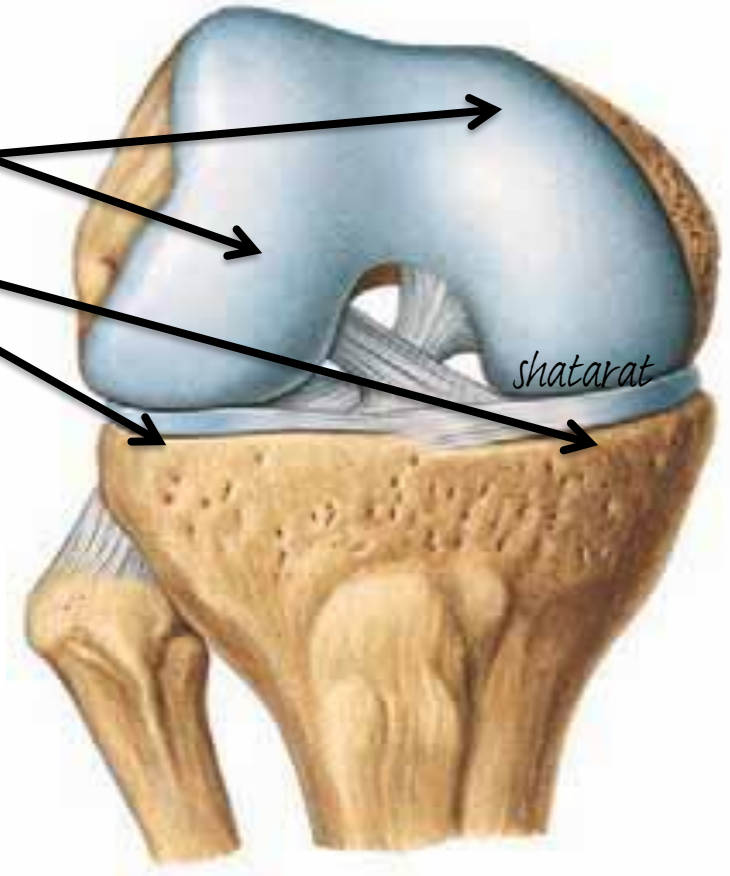
Knee Joint

➢Is the most **complicated** joint in the body!!!!

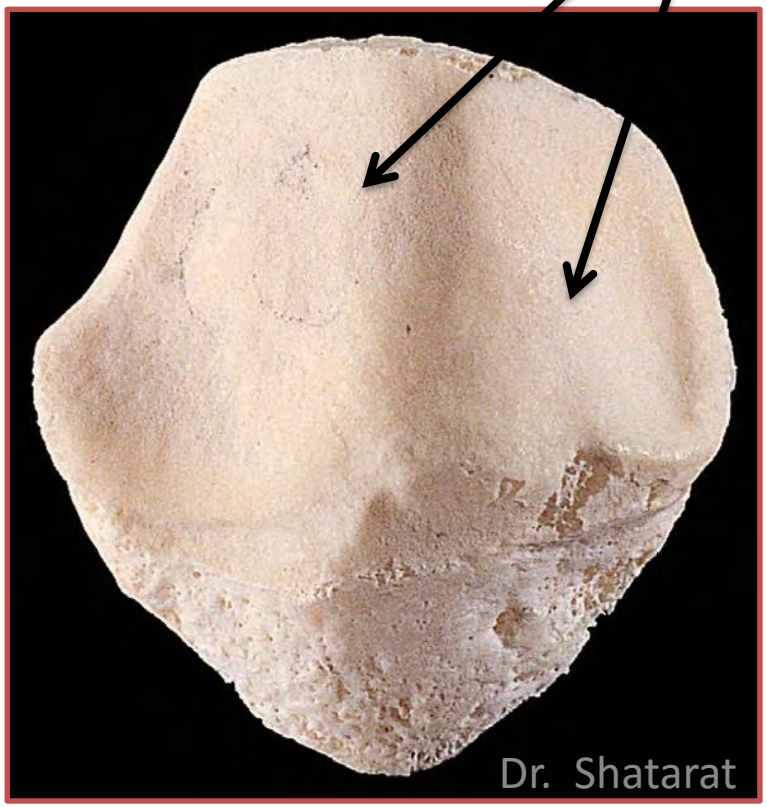
1-Consists of two condylar joints between:
A-The **medial and lateral condyles** of the **femur**
and **The condyles of the tibia**

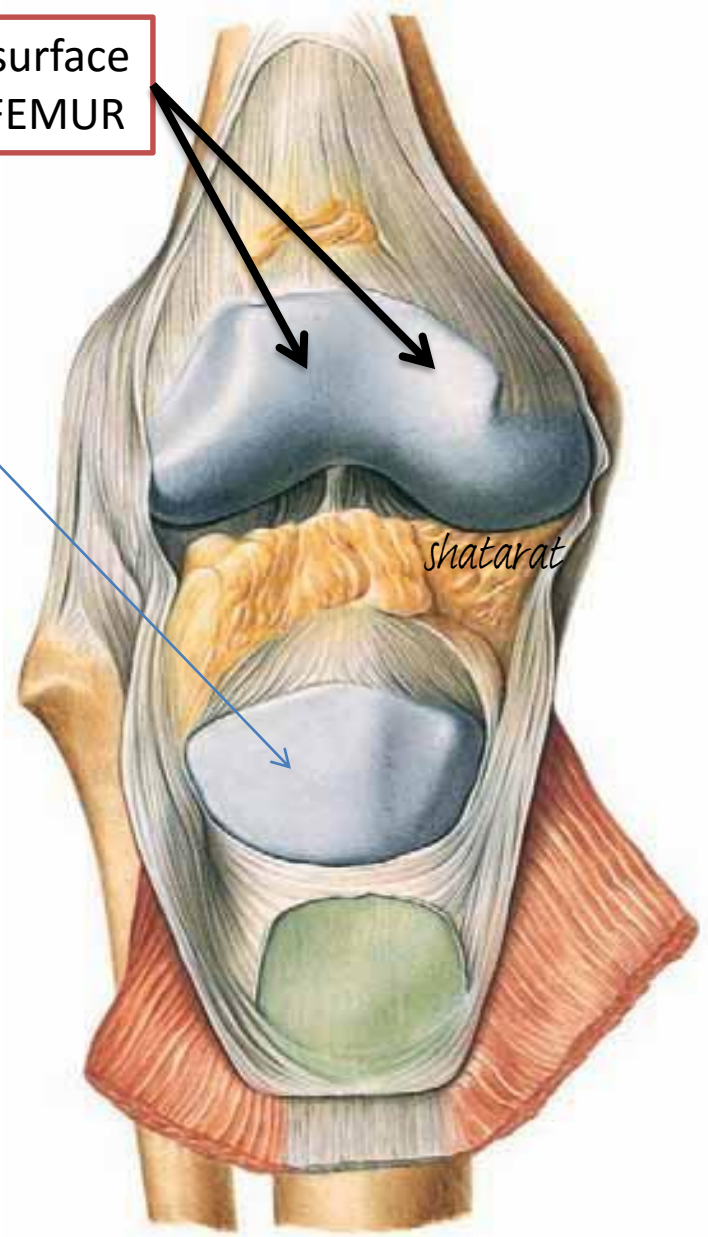
and



Patellar surface
OF THE FEMUR

B- a **gliding joint**
between **the patella and the patellar surface of the femur**
Note that the fibula is not directly involved in the joint.





2-Type OF JOINT

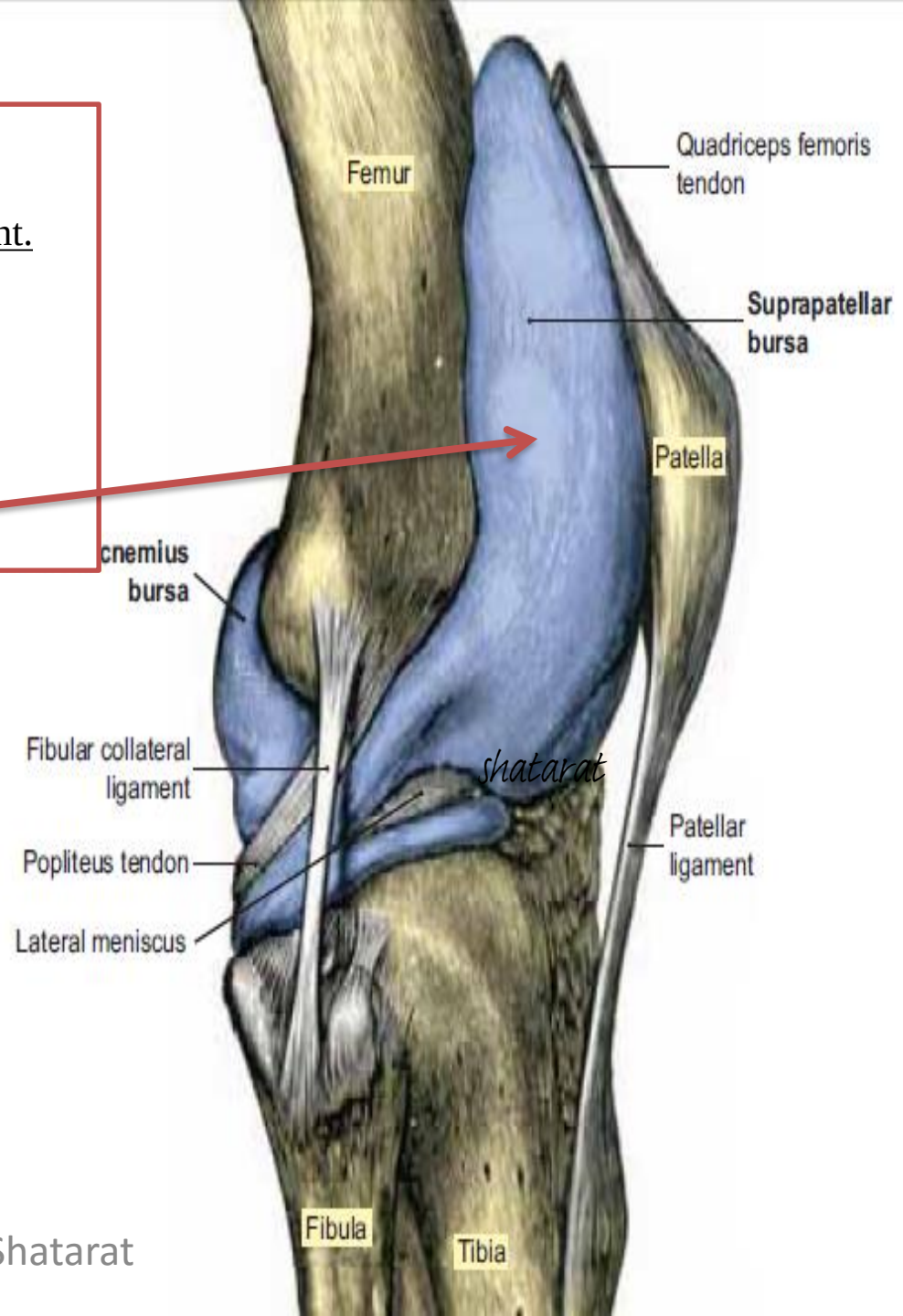
The joint between the ***femur and tibia*** is a ***synovial*** joint of the ***hinge variety***, but some degree **of rotatory movement** is possible.

