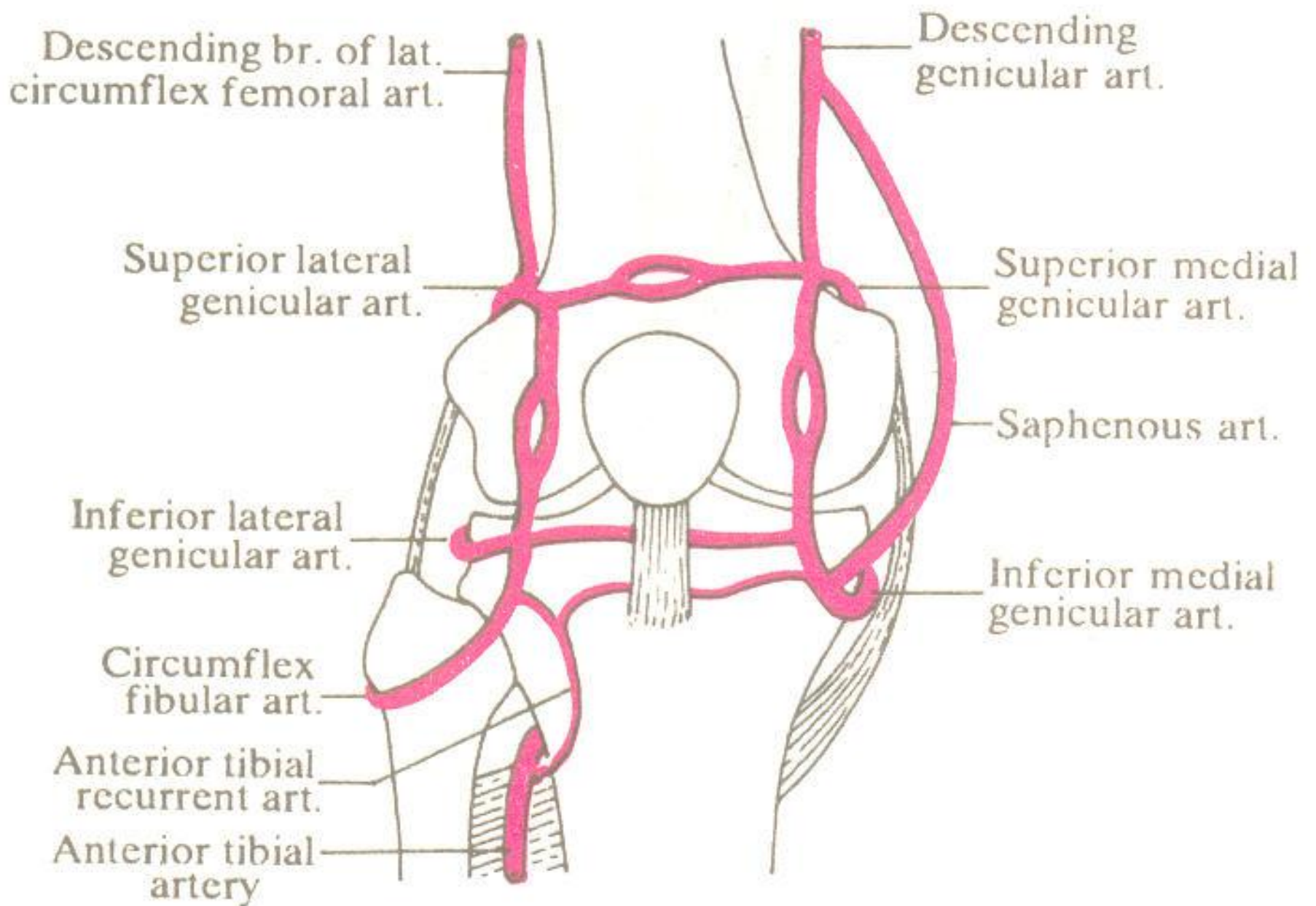
Postero-medially- Sartorius, gracilis, semimembranosus & semitendinosus

Postero-laterally- Tendon of biceps femoris & common peroneal nerve

Posteriorly- popliteal vessels, tibial nerve, both head of gastrocnemius & plantaris

ARTERIAL SUPPLY

- 1. Descending genicular branch of femoral artery.**
- 2. Descending branch of lateral circumflex femoral artery**
- 3. Genicular branches of popliteal artery.**
- 4. Recurrent branches of anterior tibial artery.**
- 5. Circumflex fibular branch of posterior tibial artery.**



NERVE SUPPLY

- From Femoral nerve –
- nerves to the vasti.
- 3 from the Tibial nerve –
- superior medial Genicular
- inferior medial genicular
- middle genicular nerve.
- 3 from the Common peroneal nerve –
- superior lateral Genicular
- inferior lateral genicular
- recurrent genicular nerve

MUSCLES PRODUCING THE MOVEMENTS:

Active movements performed at the knee joint are-

□ Extension or straightening continues until leg & thigh are in the same vertical lines. Extension is produced by Quadriceps femoris & assisted by tensor fascia latae.

