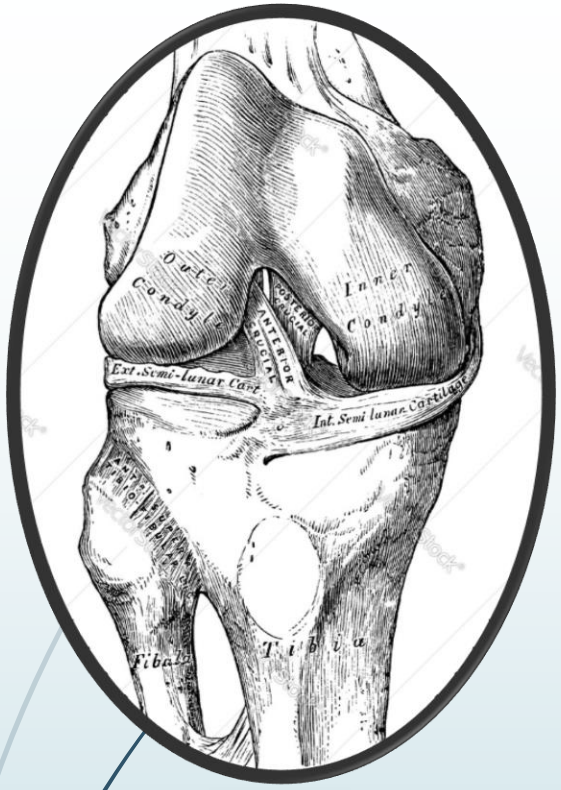

KNEE DISORDERS

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APR. 2020

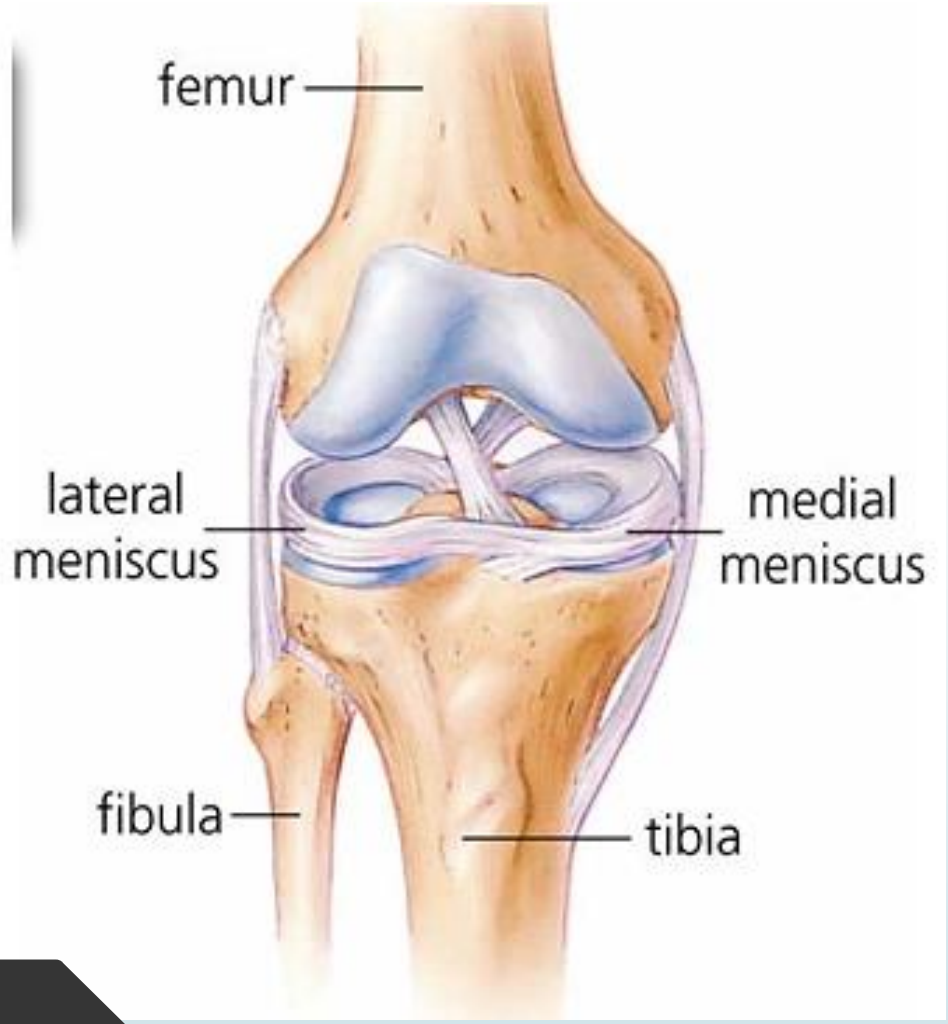
La Medica Academy

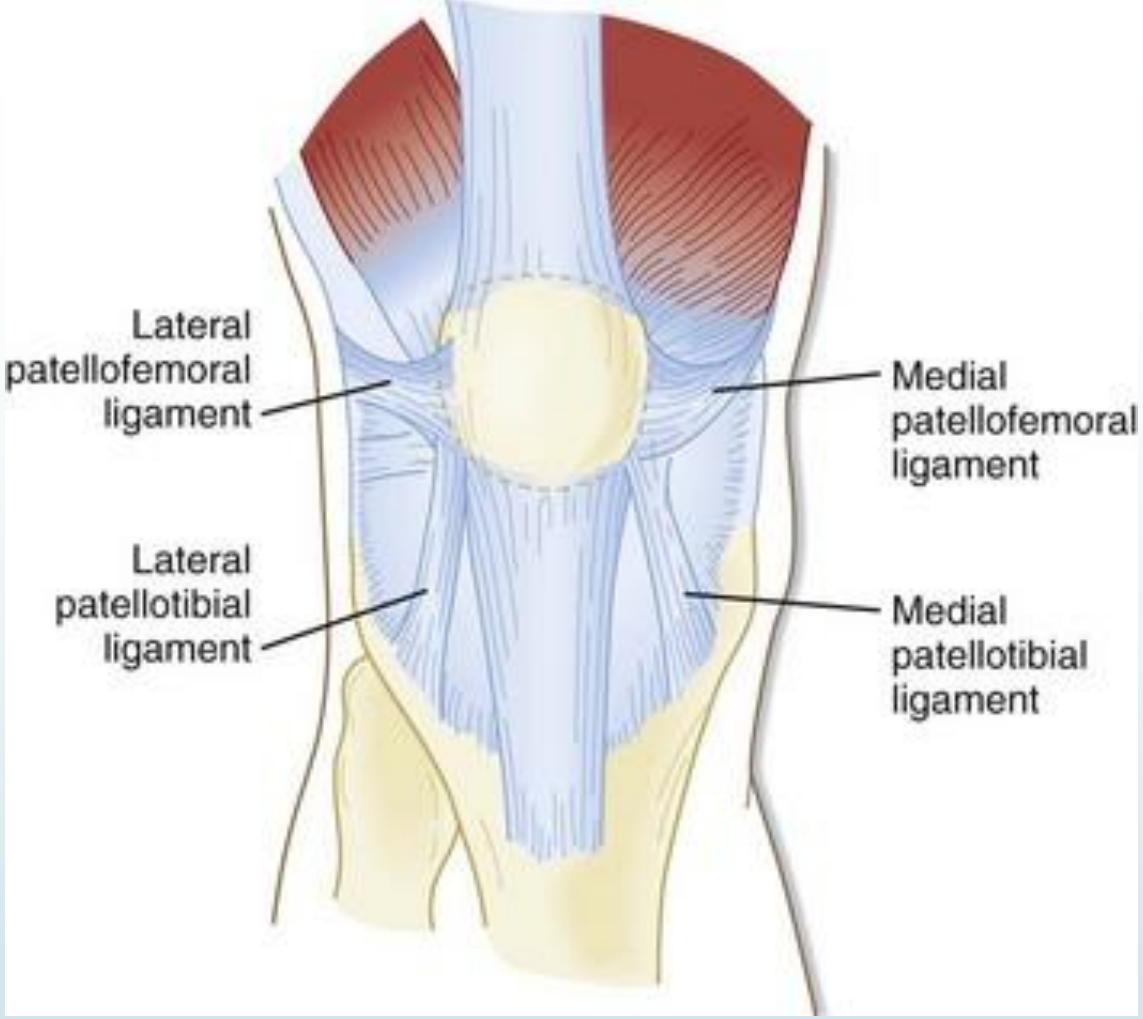
Study Smarter Not Harder

Reviewd by: Qais Abu-AL-Rub

Content:

- 1.ACL
- 2.PCL
- 3.Menisci
- 4.Patellofemoral dislocation
- 5.Swelling around the knee
- 6.Osgood Schlatter's Disease


femur
lateral meniscus
medial meniscus
fibula
tibia


Lateral patellofemoral ligament
Medial patellofemoral ligament
Lateral patellotibial ligament
Medial patellotibial ligament

Anatomy

1.Anterior cruciate Ligament

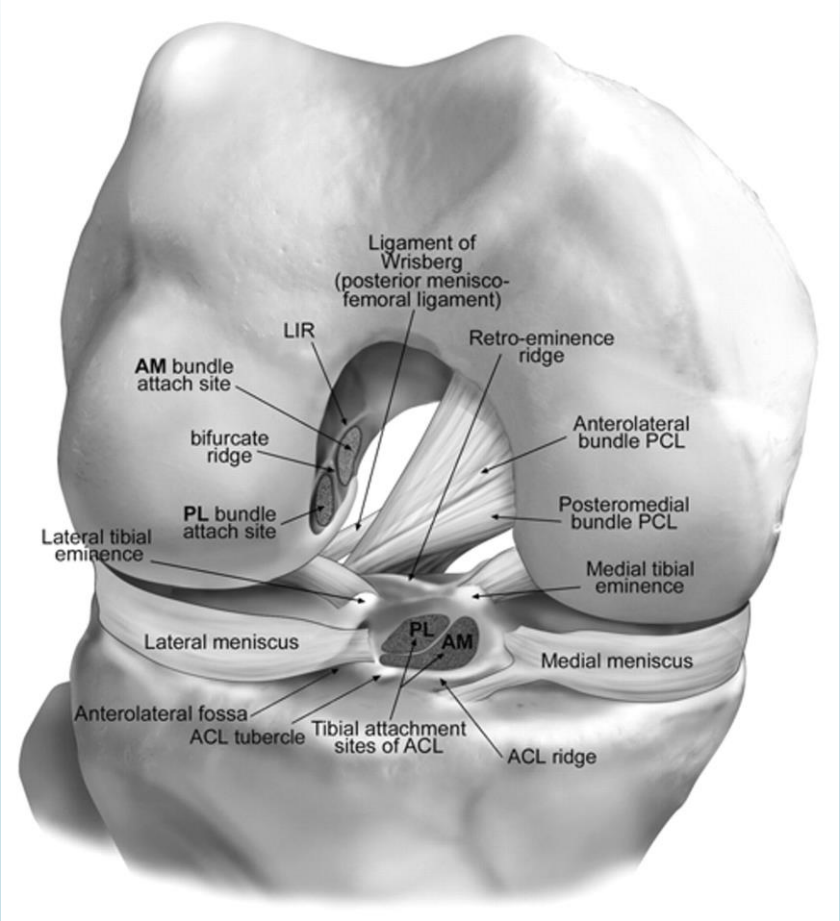
- **Function**

  prevents anterior translation of the tibia relative to the femur

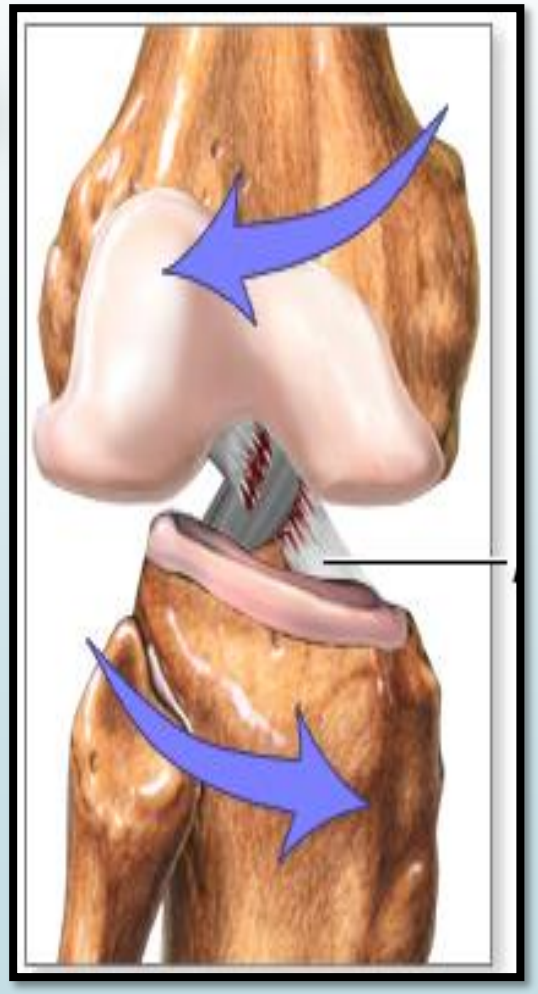
- **Anatomy**
  - **Origin**
    - lateral femoral condyle
  - **Insertion**
    - anterior and between the intercondylar eminences of the tibia
  - **Structure**
    - ✓ anteromedial (tight in flexion and loose in extension)
    - ✓ posterolateral (tight in extension, loose in flexion)