MEDIAL AND LATERAL ROTATION

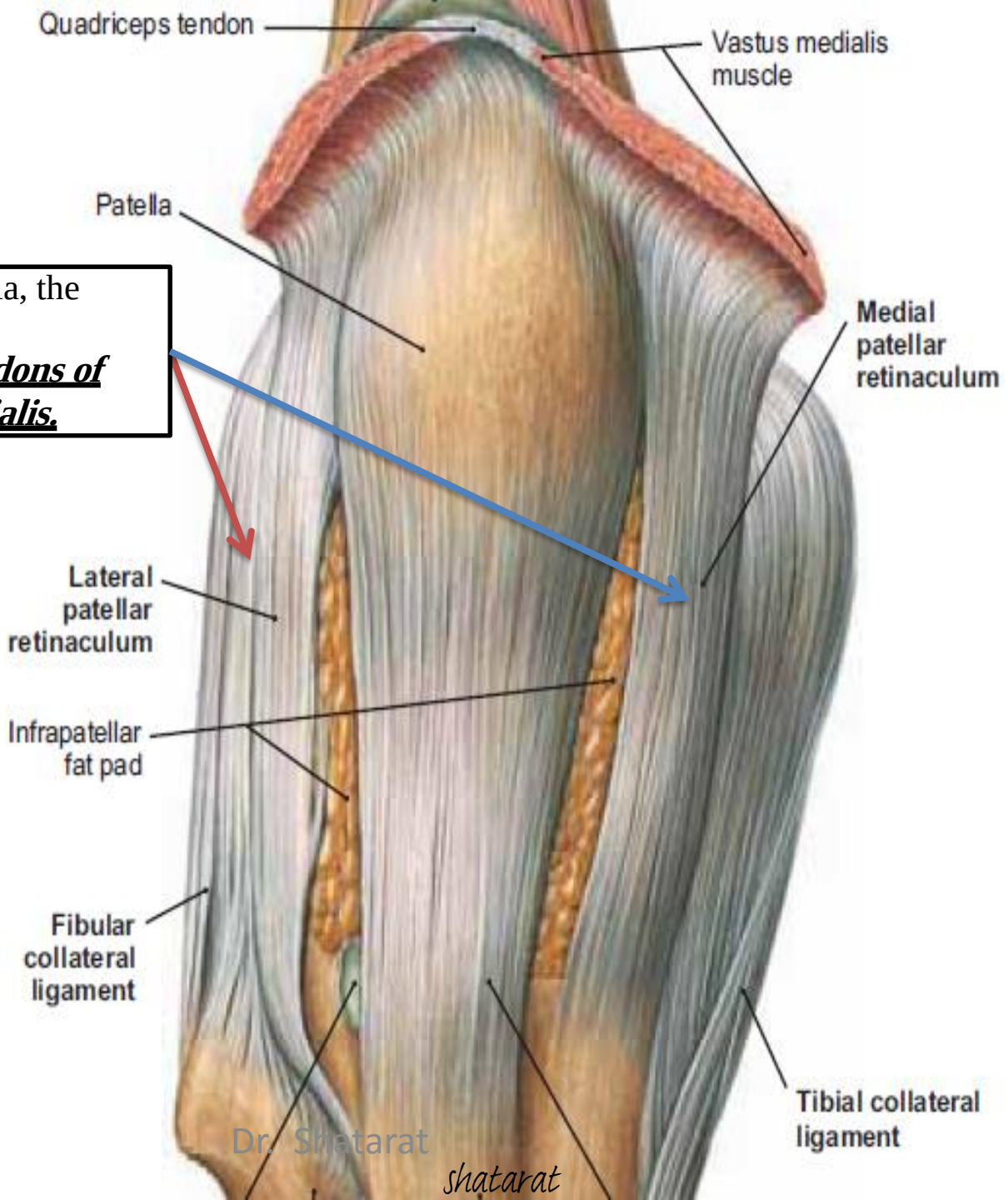
- The joint between the ***patella and femur*** is a synovial joint of the ***plane gliding*** variety.

3 - Capsule

- The capsule is attached to *the margins of the articular surfaces*
- surrounds the sides and posterior aspect of the joint.
- On the front of the joint, ***the capsule is absent*** permitting the synovial membrane to pouch upward beneath the quadriceps tendon, forming **the suprapatellar bursa**



❖On each side of the patella, the capsule is strengthened by ***expansions from the tendons of vastus lateralis and medialis.***



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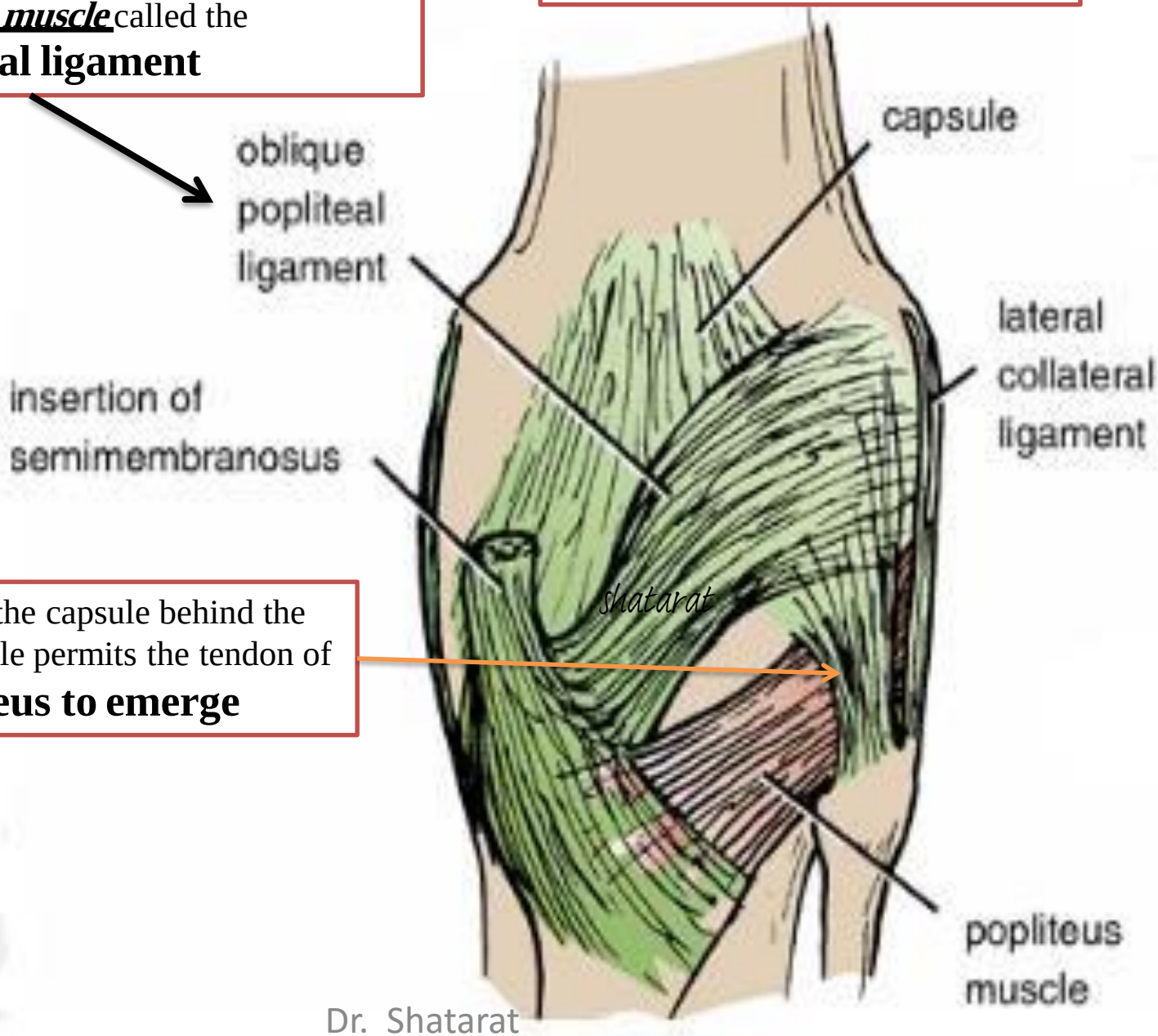
❖Behind the joint, the capsule is strengthened by an ***expansion of the semimembranous muscle*** called the **oblique popliteal ligament**

Posterior view of the knee joint



❖An opening in the capsule behind the lateral tibial condyle permits the tendon of the **popliteus to emerge**