□ Flexion –prime movers: semimembranosus, semitendinosus, biceps femoris;
initiated by, popliteus

Assisted by, sartorius, gracilis, both head of gastrocnemius & plantaris.

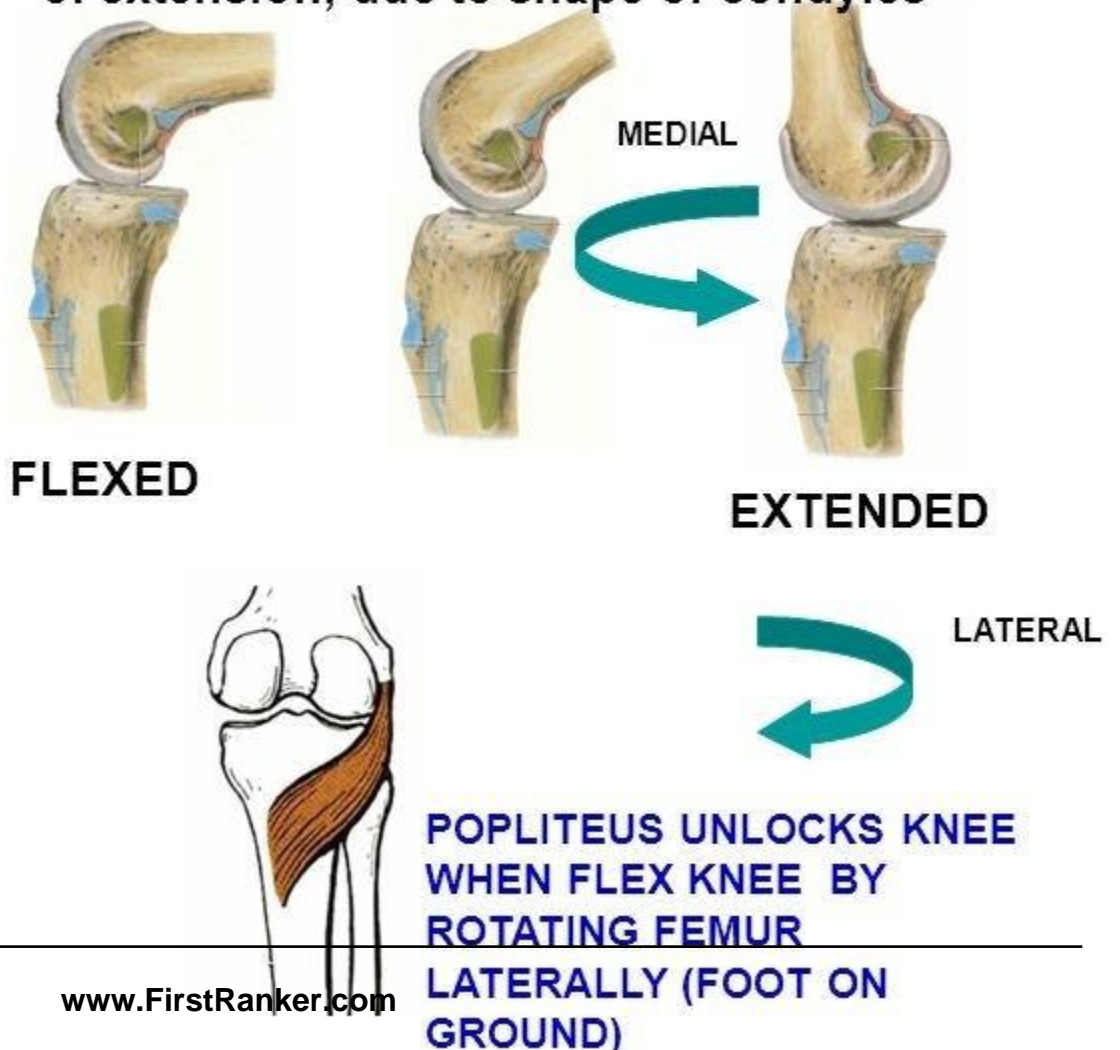
□ Medial rotation- by semimembranosus, semitendinosus, popliteus, sartorius & gracilis.