- **Blood supply: middle genicular artery**

- **Innervation: tibial nerve**



Anterior cruciate Ligament
Mechanism of injury



- **Non-contact pivoting injury**.(usually)

(tibia translates anteriorly while knee is in slight flexion and valgus)

- **Blow to the lateral aspect of the knee**

Normal

Varus

"Bow legged"

More stress on medial compartment

Valgus

"Knock-kneed"

More stress on lateral compartment

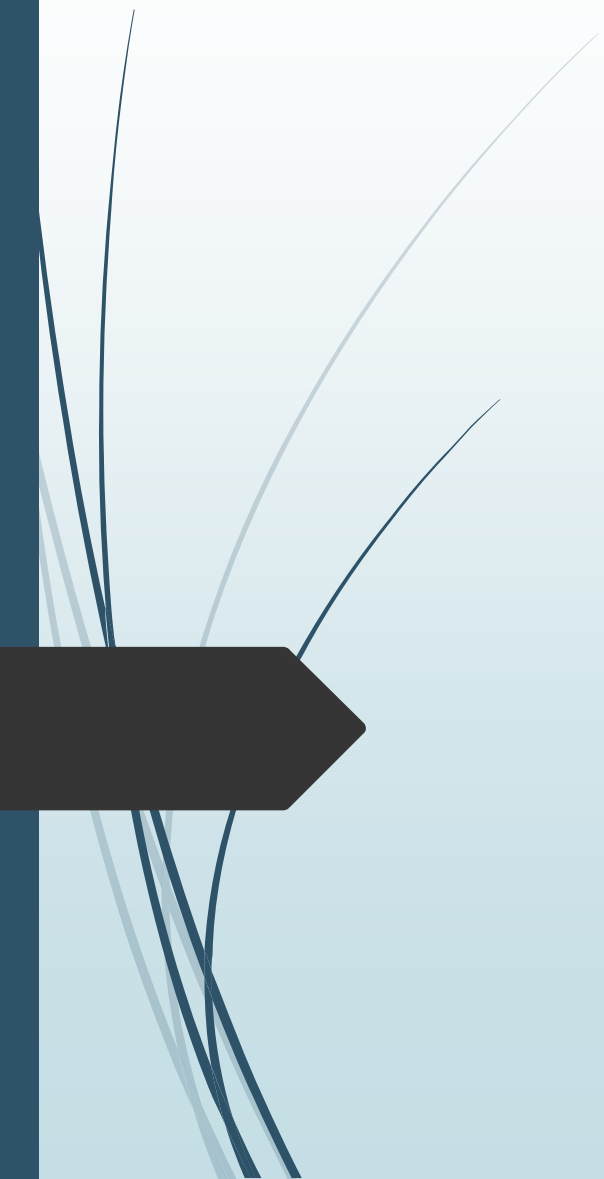
Anterior cruciate Ligament
Symptoms

acute

- **Pain**(very severe)
- **Swelling** (Hemarthrosis)
- **Felt a POP**
- **Giving way (after period ,for example 2 wks)**

Anterior cruciate Ligament Examination

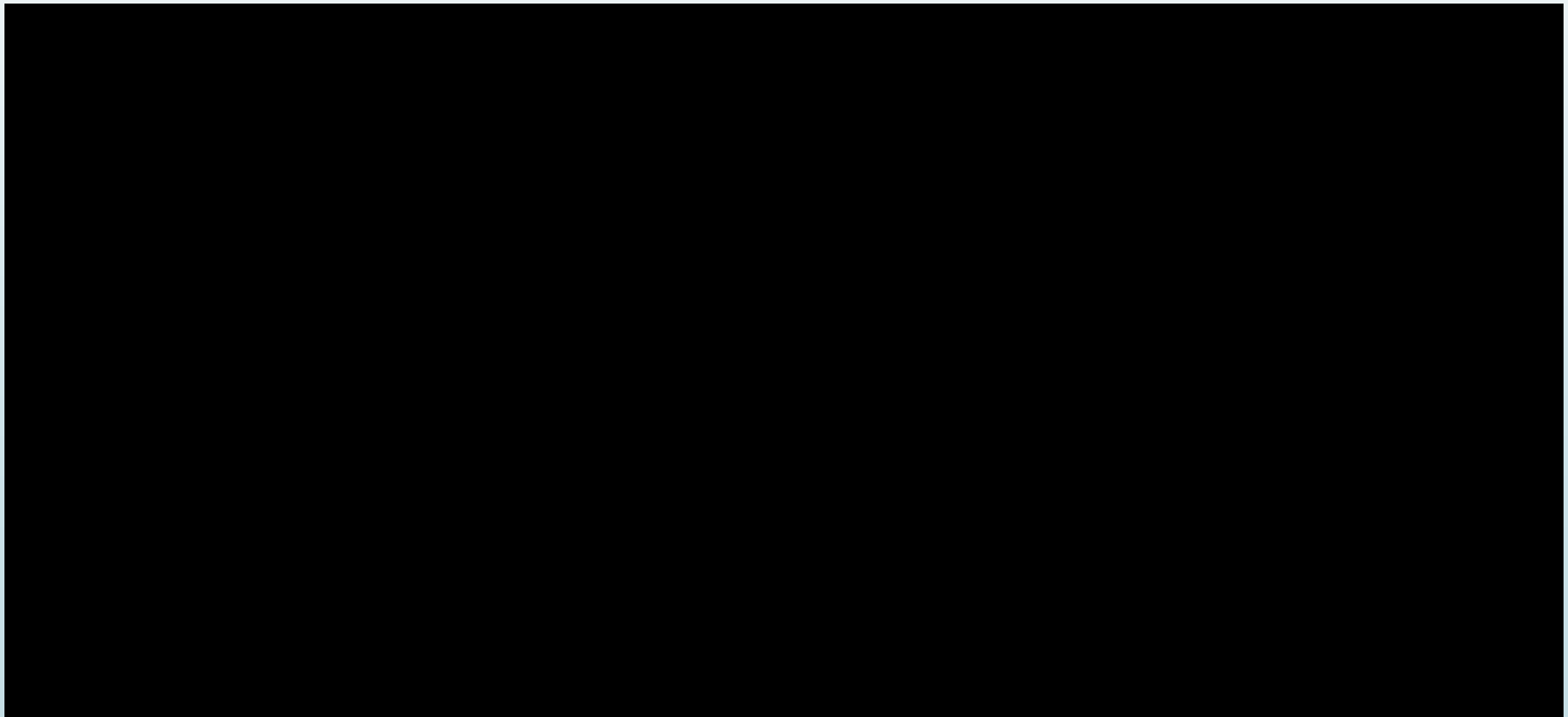
- **1.Lachman test:** (anterior gliding of tibia [relative to femur] with knee bent at 30° angle
  - but is more sensitive than anterior drawer sign



Anterior cruciate Ligament

Examination

- 3.Pivot shift test: A:internal rotation of leg + valgus stress
- B: From extension ⟶ flexion
- Positive test: when feel relocation of tibia
- Its painful so use it pre.op or after txs during procedure to confirm correction:



Anterior cruciate Ligament

Imaging

- X-Ray: **usually normal** but some cases in **children** appear like in the pictures mentioned:

Avulsion fracture: occurs when a small chunk of bone attached to a tendon or ligament gets pulled away from the main part of the bone.

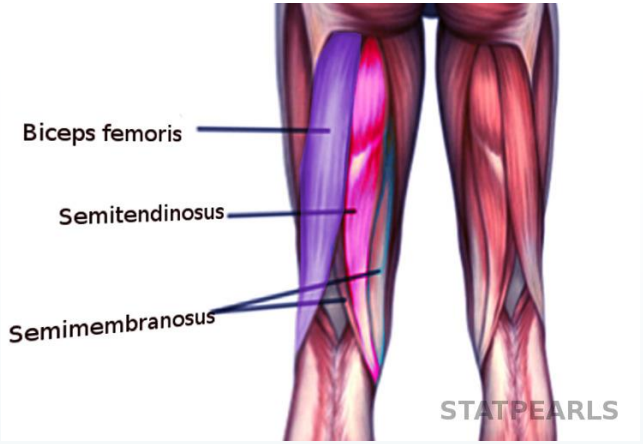
In children (skeletally immature) lead to avulsion of tibial insertion of ACL

Avulsion in capsule **(Segond Fxs)**

Anterior cruciate Ligament Imaging

- MRI: (gold standard)

Anterior cruciate Ligament Treatment



- **Depend on age and life style:**
- **1.Non Operative**:
  - **physical therapy & lifestyle modifications**
    - low demand patients with decreased laxity
    - recreational athlete not participating in cutting/pivoting activities
  - **outcomes**
    - increased meniscal/cartilage damage
      - loss of meniscal integrity, the frequency of buckling episodes, level I and II activity (e.g. jumping, cutting, side-to-side sports, heavy manual labor)

The aim of non-operative: Strengthen the hamstring muscle: the 2nd stabilizer for translation of tibia relative to femur

Anterior cruciate Ligament Treatment

Operative

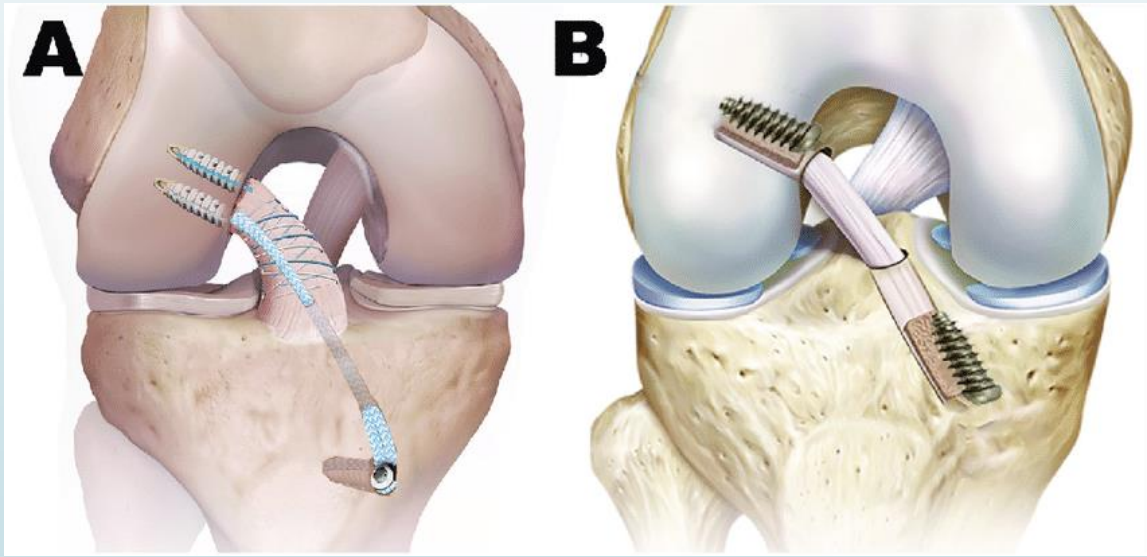
- **ACL reconstruction**
  - Indications
    - must have full motion of knee restored following injury (unless meniscal tear causing mechanical block)
    - lack of pre-operative motion risk factor for post-operative arthrofibrosis
    - younger, more active patients (reduces the incidence of meniscal or chondral injury)
    - children (activity limitation is not realistic)
    - older active patients (age >40 is not a contraindication if high demand athlete)
    - partial/single bundle tears with clinical and functional instability
    - prior ACL reconstruction failure
  - outcomes
    - return to play largely influenced by psychological, demographic and functional outcomes

Steps:

A: Autograft: same ptn. from hamstring tendon

Allograft: cadaver
Synthetic graft: not strong

B: ***Brace 6 wks
C: physiotherapy: 3-9 mnths

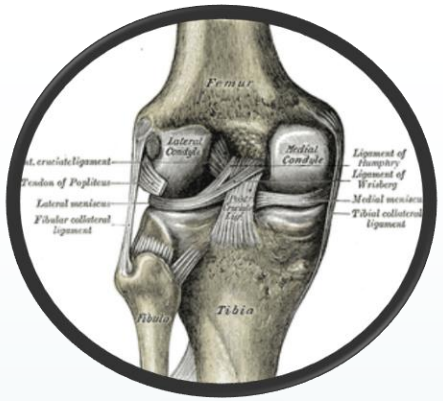


***Brace 6 wks

- designed to stabilize a broken bone or surgery site and permits you to participate in range-of-motion and weight-bearing activities such as light walking and activities of general, daily living

- **use it in treatment step of ACL reconstruction after auto graft**

2.Posterior Cruciate Ligament



➢ Function

prevents posterior translation of the tibia relative to the femur

➢ Anatomy

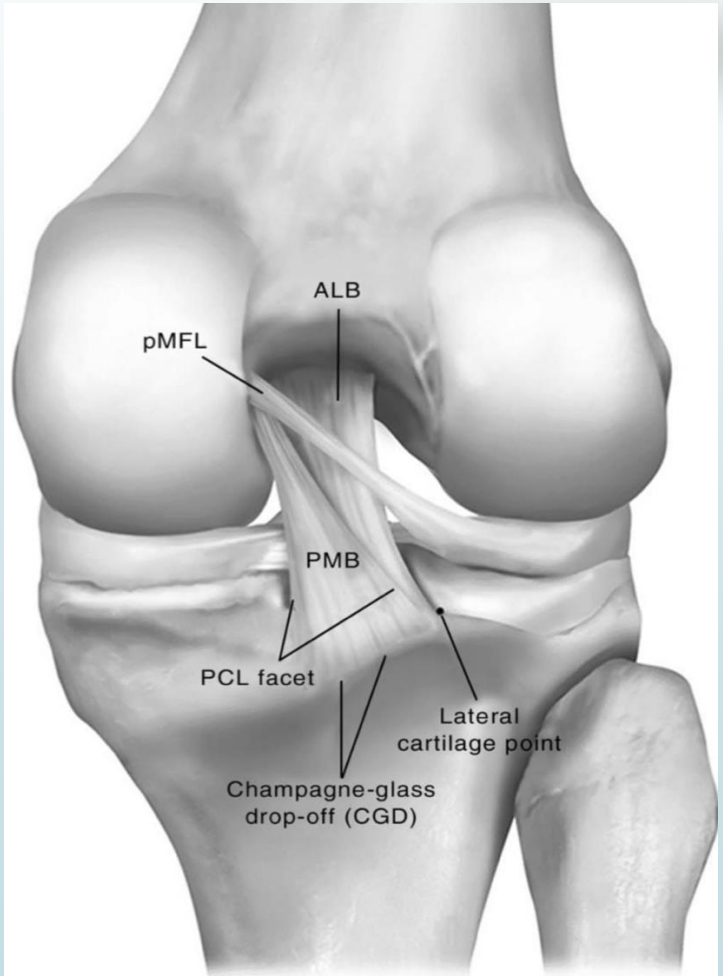
extrasynovial but intracapsular

- ❑ **Origin**
  - •medial femoral condyle
- ❑ **Insertion**
  - •tibial sulcus

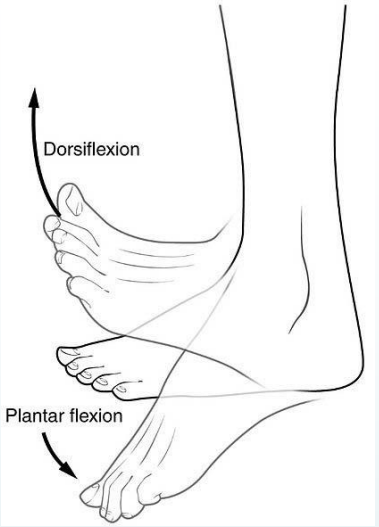
➢ Structure

- •two bundles
  - anterolateral
  - Posteromedial

➢ **Blood supply: middle genicular artery**

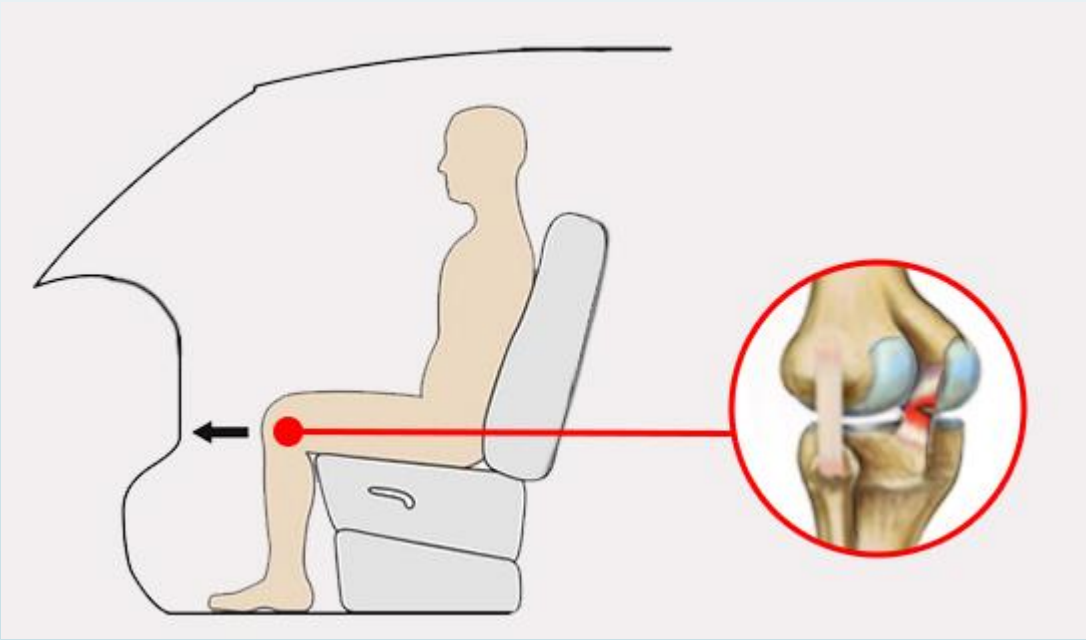


Posterior Cruciate Ligament
Mechanisim of Injury

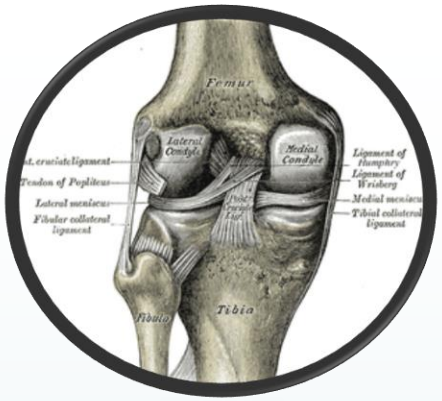


- Direct blow to proximal tibia with a flexed knee (**Dashboard injury**)
- Noncontact hyperflexion with a plantar-flexed foot
- Hyperextension injury

RARELY Alone , usually multi-ligamentus injury

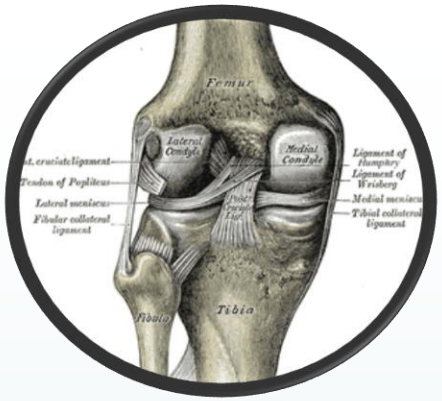


Posterior Cruciate Ligament Symptoms

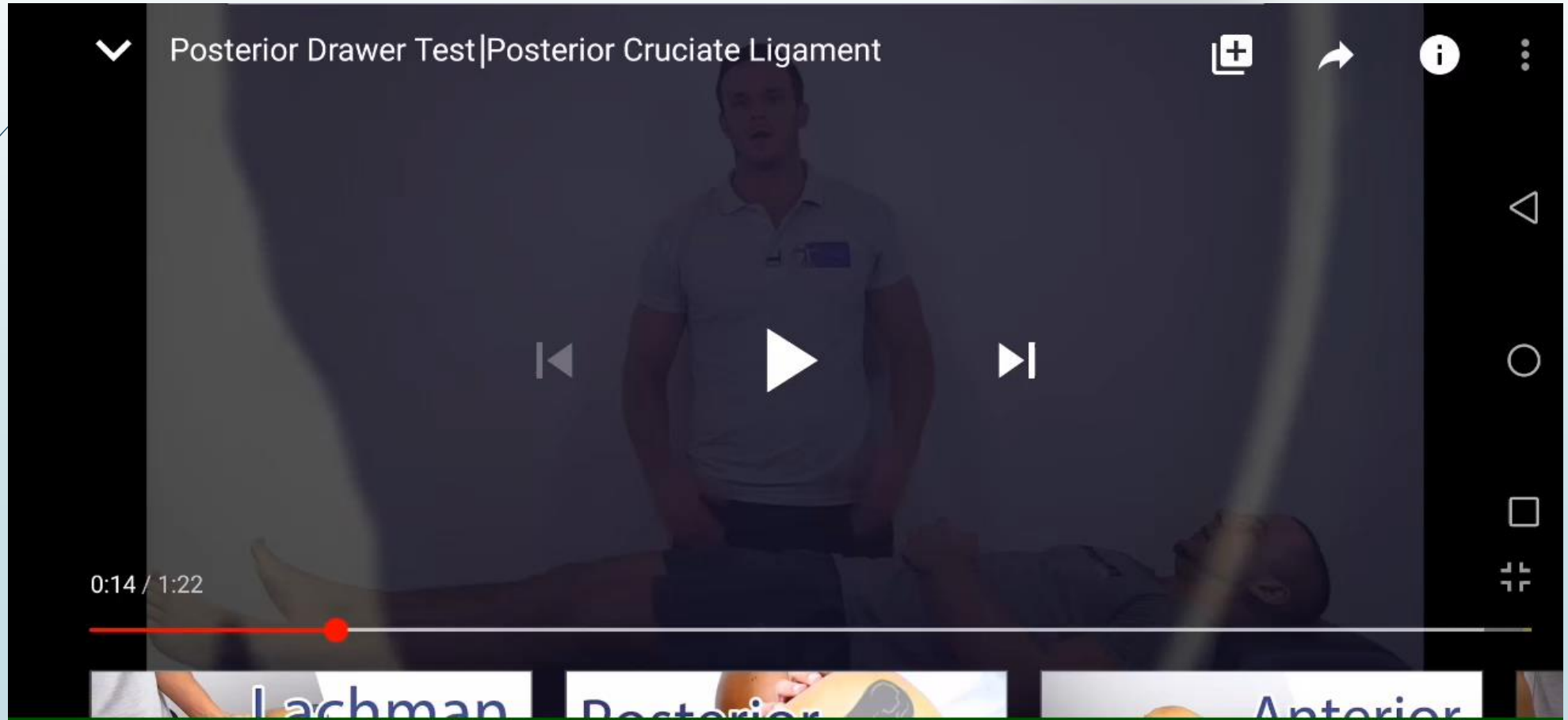


- posterior knee pain
- instability
  - often subtle or asymptomatic in isolated PCL injuries.