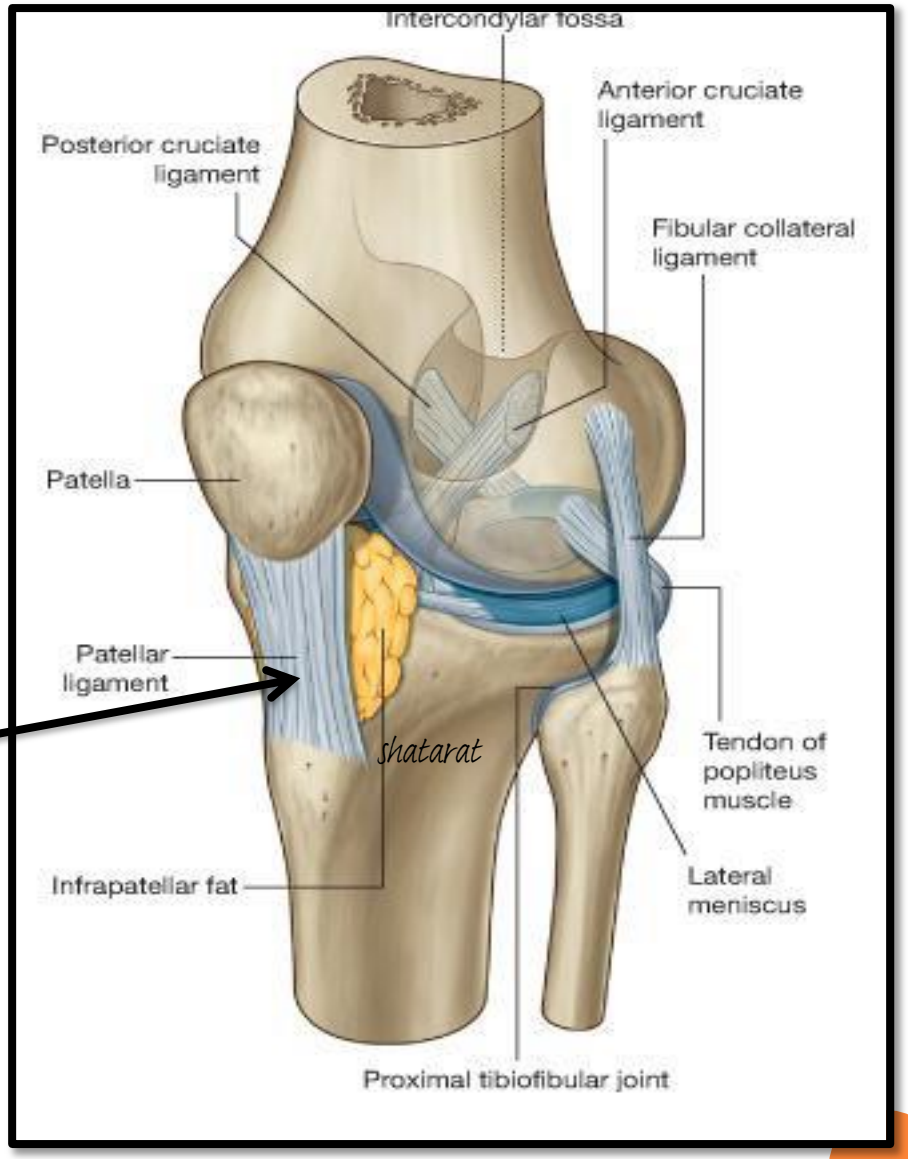
4-Ligaments of the knee joint

❖ ***The ligaments may be divided into***

A-Extracapsular Ligaments

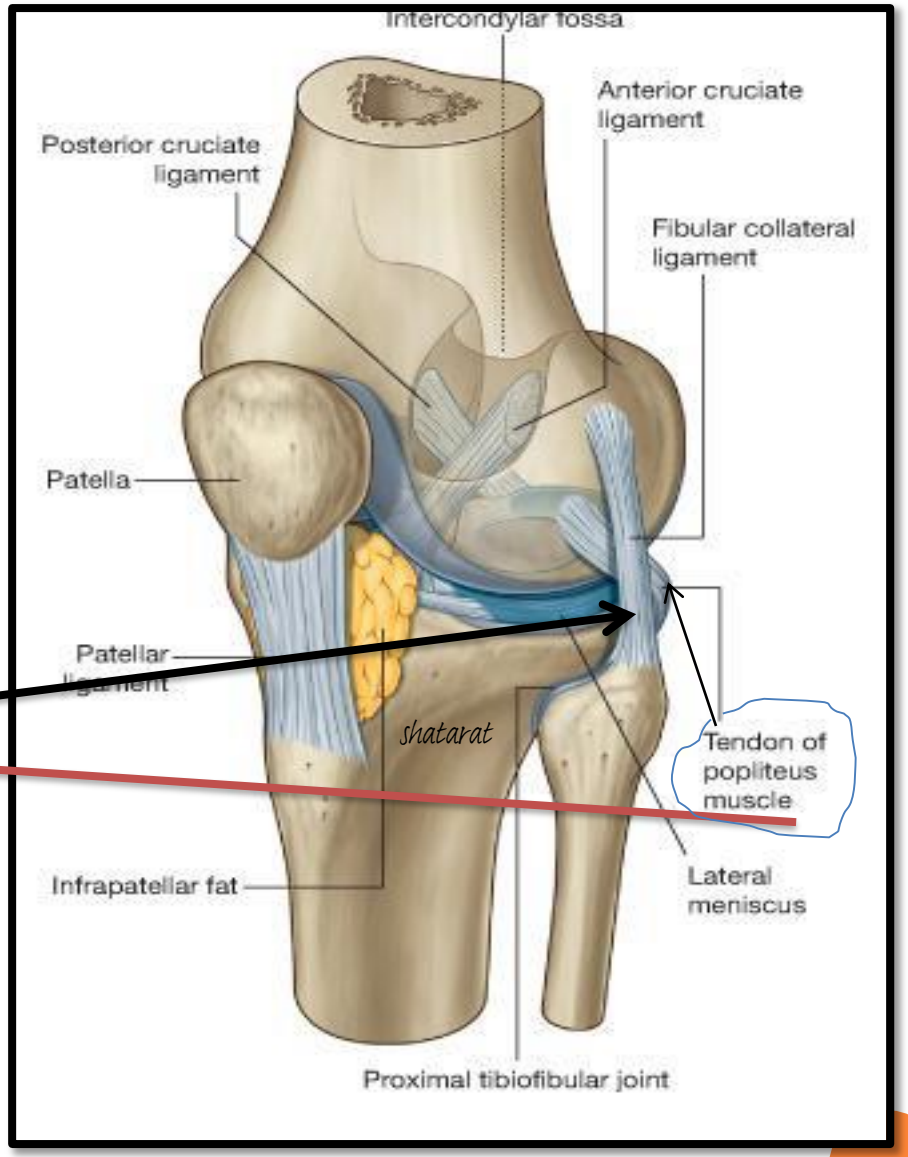
The ligamentum patellae

is attached above to the lower border of the patella and below to the tuberosity of the tibia.



❖The lateral collateral ligament

is ***cordlike*** and is attached above to the ***lateral condyle*** of the femur and below to the ***head of the fibula***.



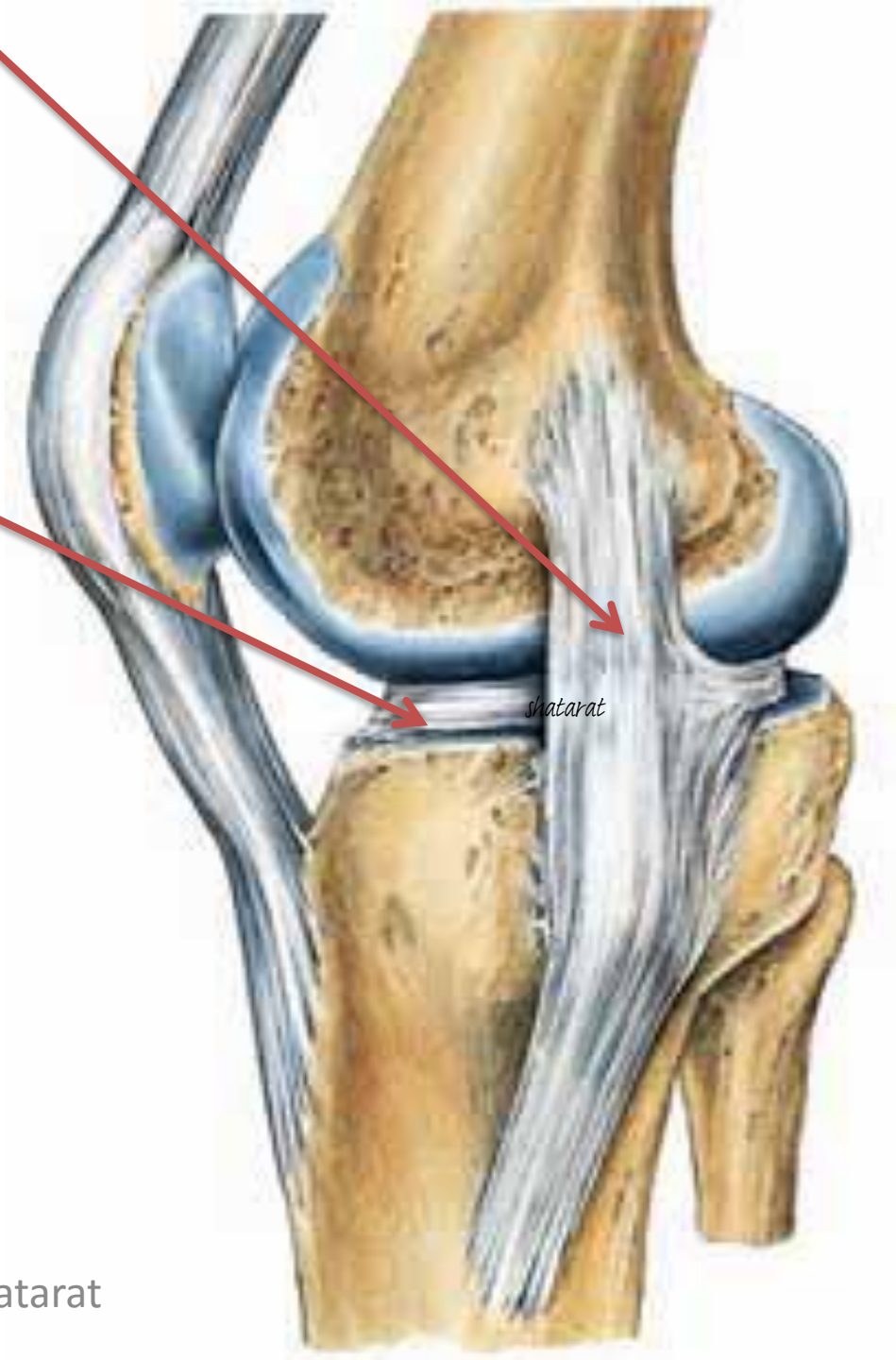
The tendon of the popliteus muscle intervenes between the ligament and the lateral Meniscus (thus, *the ligament is not attached to the lateral meniscus)*

What does this mean?