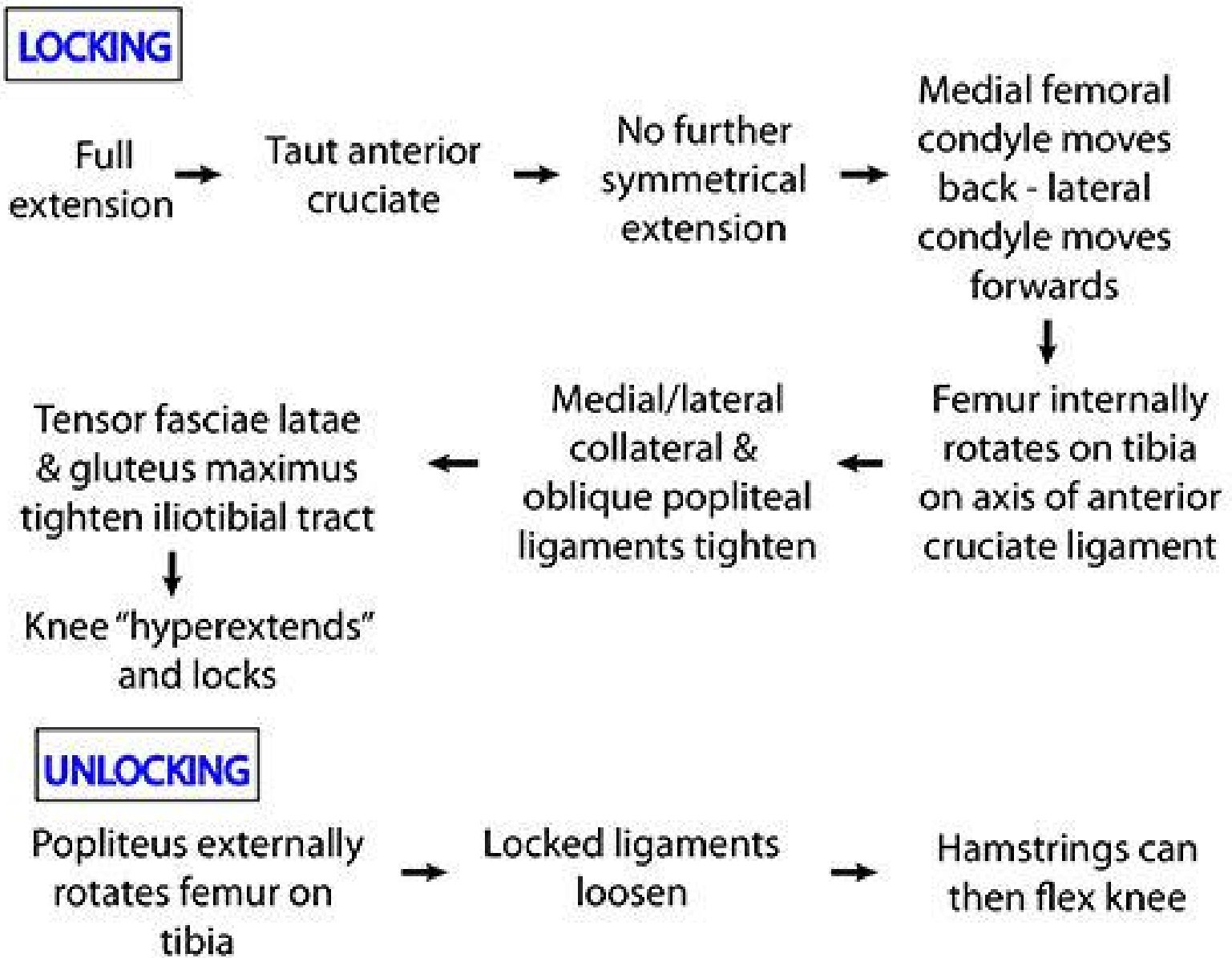
□ Lateral rotation-biceps femoris.

LOCKING AND UNLOCKING KNEE JOINT

Femur rotates medially during last 30 degrees of extension, due to shape of condyles

- When moving to full extension of knee joint, femur rotates medially during last 30 degrees of movement.
- this pulls all major ligaments of the knee joint taut, 'locking' the knee and making it very stable;
- to flex knee from full extension, joint must first be unlocked by contracting the **popliteus muscle** which rotates the femur laterally (foot is firmly on ground)





Applied Anatomy

Injuries to menisci

- ❑ Most injured structures of the knee are Tibial collateral ligament, the medial menisci & ACL
- A blow to lateral aspect of the knee when the foot is on the ground may sprain the tibial collateral ligament, the attached medial menisci may also be torn.
- ACL tears may occur when the tibial collateral ligament & medial menisci are injured, a blow to the anterior aspect of the flexed knee may tear only the ACL.
- ❑ Injuries to the menisci commonly occur in the flexed knee as a result of forcible rotation or abduction. The medial meniscus suffers more frequently than the lateral.



Vertical



Transverse



Peripheral



Bucket-handle



Parrot-beak



Flap

- **Rupture of cruciate ligaments** is less common. Anterior ligament is more commonly affected.
- If both cruciate ligaments are injured, excessive forward & backward gliding of tibia, abduction & adduction of joint occur.
- **Fracture of patella** is a frequent problem. Does not heal as it is a sesamoid bone. Wiring has to be done.
- **Acute traumatic synovitis.**
Joint cavity is distended with fluid. swelling is above and on the sides of patella.

. Inflammation of bursa-

Housemaids knee - Subcutaneous pre-patellar bursa.

Clergyman's knee - Subcutaneous infra patellarbursa.

. Osteoarthritis of knee joint.

Genu valgum (Knock knees)

Angle between long axis of thigh and leg is reduced laterally

Genu varus (bow legs)

Angle between long axis of thigh and leg is increased laterally.