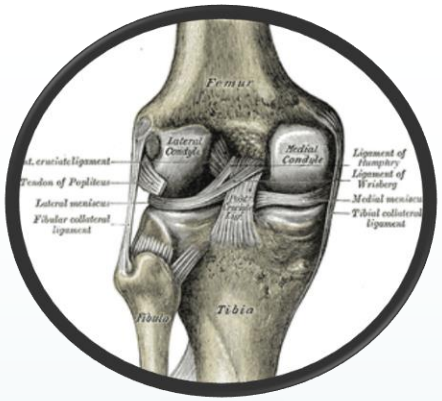
Posterior Cruciate Ligament
Examination



- Posterior drawer test



Posterior Cruciate Ligament
Imaging

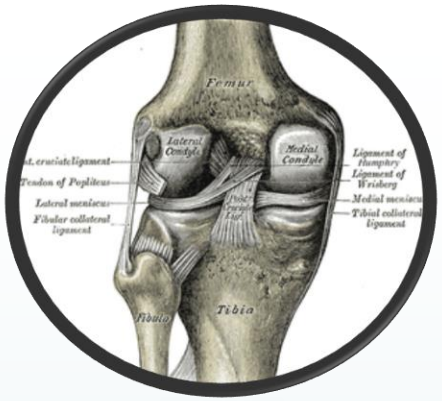


X-ray: usually normal

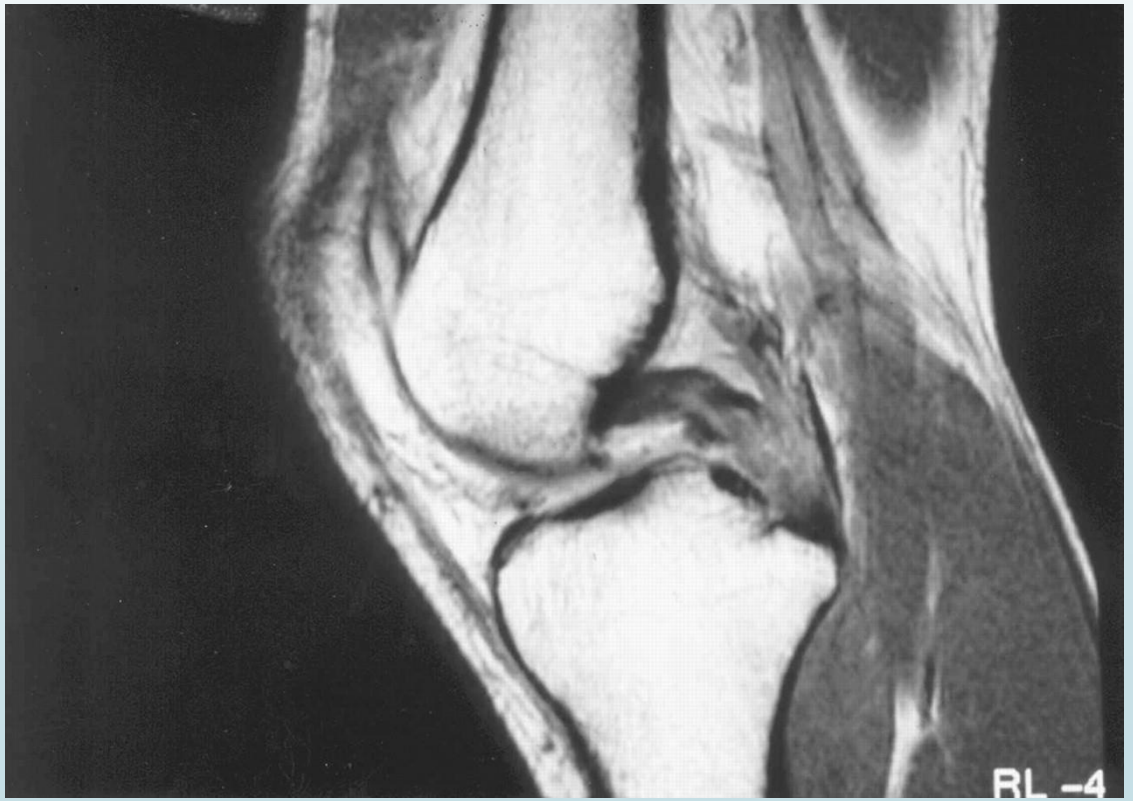
Its good to repair : ORIF with wires

ORIF: open reduction, internal fixation

Posterior Cruciate Ligament Imaging



MRI: incontinently of the ligament



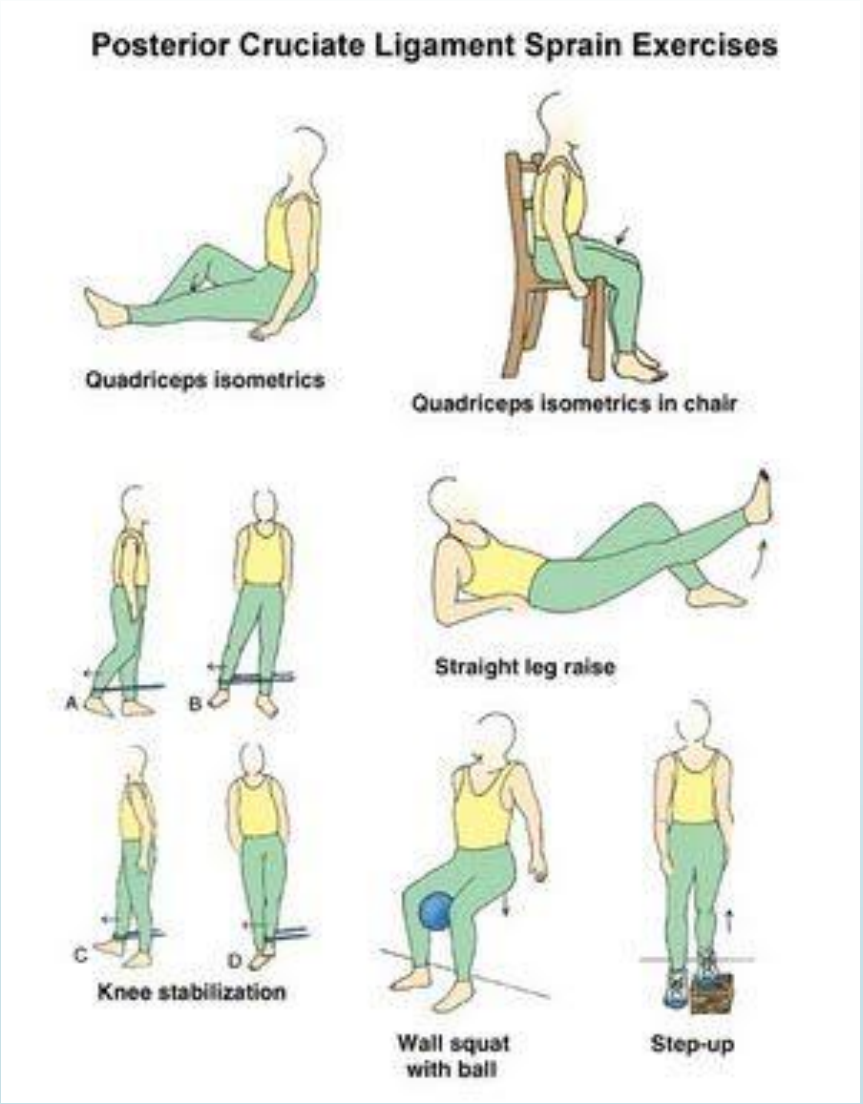
Posterior Cruciate Ligament Treatment

- **1.Nonoperative**

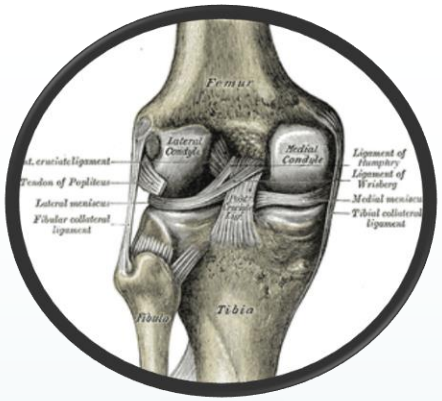
protected weight bearing & rehab.

  - indications
    - isolated Grade I (partial) and II (complete isolated) injuries

  - Modalities:
    - **quadriceps** rehabilitation with a focus on knee extensor strengthening



Posterior Cruciate Ligament

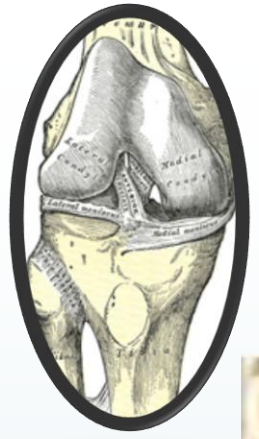


2.Operative

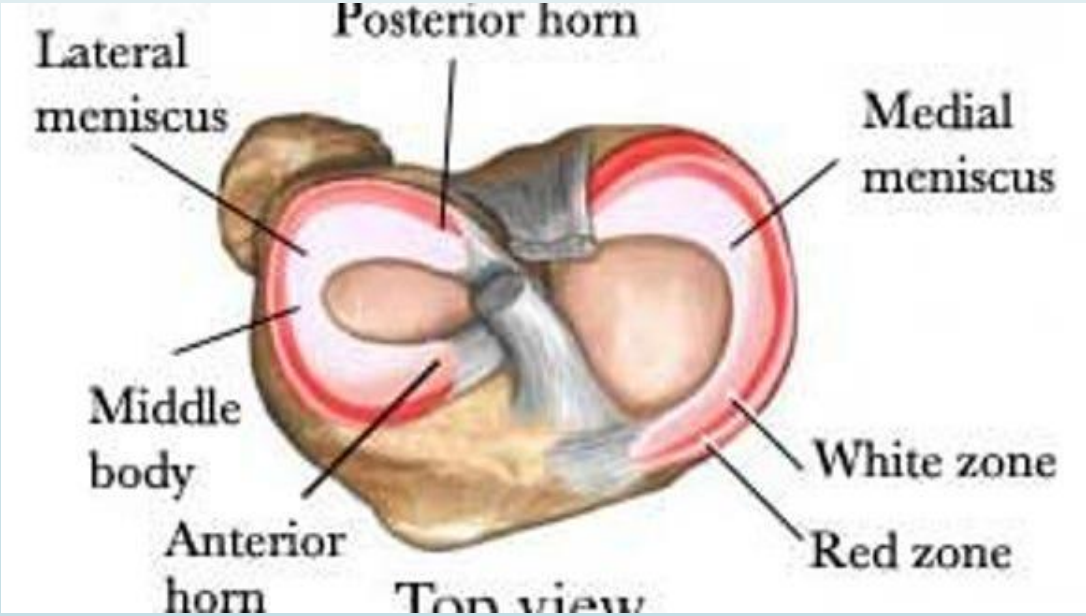
PCL repair of bony avulsion fractures or reconstruction

- indications
  - combined ligamentous injuries
  - isolated Grade II or III injuries with bony avulsion
  - isolated chronic PCL injuries with a functionally unstable knee

3.Menisci

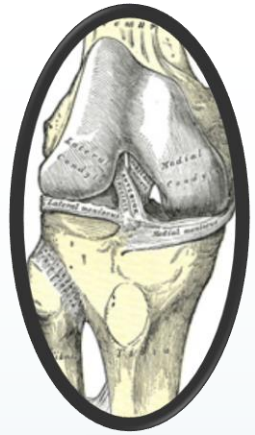


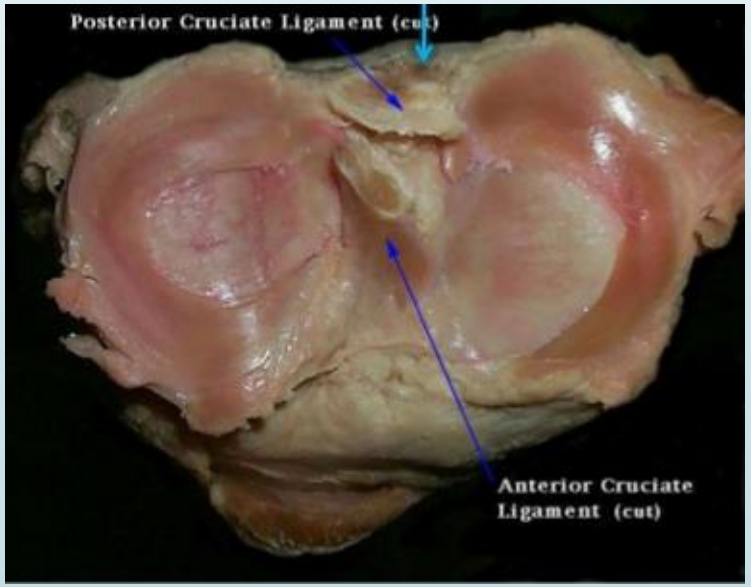
- They are C-shaped sheets of fibrocartilage.
- The peripheral border is thick & attached to the capsule, the inner border is thin & concave forming a free edge.
- The upper surfaces are in contact with the femoral condyles.
- The lower surfaces are in contact with the tibial condyles.
- Medial menisci is a semicircle but the lateral is almost a complete circle