The medial collateral ligament is a ***flat band*** and is attached above to ***the medial condyle*** of the femur and below ***to the medial surface*** of the ***shaft of the tibia***.

<u>It is firmly attached to the edge of the medial meniscus ?!</u>

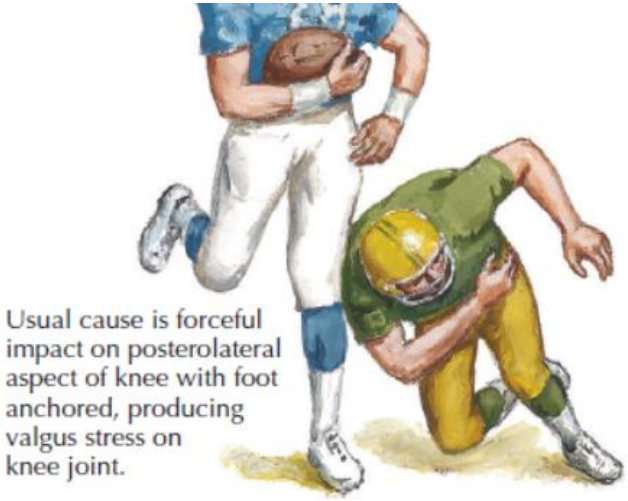
What does this mean?



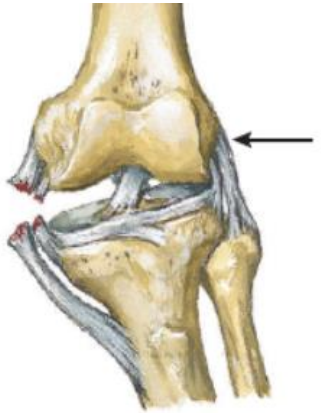
Tibial (medial) and fibular (lateral) collateral ligaments

Tibial collateral ligament extends from the medial epicondyle of the femur inferiorly to attach to the medial aspect of the tibia. It is firmly attached to the capsule and medial meniscus. The tibial ligament prevents **lateral displacement** (abduction) of the tibia under the femur.

Injury to the medial collateral ligaments



Usual cause is forceful impact on posterolateral aspect of knee with foot anchored, producing valgus stress on knee joint.



Valgus stress may rupture tibial collateral and capsular ligaments.

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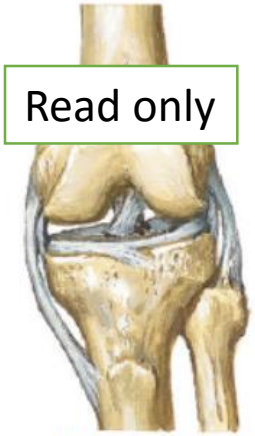

1st-Degree sprain. Localized joint pain and tenderness but no joint laxity

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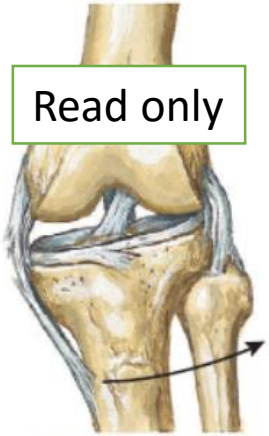

2nd-Degree sprain. Detectable joint laxity plus localized pain and tenderness

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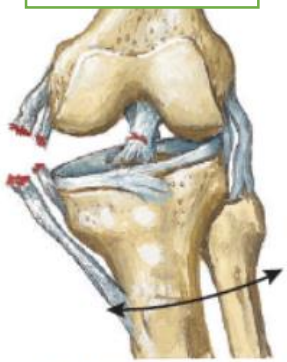
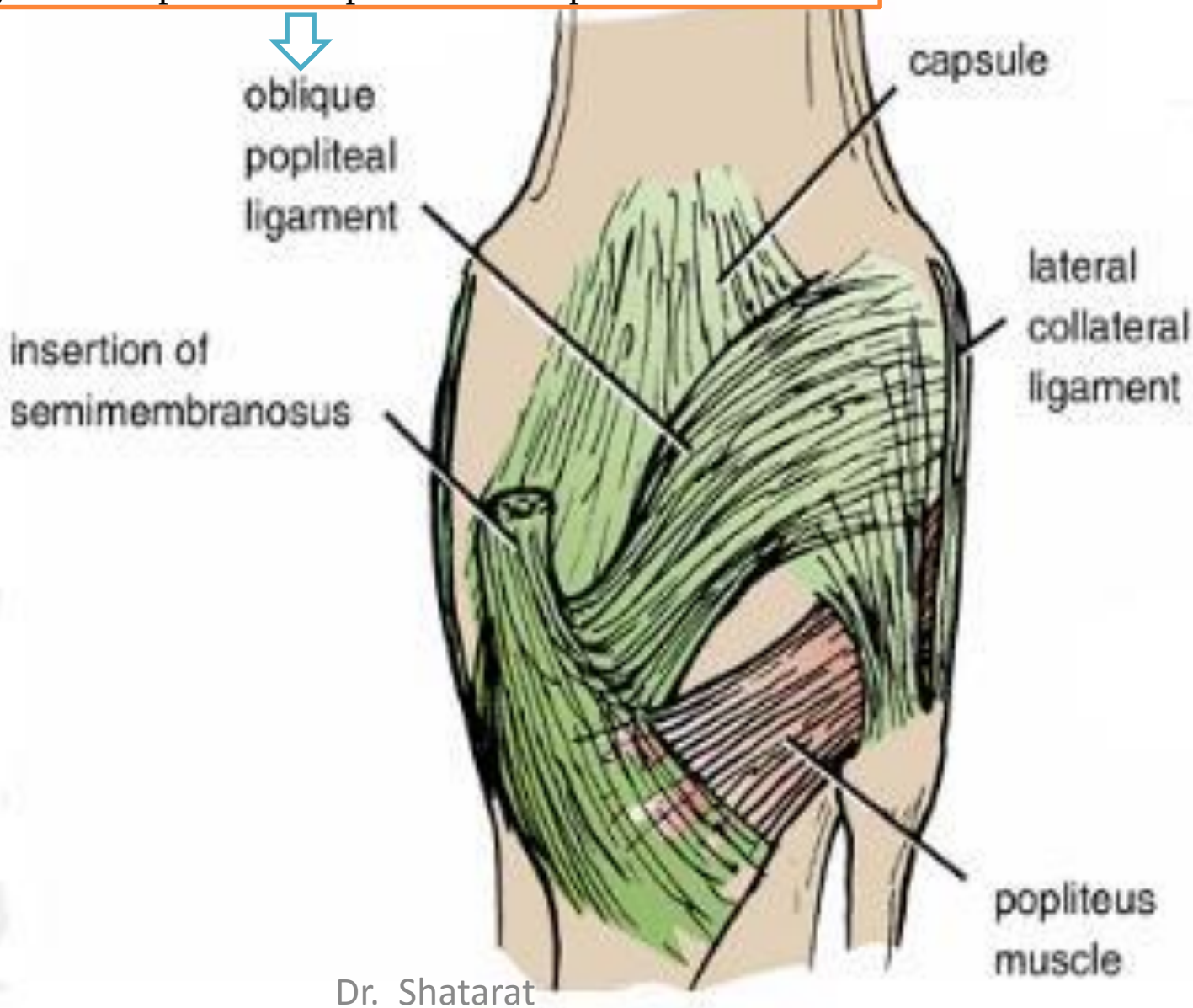


3rd-Degree sprain. Complete disruption of ligaments and gross joint instability

❖The oblique popliteal ligament

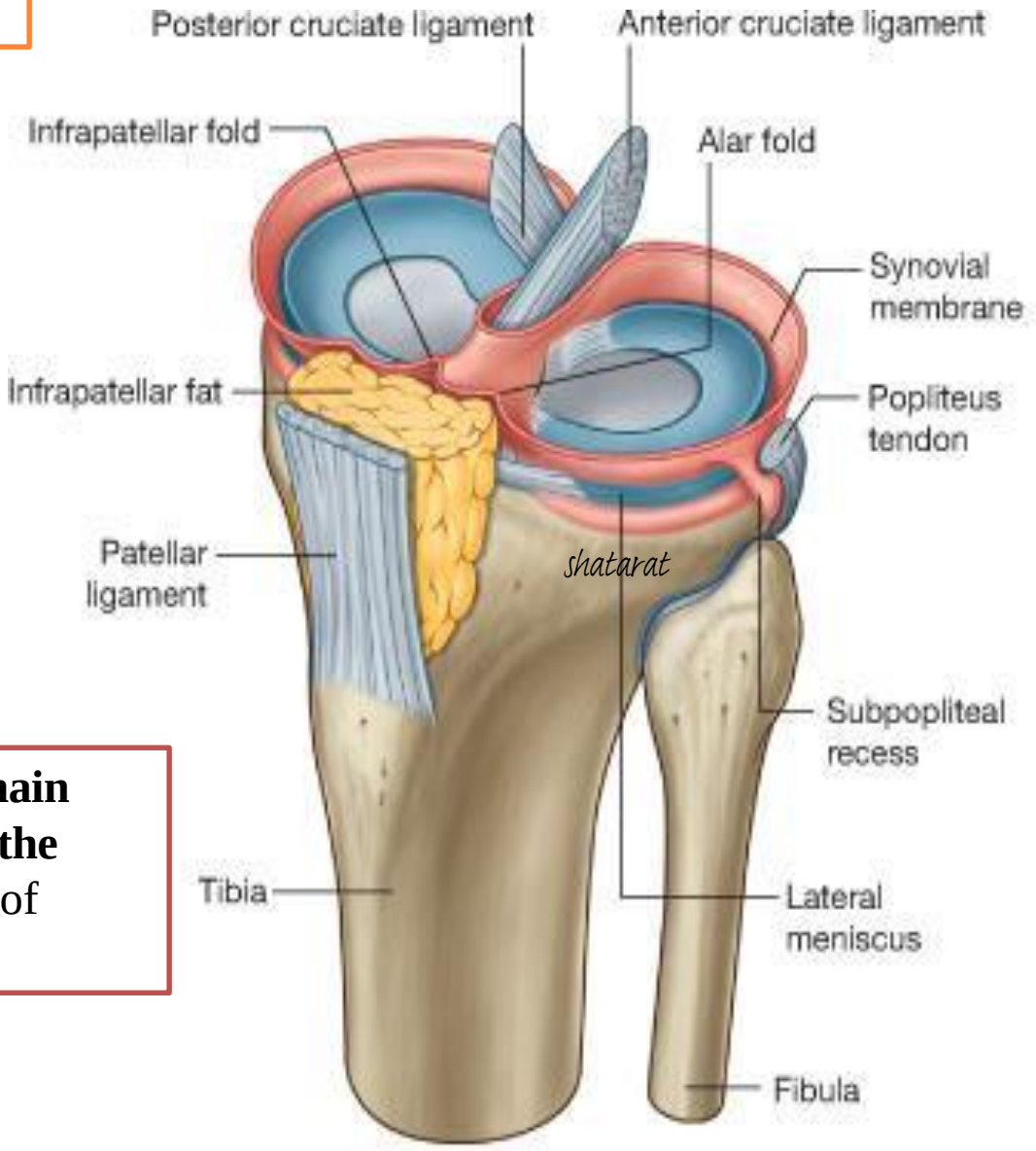
Is a tendinous expansion derived from the semimembranosus muscle.
It strengthens the posterior aspect of the capsule



B- Intracapsular Ligaments

The cruciate ligaments

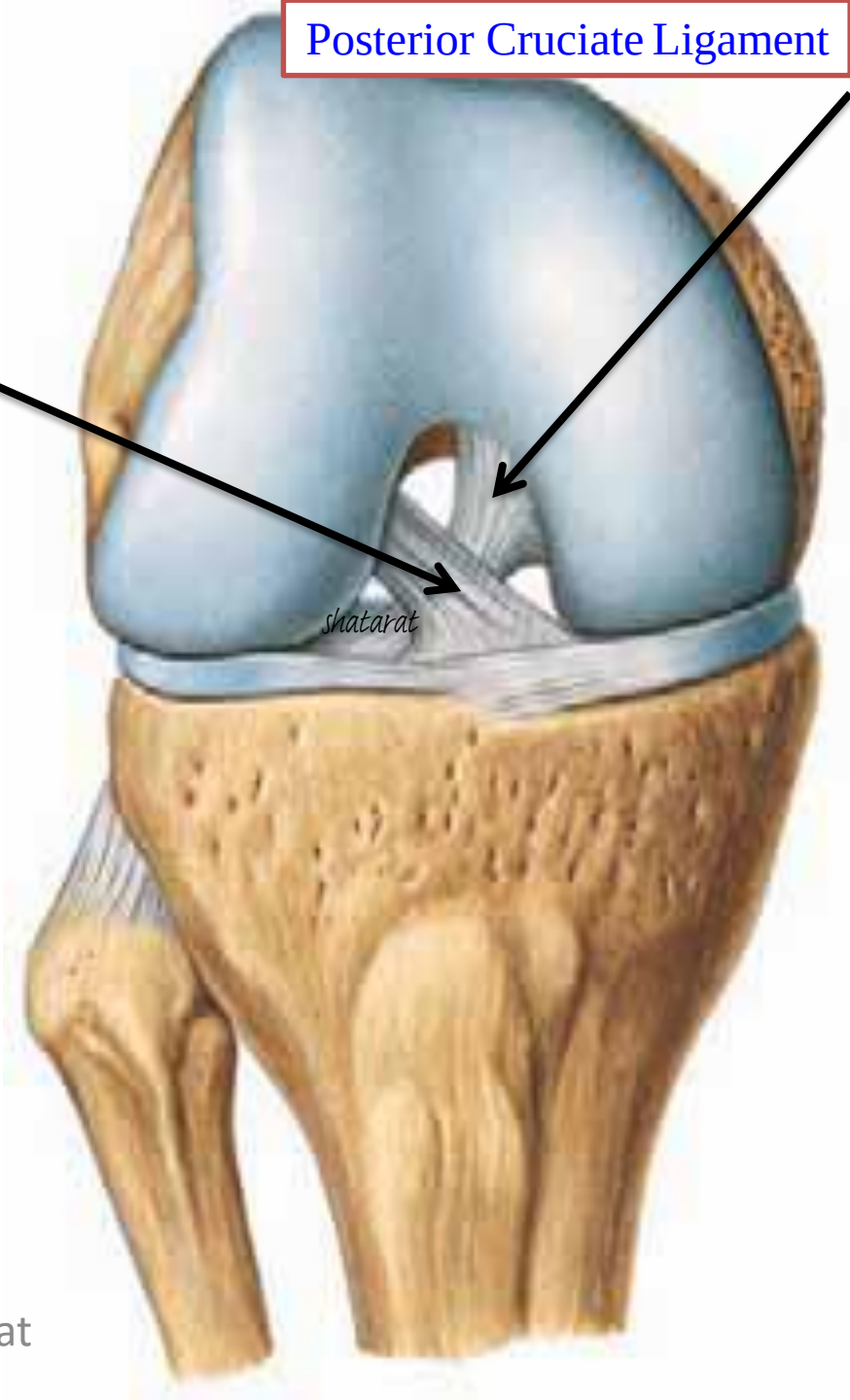
They are named anterior and posterior, according to their tibial attachments



The cruciate ligaments are **the main bond** between the **femur and the tibia** during the joint's range of movement.

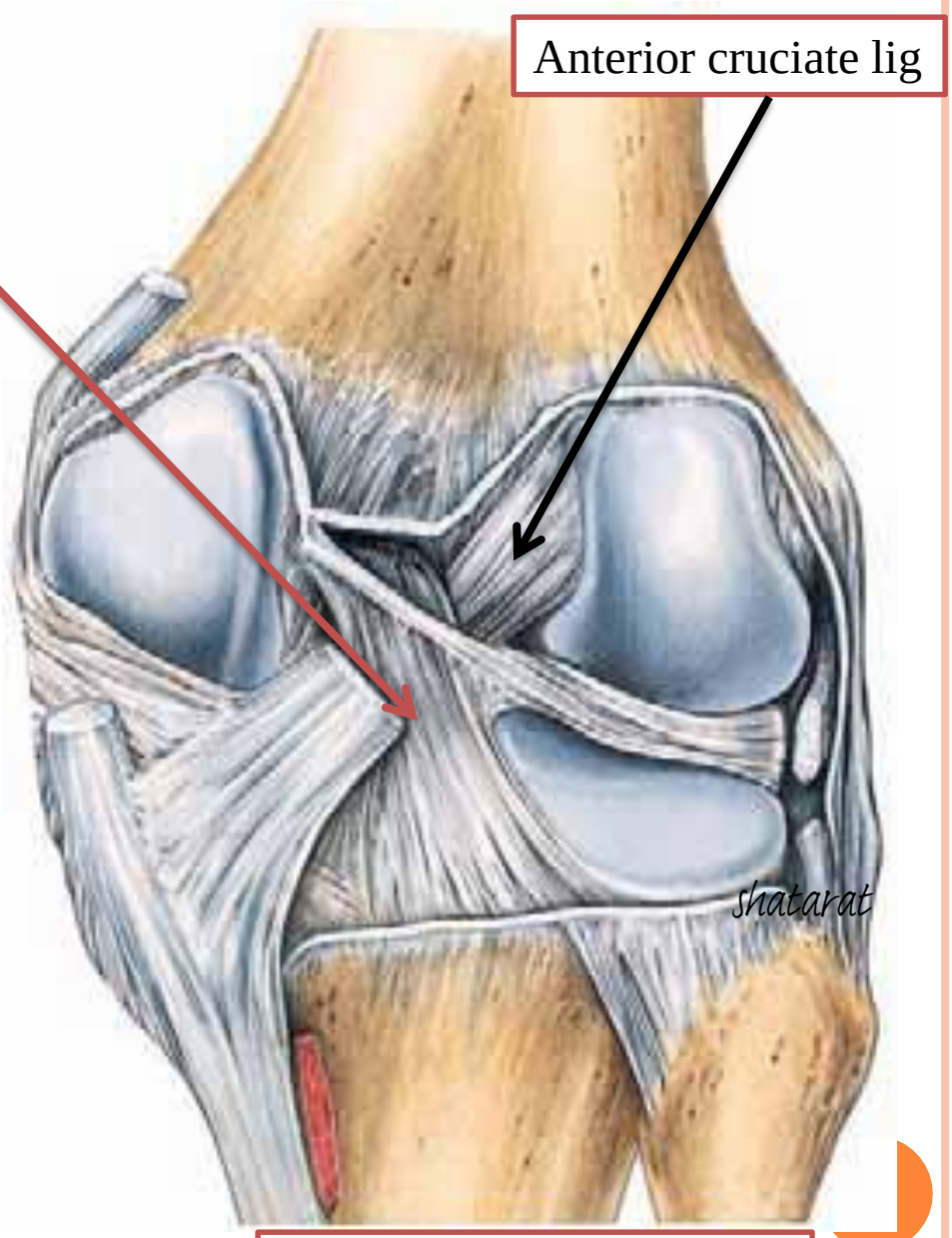
Anterior Cruciate Ligament

- Is attached to the **anterior intercondylar area** of the tibia and ***passes upward, backward, and laterally***, to be attached to ***the posterior part of the medial surface of the lateral femoral condyle***
- Prevents ***posterior displacement*** of the femur on the tibia. With the knee joint flexed, the anterior cruciate ligament prevents the tibia from being **pulled anteriorly.**



Posterior Cruciate Ligament

- Is attached to **the posterior intercondylar area** of the tibia and ***passes upward, forward, and medially*** to be attached to the **anterior part of the lateral surface of the medial femoral condyle**
- Prevents ***anterior displacement*** of the femur on the tibia. With the knee joint flexed, the posterior cruciate ligament prevents the tibia from being **pulled posteriorly**.