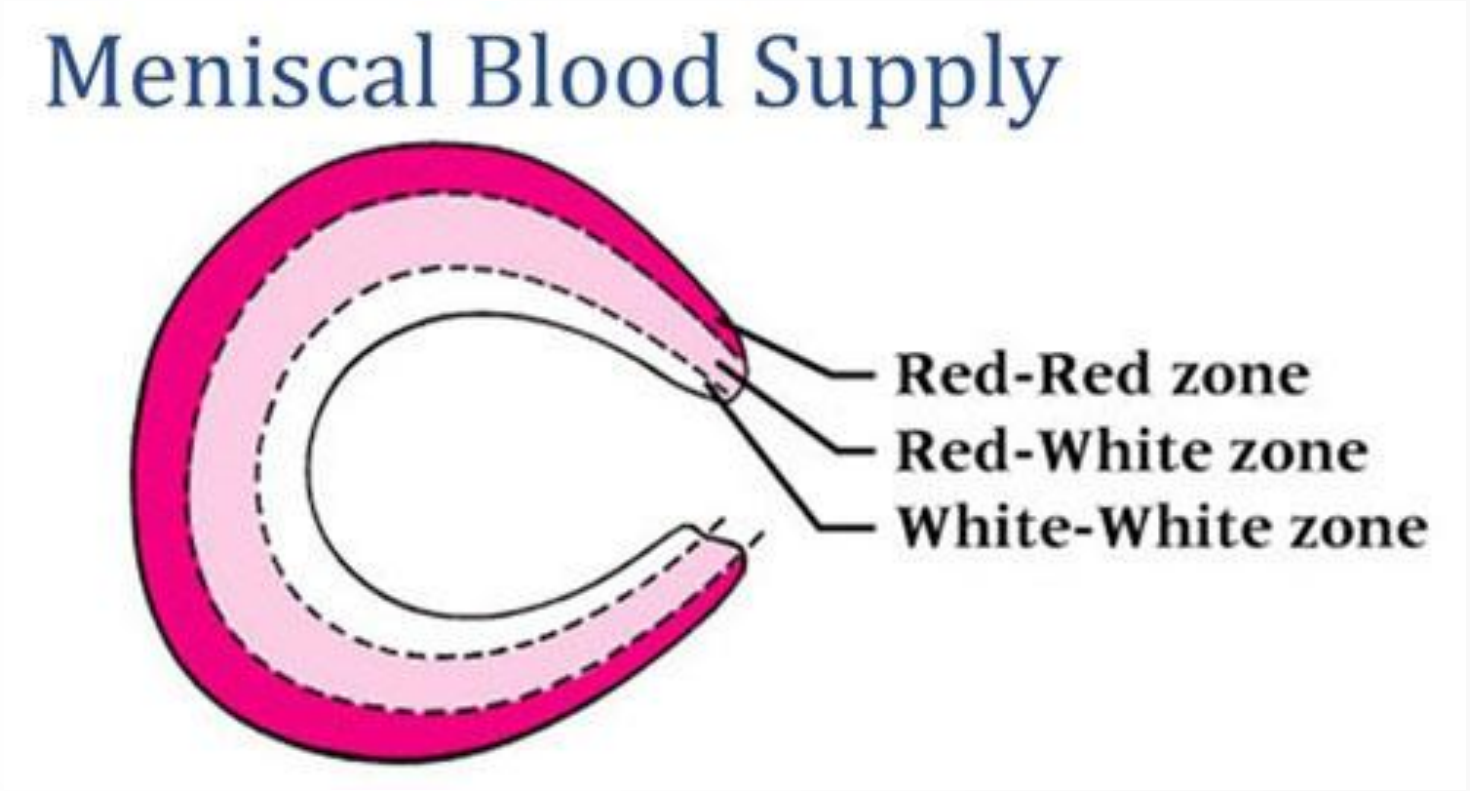
Menisci

- They deepen the articular surfaces of the tibial condyles to receive the convex femoral condyles.
- They transmit the load across the surface of the joint(like-cushion), thus reducing the load per unit area on the tibio-femoral contact sites i.e. cushioning the joint
- Each meniscus is attached to the upper surface of the tibia by anterior and posterior horns.
- Because the medial meniscus is also attached to the medial collateral ligament, it is relatively immobile, the lateral menisci is free & mobile.





- 1.red zone (outer third, vascularized)
- 2.red-white zone (middle third)
- 3.white zone (inner third, avascular)



Important !!!!

- **medial menisci** is **more** prone to injury than lateral menisci

- People who prone to acute ACL injury are **more** prone to **lateral meniscus** injury more than medal

Menisci
Mechanisim of injury

- An acute twisting injury from impact during a sport

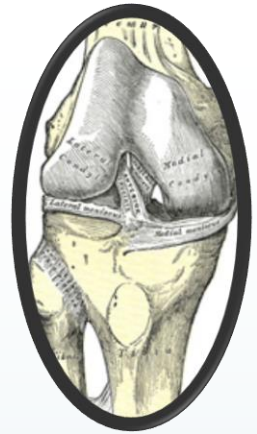
(Usually the foot stays fixed on the ground and the rest of body rotates)

- Getting up from a squatting or crouching position.
- Loading the knee from a fixed position.

two type of injury: **تذكرو مثال القميص!!**
1: acute: can be repaired
2: degenerative: usually associated with osteoarthritis: difficult to repair

Menisci

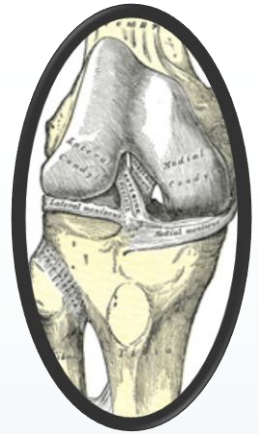
Symptoms



- 1.pain localizing to medial or lateral side
- 2.mechanical symptoms (**locking** and clicking), especially with squatting
- 3.delayed or intermittent swelling***

- **Note!!!**
- **Swelling***(hemarthrosis): usually in the 2nd or 3rd day ,unlike ACL injury swelling,which usually in the 1st day
- Cauze the menisci is **less blood supply** than ACL

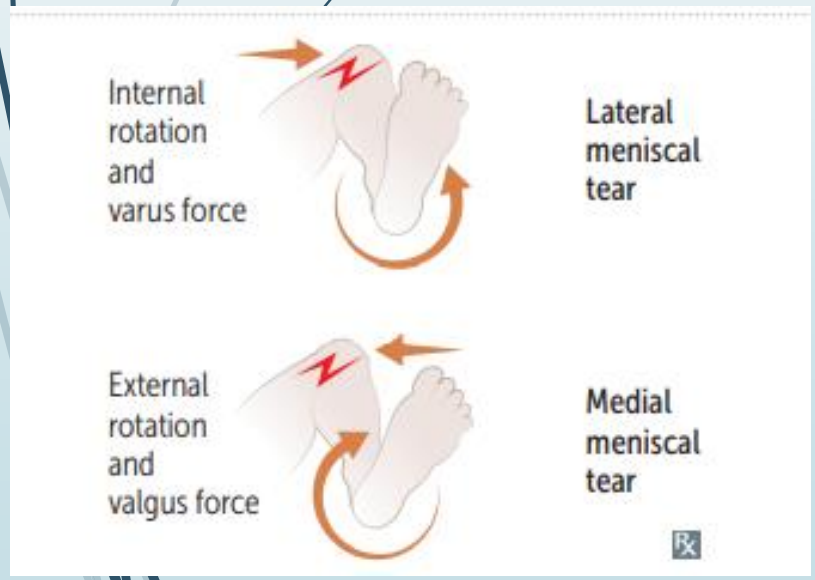
Menisci
Examination

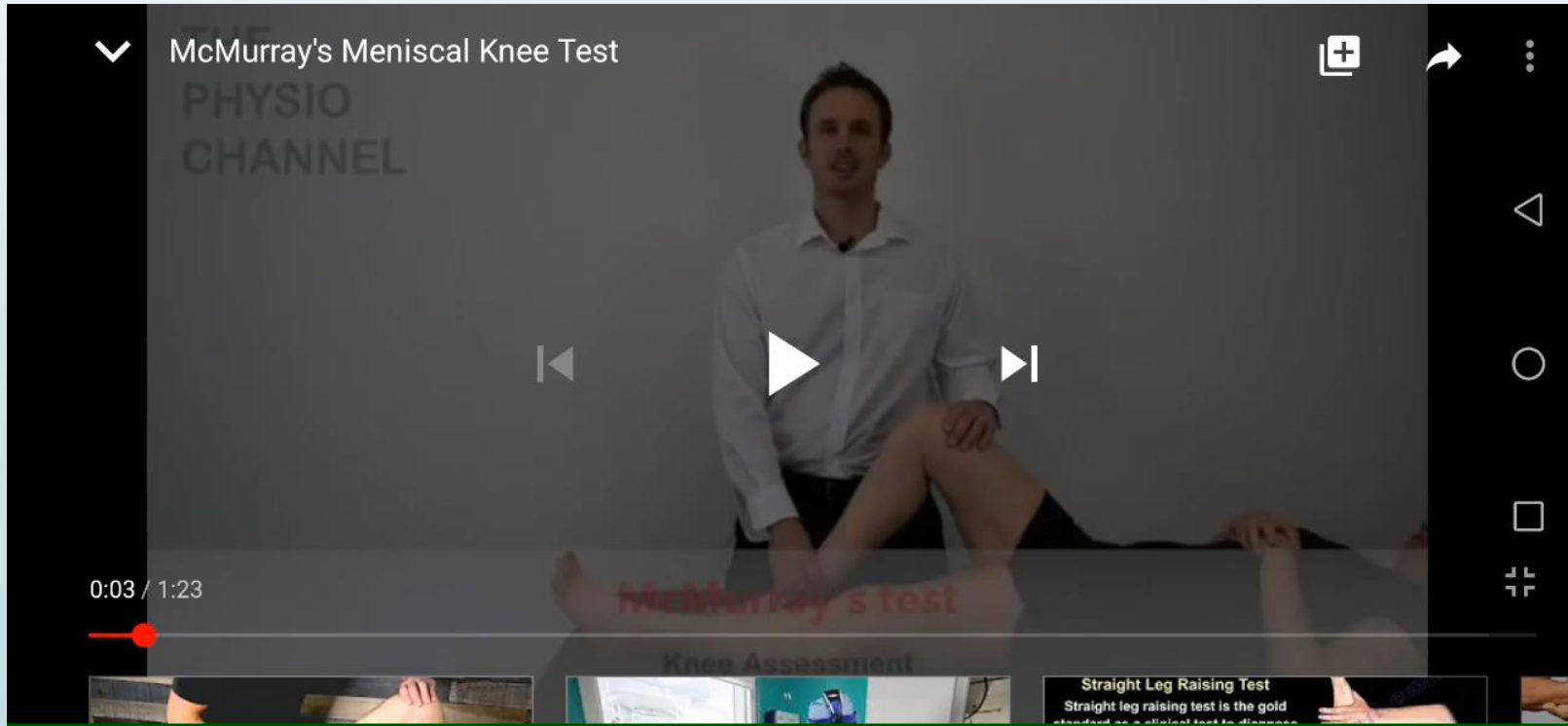


- 1.**Joint Line tenderness :**is the **most sensitive** physical examination finding.
- Joint Line Tenderness Palpation | Meniscus Tear – YouTube
- **Minute 1:10**

Menisci Examination

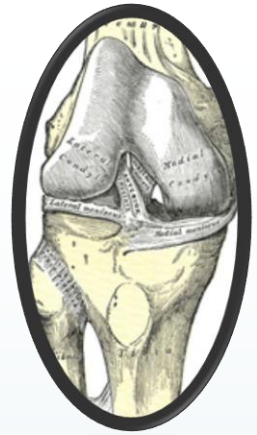
- **2.Mcmurray's test:** Pain, "popping" on **internal rotation and varus force for Lateral meniscal tear**
- **Pain, "popping" on external rotation and valgus force for Medial meniscal tear**