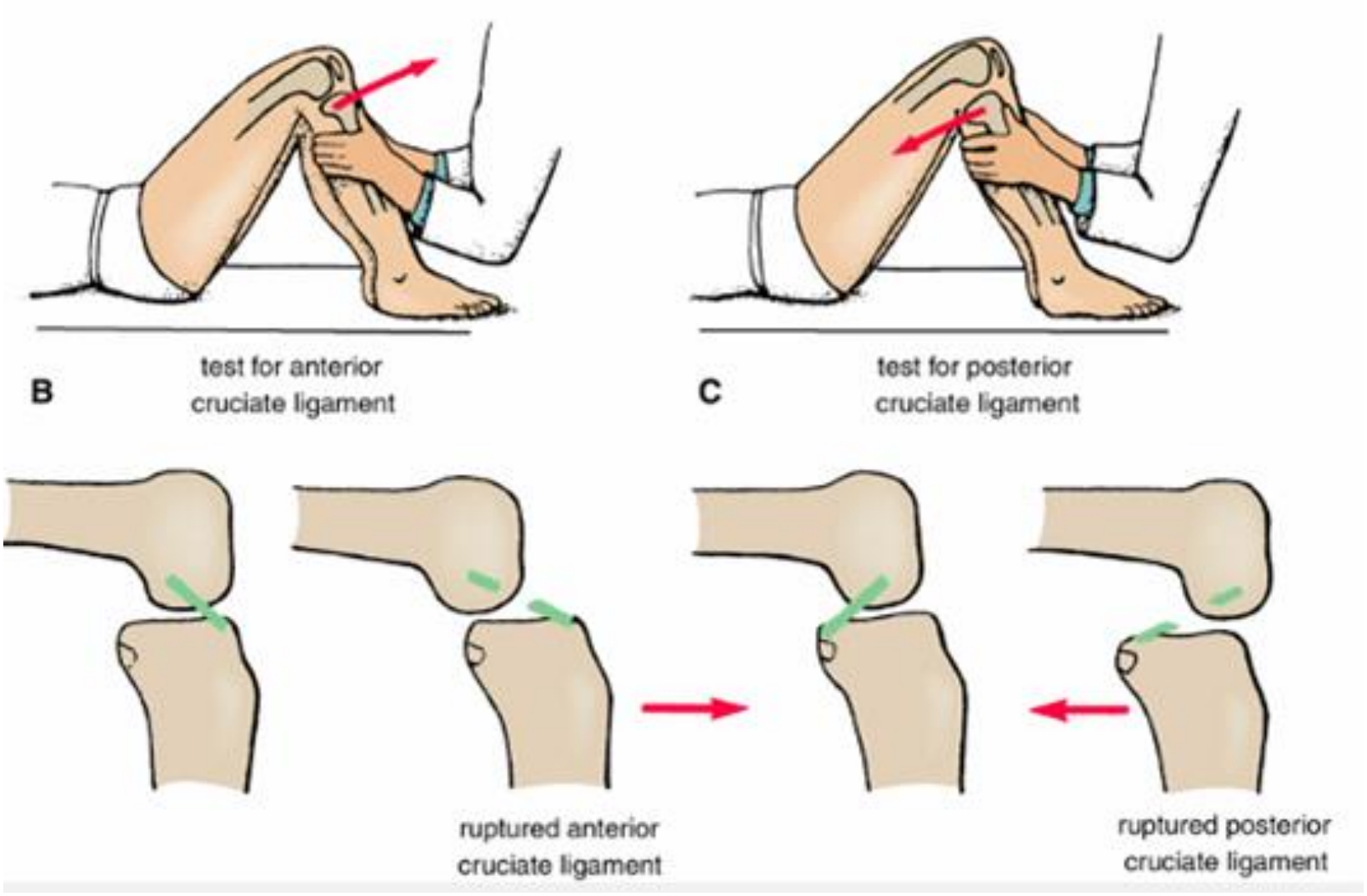
Posterior view of the knee

Clinical Correlate

The tests for the integrity of the anterior and posterior cruciate ligaments are the **anterior and posterior drawer signs.** Tearing of the anterior cruciate ligaments allows the tibia to be easily pulled **forward** (anterior drawer sign). Tearing of the posterior cruciate ligament allows the tibial to be easily pulled **posteriorly** (posterior drawer sign).

Read only LELLI'S TEST FOR ACL LESION

https://www.youtube.com/watch?v=eEhpwTU3KXg


B
test for anterior
cruciate ligament
C
test for posterior
cruciate ligament
ruptured anterior
cruciate ligament
ruptured posterior
cruciate ligament

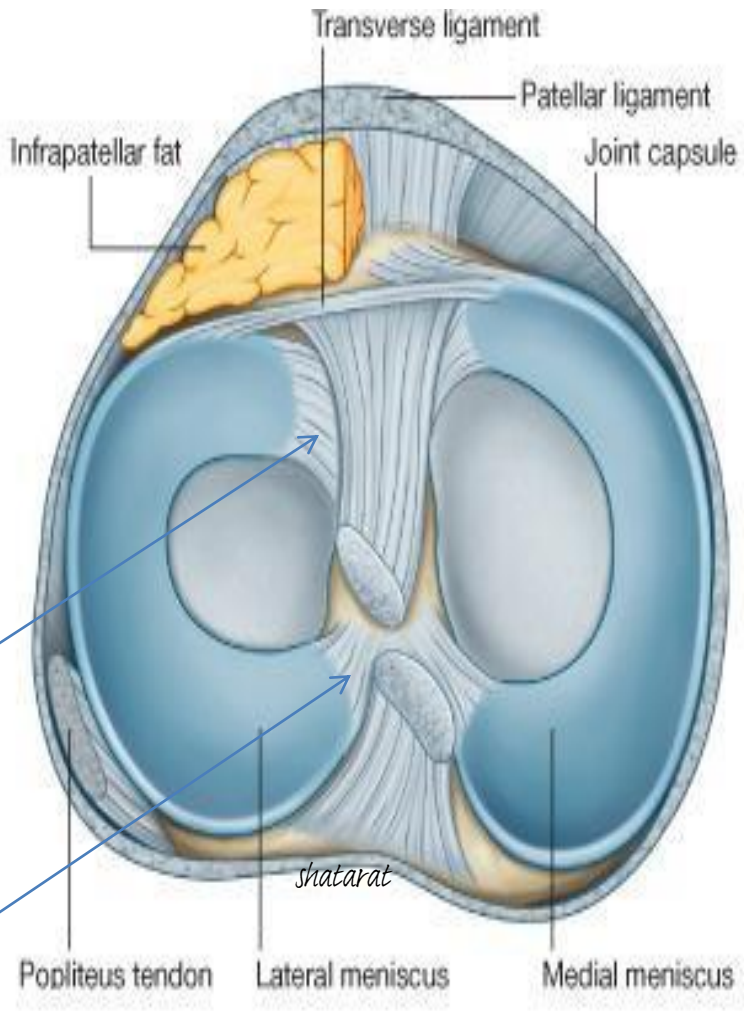
5-Menisci

➢Medial and lateral menisci are C-shaped sheets of fibrocartilage. (composed of ***fibrous connective tissue and NOT of cartilage***.

➢Their function ***is to deepen*** the articular surfaces of the tibial condyles to receive the convex femoral condyles;

➢They also serve as ***cushions*** between the two bones

➢Each meniscus is attached to the upper surface of the tibia **by anterior and posterior horns.**



A. Complete bucket handle tear.

B. The meniscus is torn from its peripheral attachment.

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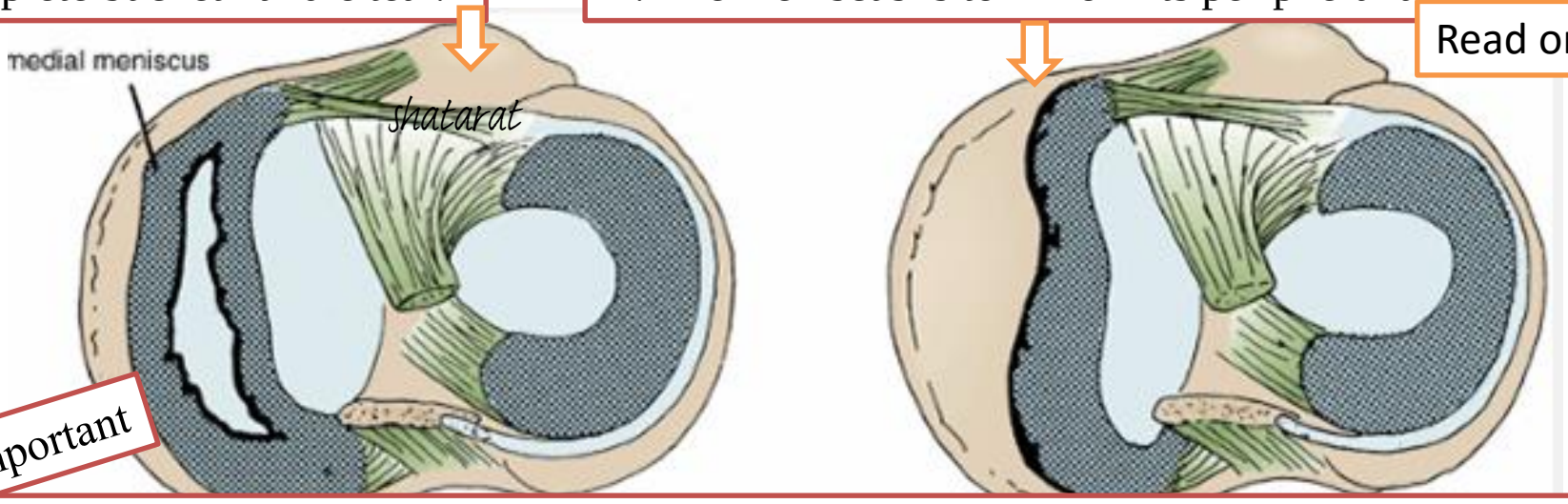

important

The most common type of meniscus tear that causes locking is known as a bucket-handle tear. This is where part of the cartilage gets torn, but remains partially attached producing a moveable flap. As the knee moves around, if the flap is large enough it can get wedged in the wrong position, blocking the joint and causing **knee locking.**