Menisci

Examination

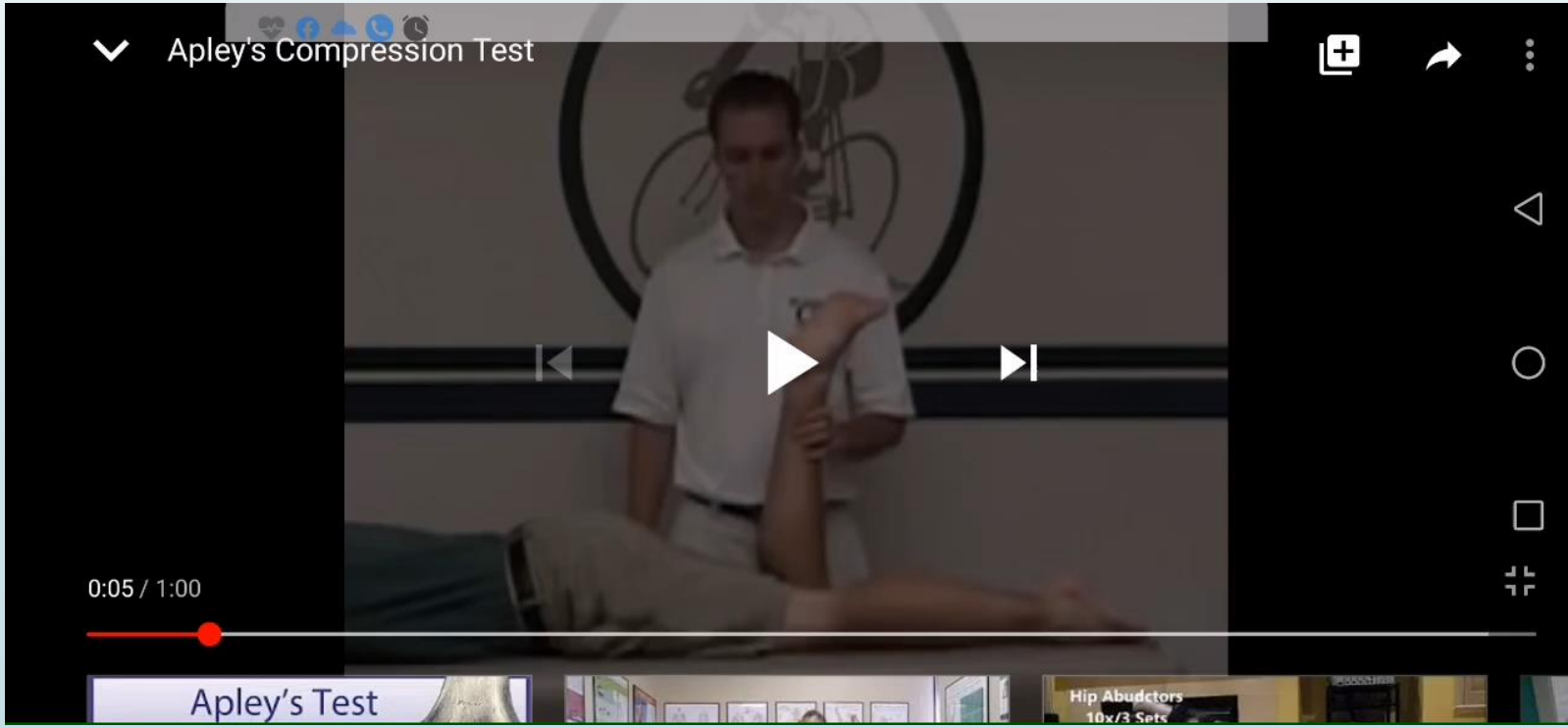


- **3.Apply grinding(**Compression) **test:**
- **Prone position, flex 90 degree, apply axial loading and twist foot medially and laterally ⟶ elicit pain(means + positive)**

- **Note:** Apley distraction test:

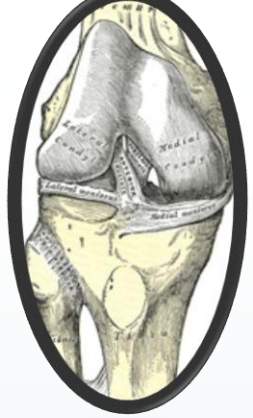
To examine if associated with ligamentous injury

Non-specific, non-sensitive

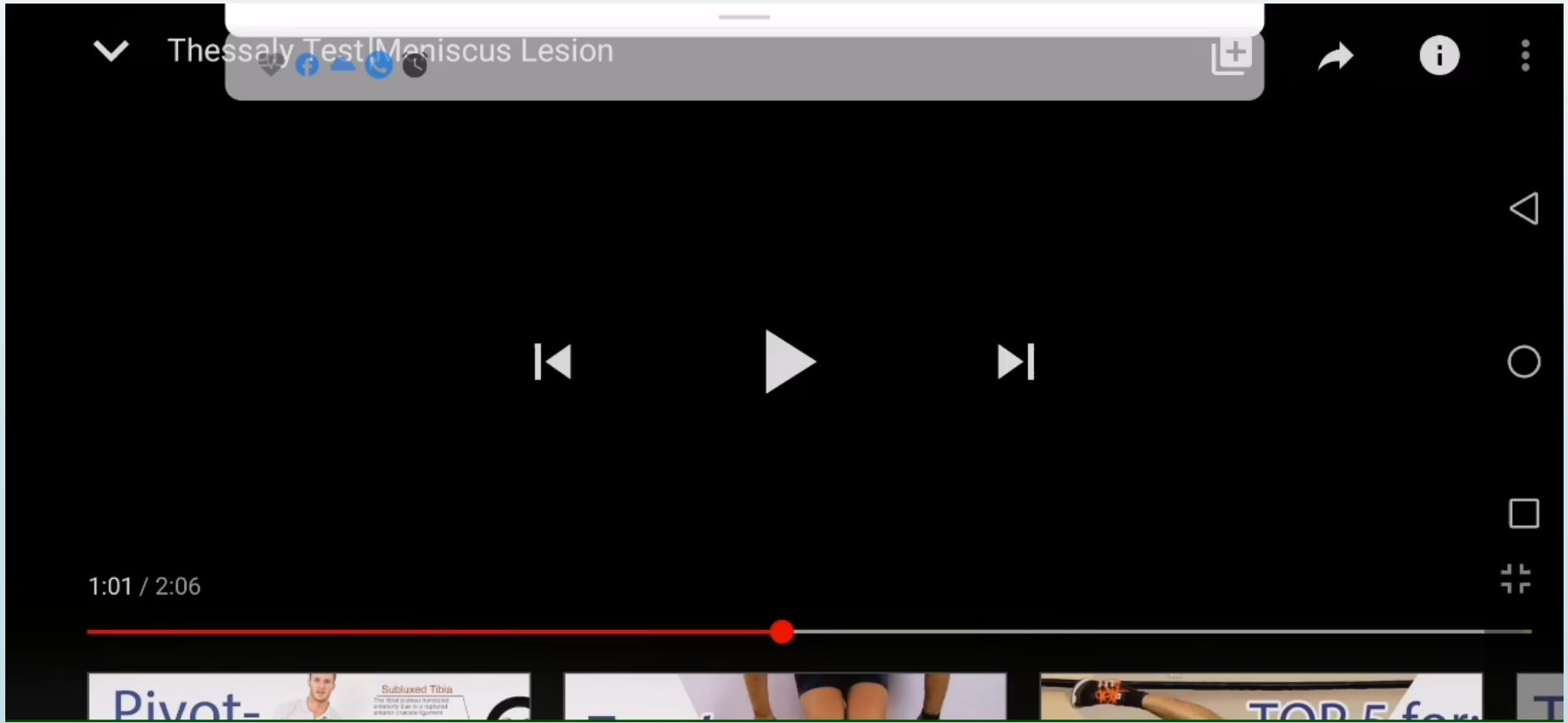


Menisci

Examination



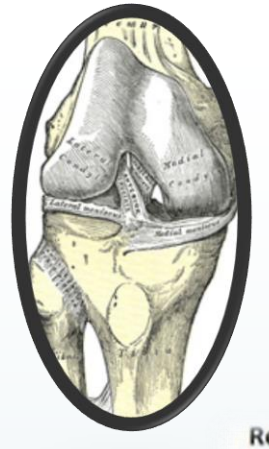
- 4.Thessaly test: stand on the painful knee and start hip rotation
- Positive if elicit pain

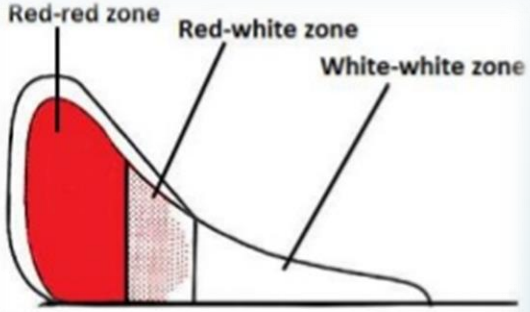


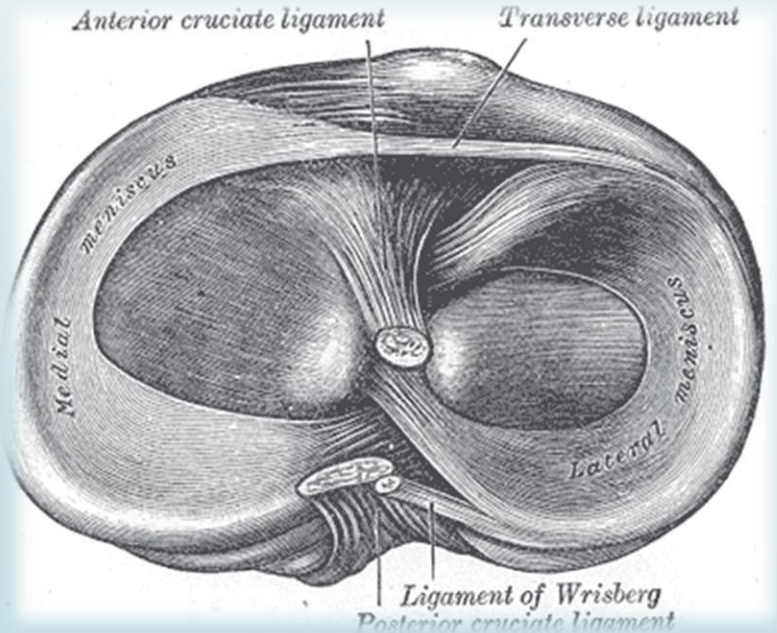
Menisci

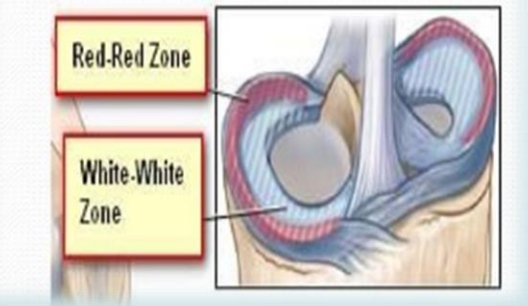
Classification

- **location**
  - •red zone (outer third, vascularized)
  - •red-white zone (middle third)
  - •white zone (inner third, avascular)
- **Position** (anterior, middle, posterior third, root)
- **Size**



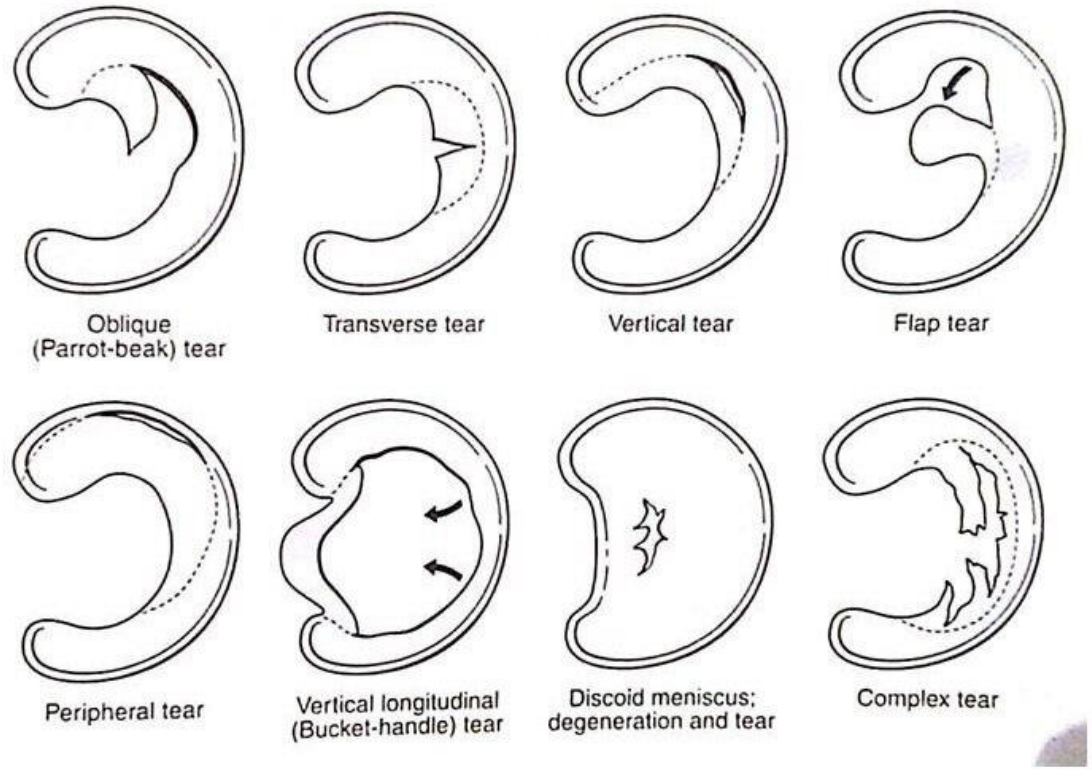






Menisci Classification

- **Pattern**
  - vertical/longitudinal
  - bucket handle
  - oblique/flap/parrot beak
  - radial
  - horizontal
  - complex
  - root