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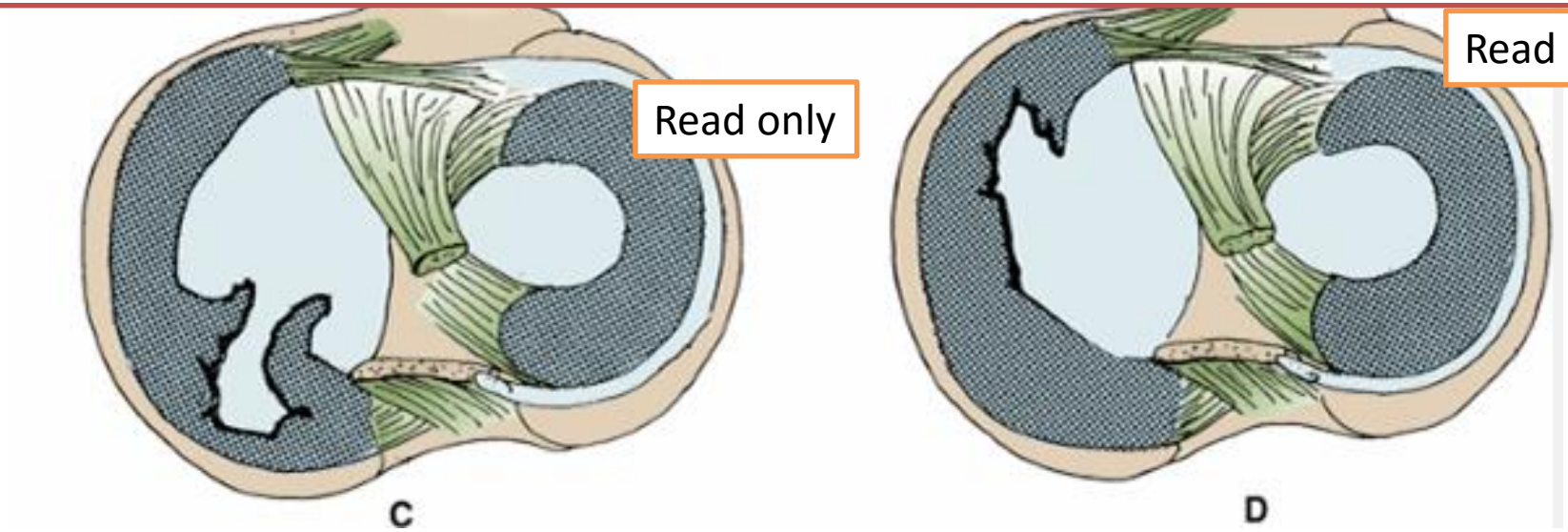
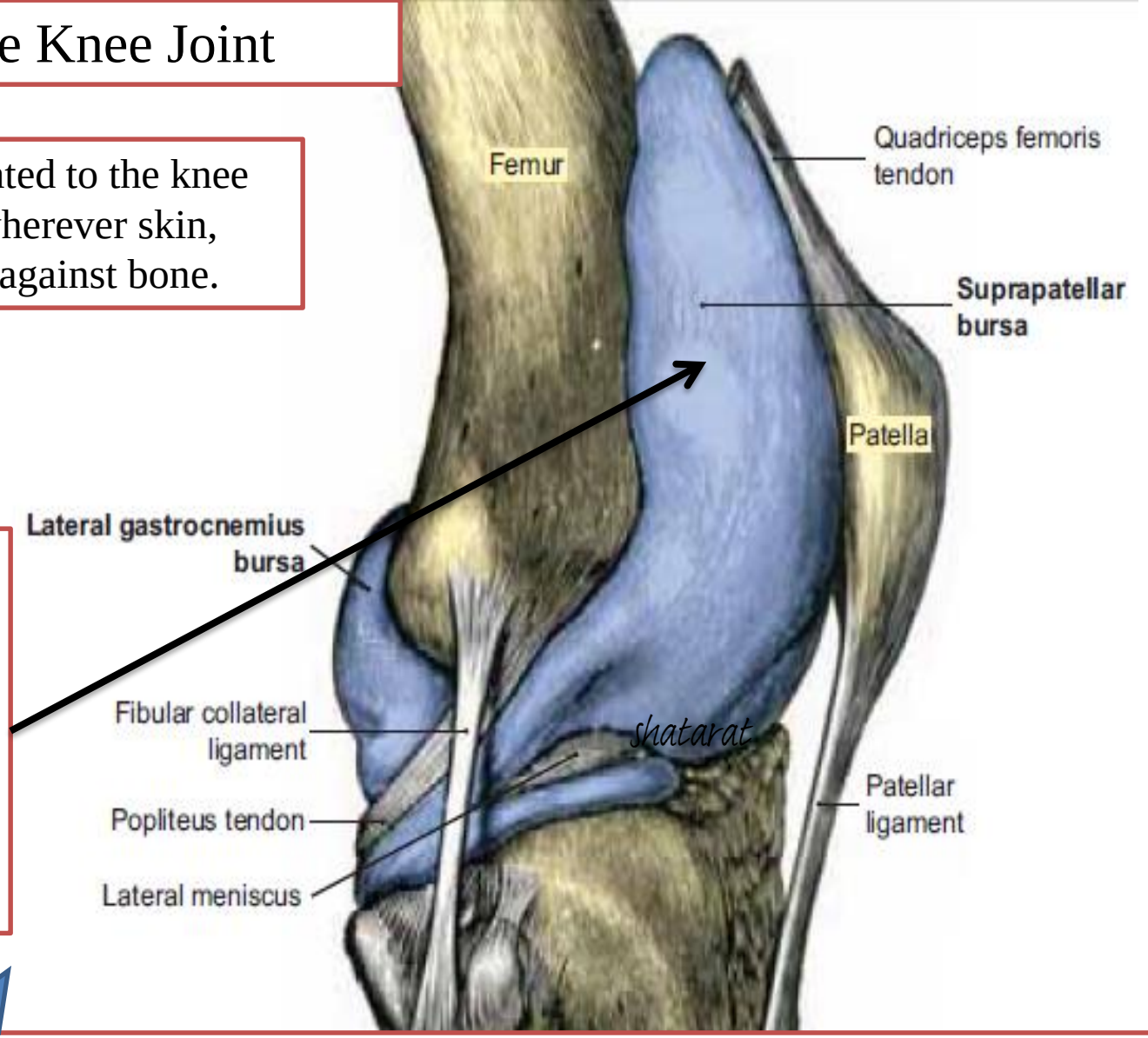


C. Tear of the posterior portion of the meniscus

D. Tear of the anterior portion of the meniscus

6-Bursae Related to the Knee Joint

Numerous bursae are related to the knee joint. They are found wherever skin, muscle, or tendon rubs against bone.



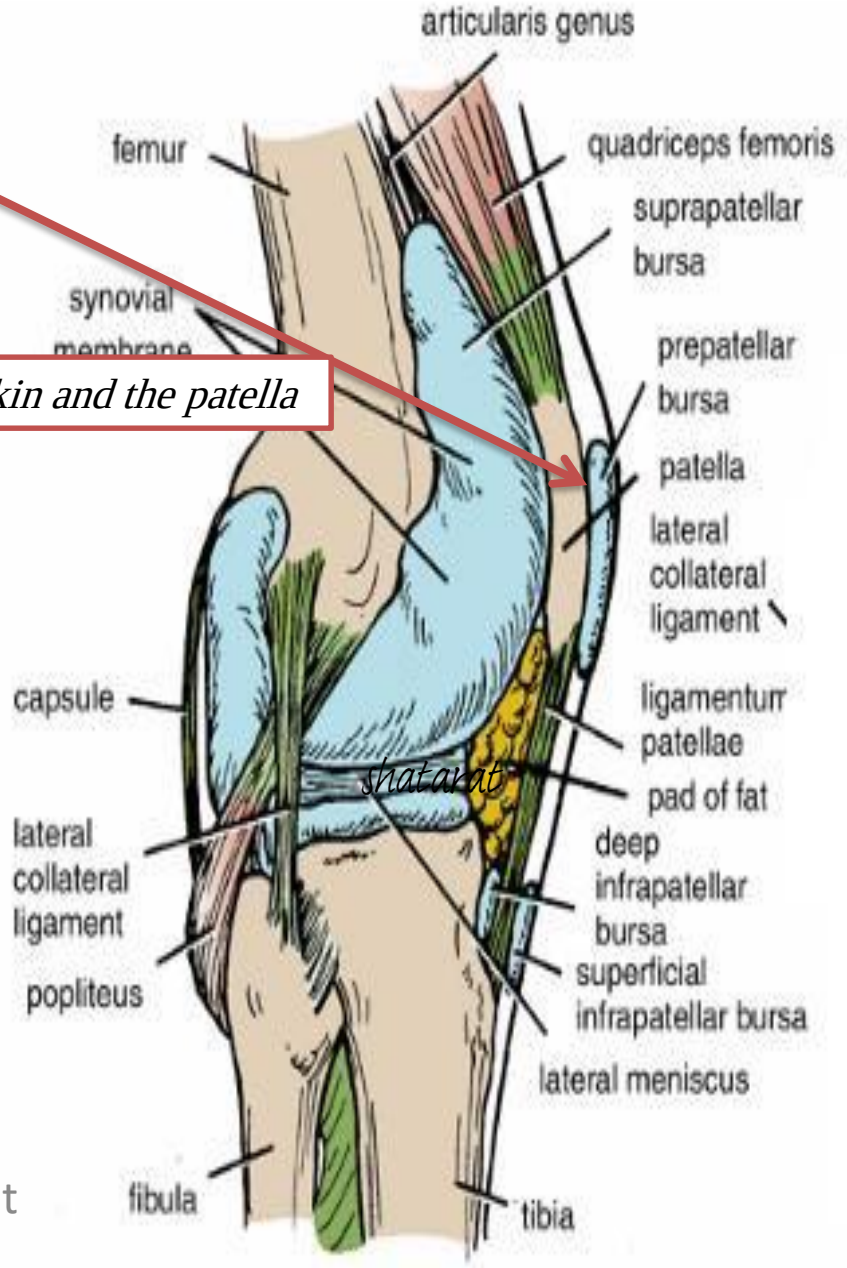
The suprapatellar bursa lies beneath the quadriceps muscle and **communicates with the joint cavity**

consequently, abrasions or penetrating wounds (e.g., a stab wound) superior to the patella may result in ***suprapatellar bursitis*** *caused by bacteria entering the bursa from the* torn skin. **The infection may spread to the knee joint**.

The prepatellar bursa lies in the subcutaneous tissue between the skin and the front of the lower half of the patella and the upper part of the ligamentum patellae

*Prepatellar bursitis ("**housemaid's knee")***

is usually a friction bursitis caused by friction between the skin and the patella



8-Nerve Supply of knee joint
The femoral, obturator, common peroneal, and tibial nerves supply the knee joint.

Pain can be perceived in the hip???!!!!

9-movements of the knee joint

Flexion

The **biceps femoris, semitendinosus, and semimembranosus** muscles, assisted by **the gracilis, and sartorius**, produce flexion.