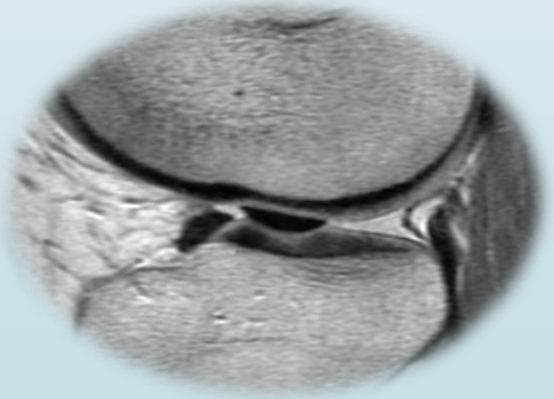


Menisci
Imaging

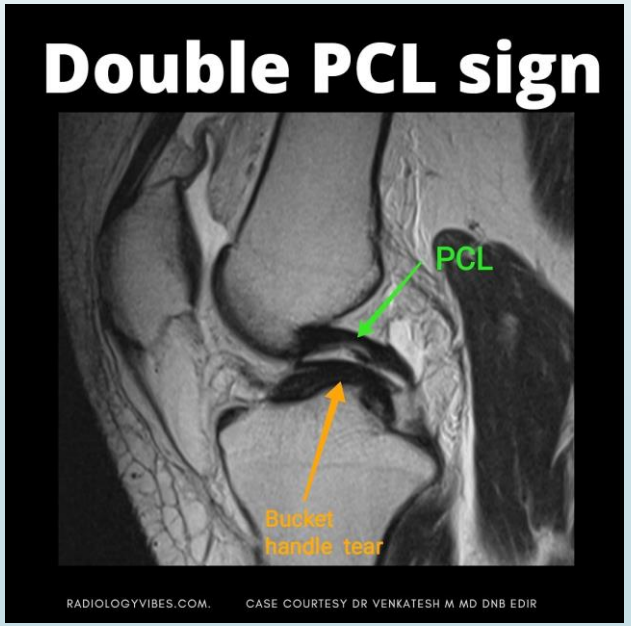
- **MRI**

  *(**Most sensitive** diagnostic test, but also has a high false positive rate)*

انمزع وراح على الشمال

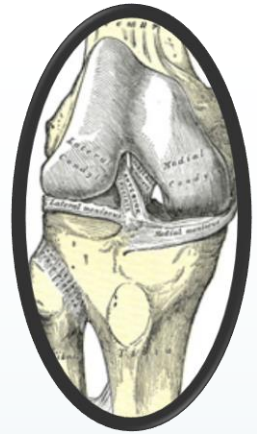


Note:Menisci appear black!



Degenerative tear, but still in place

Menisci
Treatment

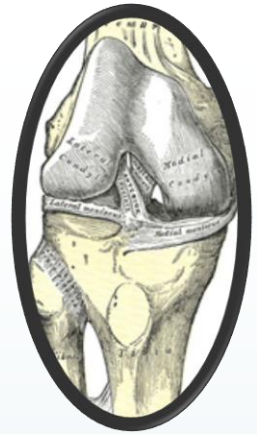


- **Nonoperative**

  (Rest, NSAIDS, Rehabilitation)

  - **indicated as first line treatment for degenerative tears**
  - **outcomes**
    - **improvement in knee function following physical therapy**
    - **"noninferior" when compared to arthroscopic partial meniscectomy**

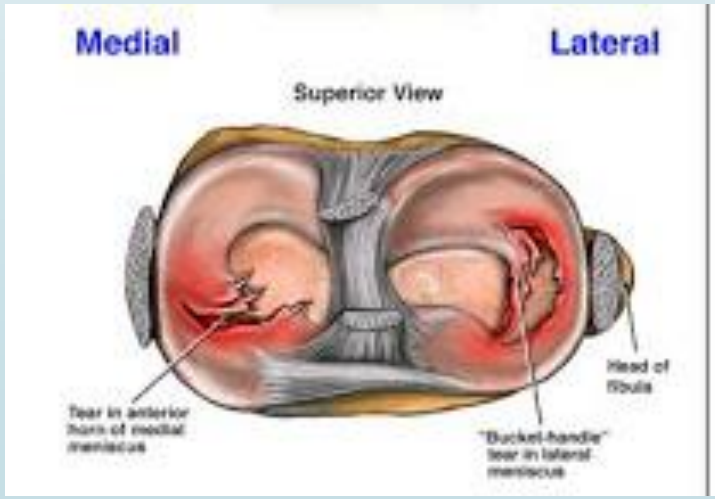
Menisci
Treatment

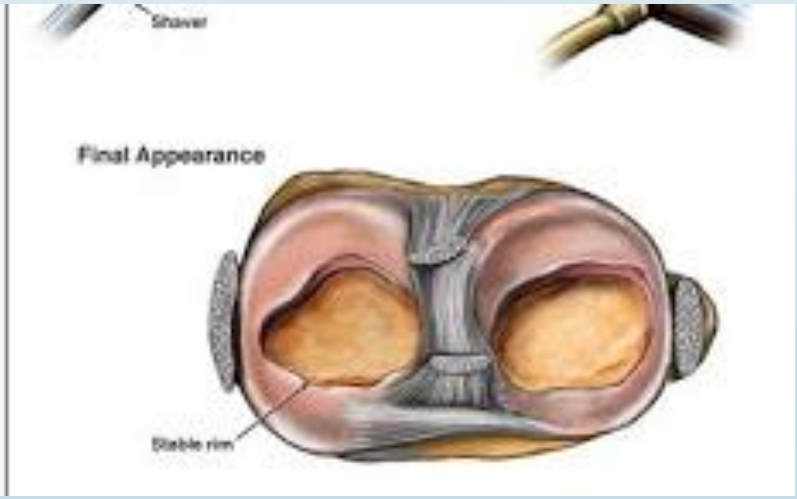


Partial meniscectomy

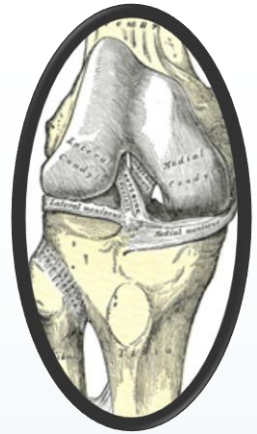
- •1.tears not amenable to repair (complex, degenerative, radial tear patterns)
- •2.repair failure >2 times

- •outcomes
  - •>80% satisfactory function at minimum follow-up





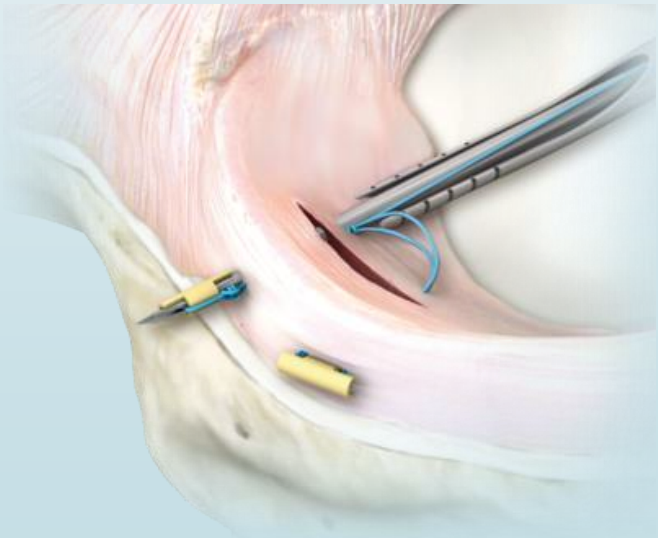
Menisci
Treatment



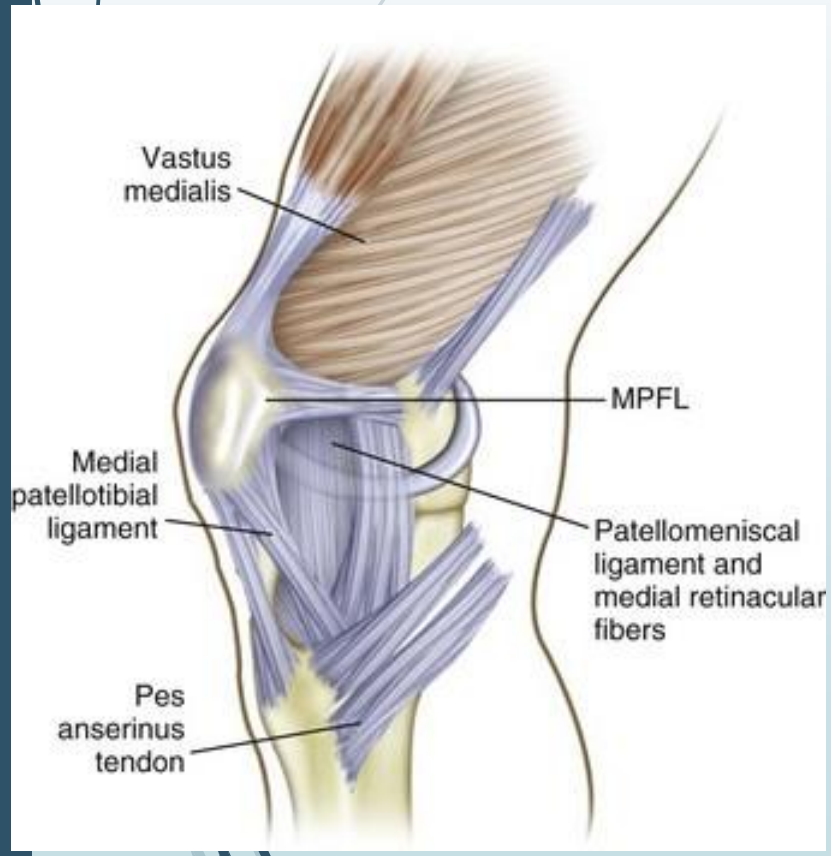
Meniscal Repair

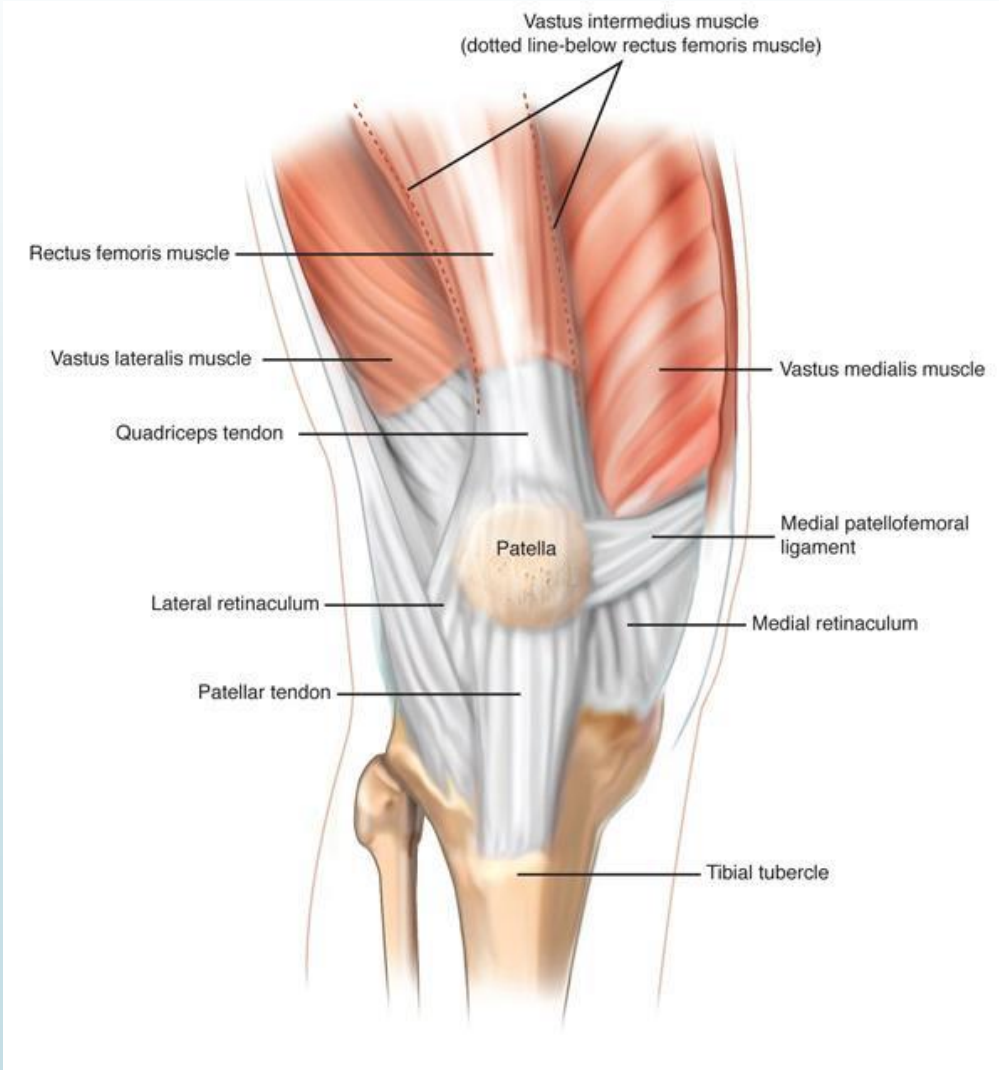
- 1.Peripheral in the red-red zone (vascularized region)
- 2.Vertical and longitudinal tear
  - •rather than radial, horizontal or degenerative tear
  - •bucket handle meniscus tear.
- 3.Root tear
- 4.Acute repair combined with ACL reconstruction