Flexion is limited by **the contact of the back of the leg with the thigh.**

Extension

The **quadriceps femoris**.

Extension is limited **by the tension of all the major ligaments of the joint**.

Medial Rotation

The **sartorius**, **gracilis**, and **semitendinosus**

Lateral Rotation

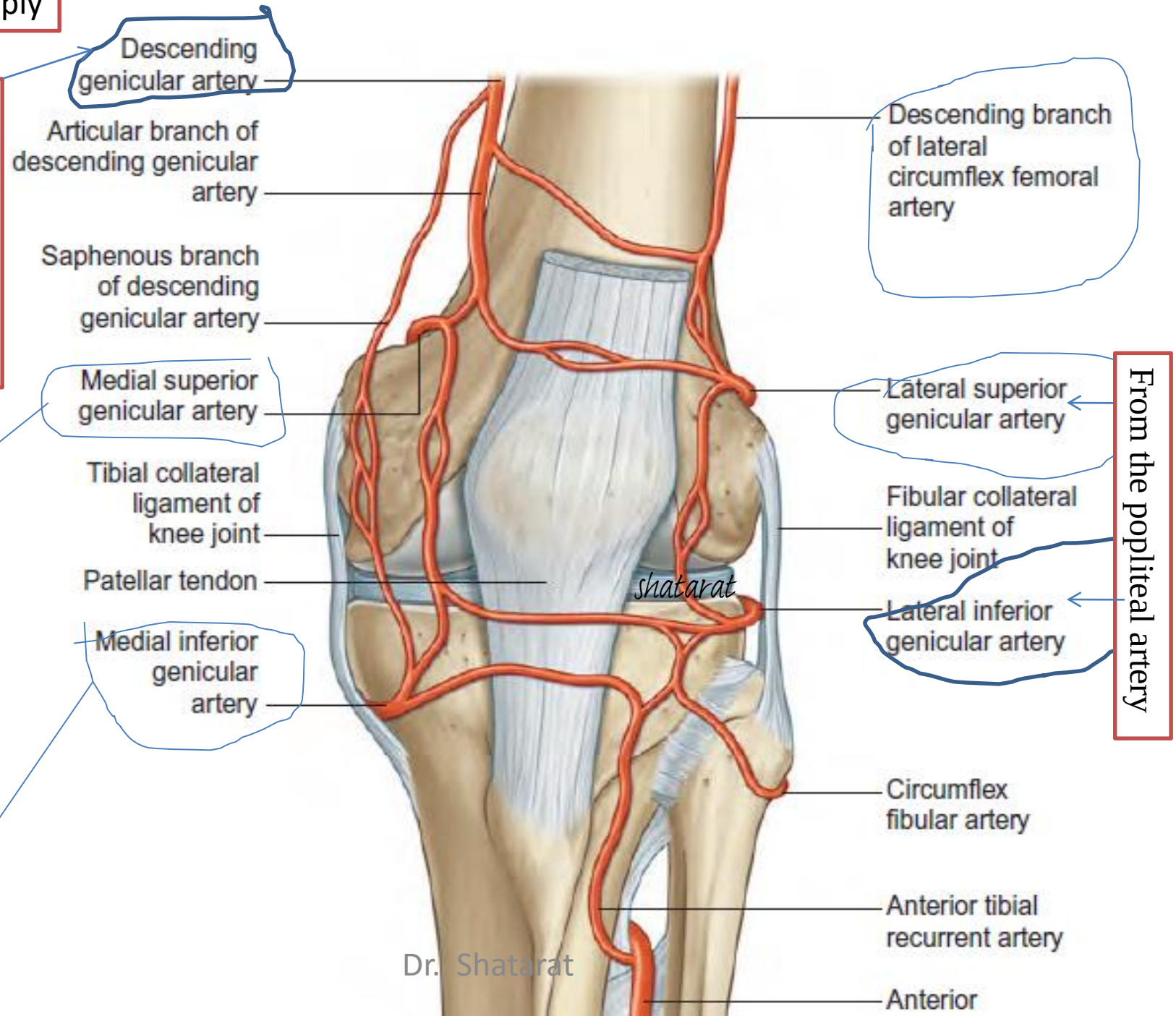
The biceps femoris

Note:

The stability of the knee ***joint depends on the tone of the strong muscles*** acting on the joint and the strength of the ligaments.

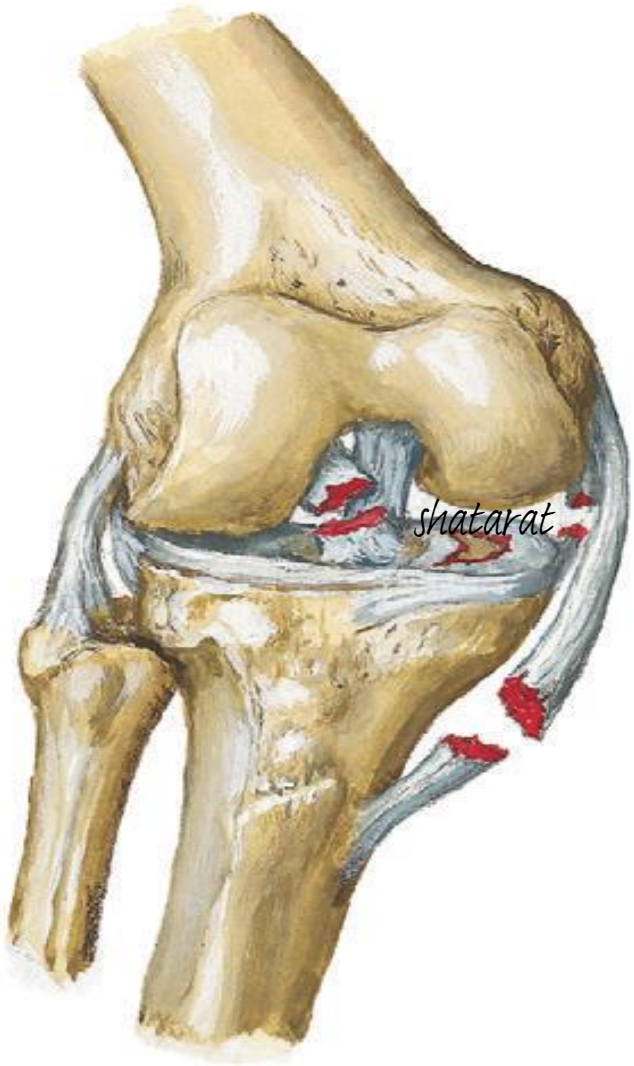
10- blood supply

Branch of the femoral artery in the adductor canal



Common Knee Injuries

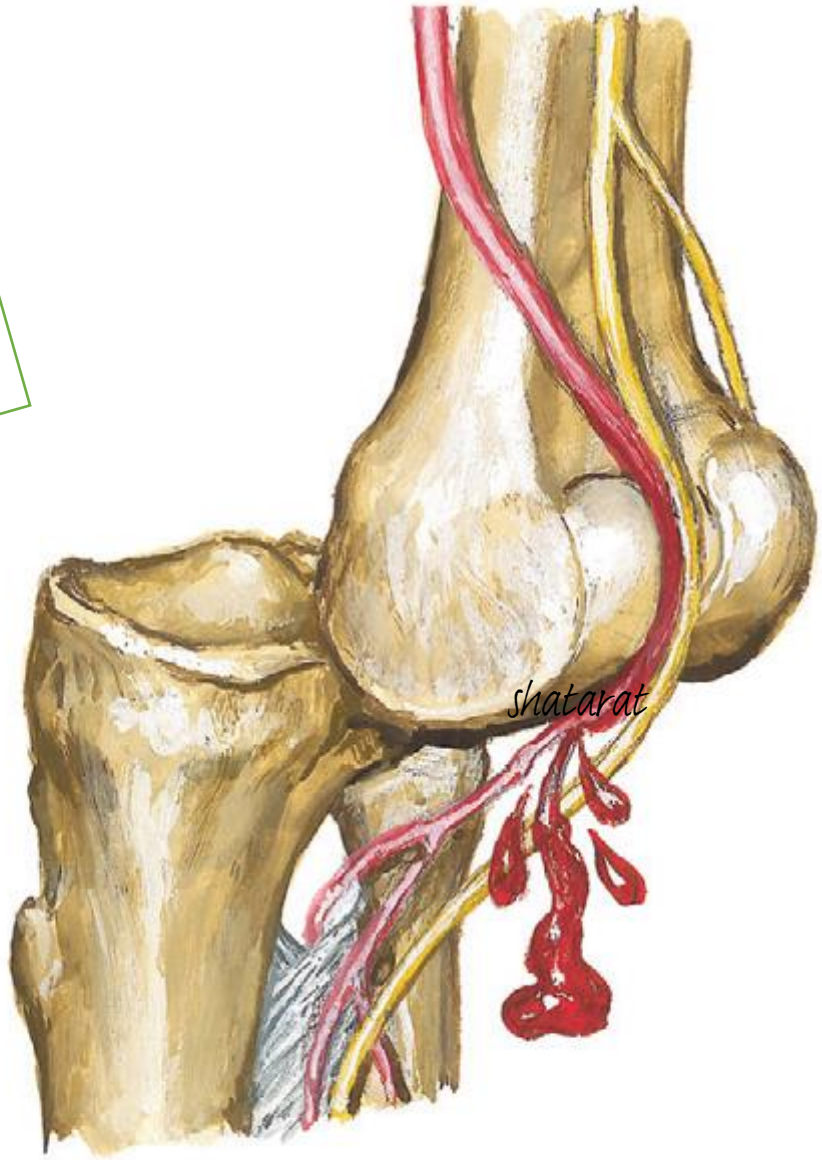
The 3 **most commonly injured structures at the knee** are the tibial collateral ligament, the medial meniscus, and the ACL (**the terrible or unhappy triad**)—usually results from a blow to the lateral aspect of the knee with the foot on the ground.



Posterior Dislocation of the knee joint

May cause

Tear of popliteal artery
or
Tibial common peroneal nerves



In fractures of the distal third of the shaft of the femur, the same displacement of the distal fragment occurs as seen in fractures of the middle third of the shaft..

However, the distal fragment is smaller and is rotated backward by the gastrocnemius muscle to a greater degree and may exert pressure on the

popliteal artery

and interfere with the blood flow through the leg and foot