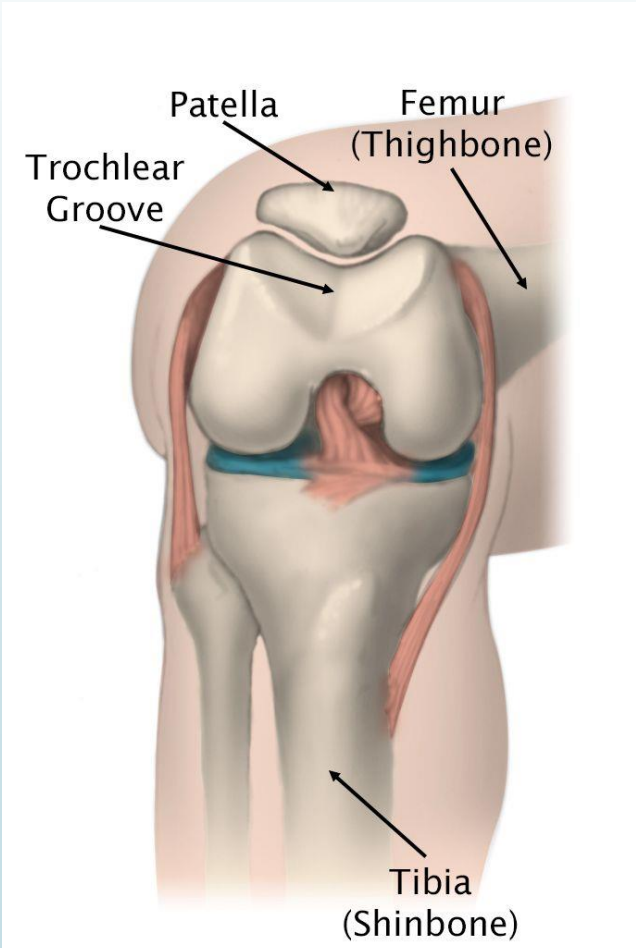
•70-95% successful



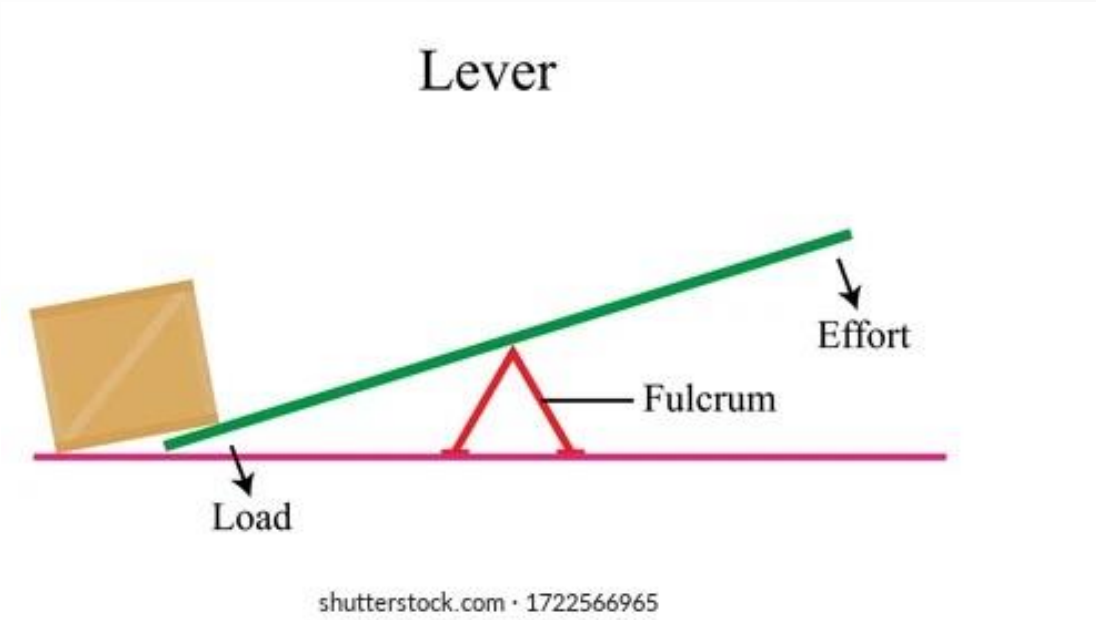
4.Patellofemoral Dislocation
Anatomy







- **Whos prevent patella to translate laterally:**
- 1.Bony configuration,
- 2.vastus medialis
- 3.,MPFL



Patella like fulcrum عتلة

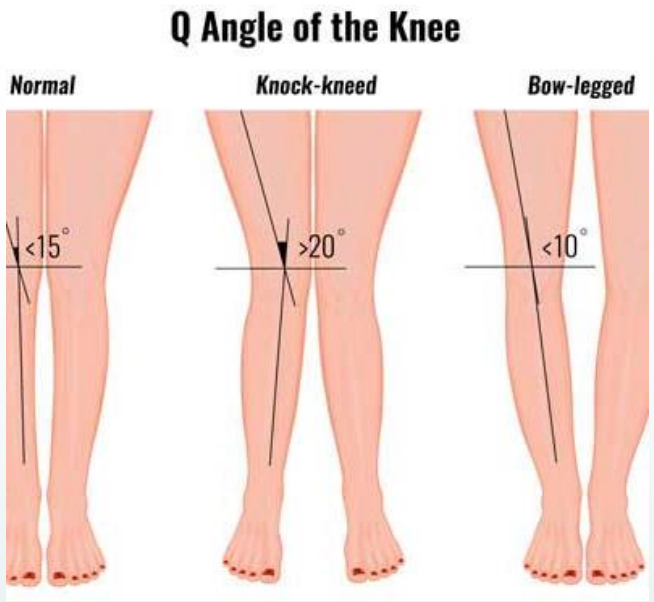
Patellofemoral Dislocation Risk factors

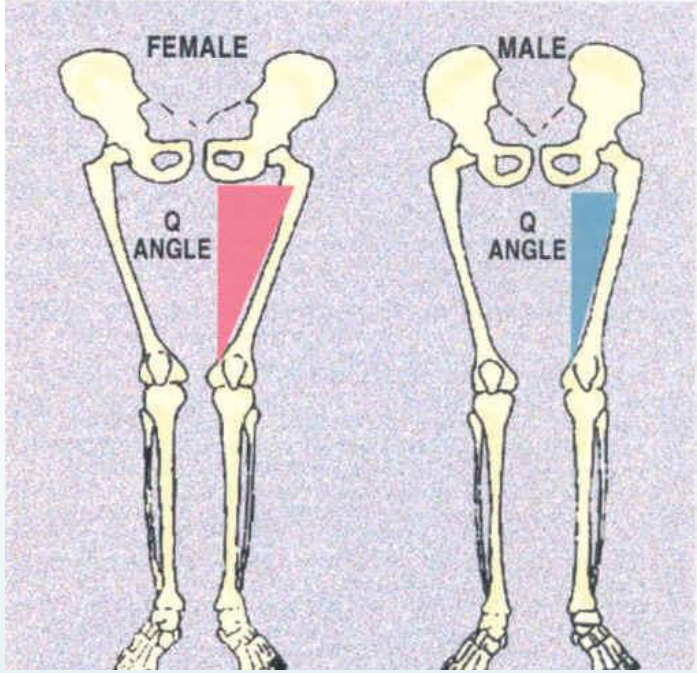
General factors

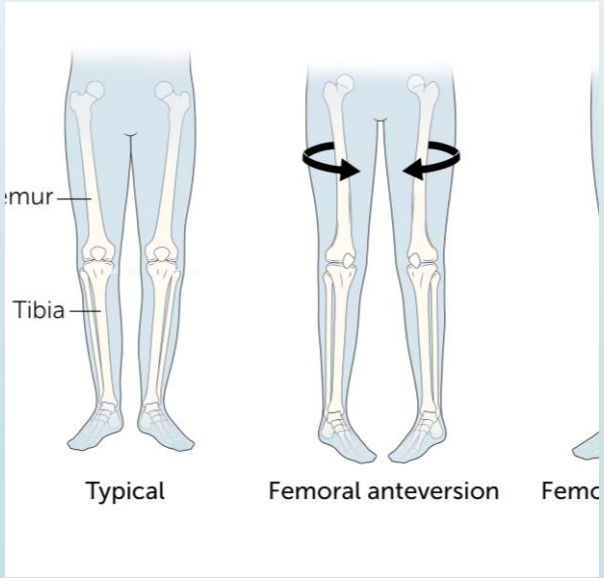
- 1.ligamentous laxity (Ehlers-Danlos syndrome)
- 2.Previous patellar instability event
- 3."miserable malalignment syndrome" (*a term named for the 3 anatomic characteristics that lead to an increased* ***Q angle)***
  - 1.femoral anteversion
  - 2.genu valgum
  - 3.external tibial torsion / pronated feet

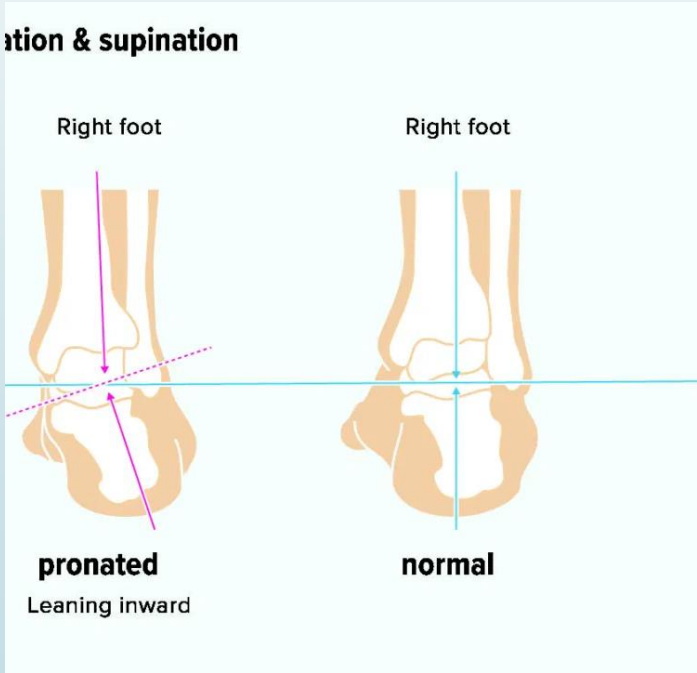
- **Anatomical factors**

- patella alta(high) causes patella to not articulate with sulcus, losing its constraint effects
- trochlear dysplasia(SHALLOW)
- lateral femoral condyle hypoplasia not prominent



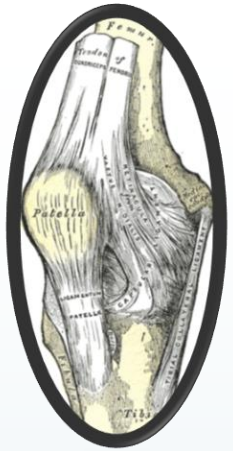




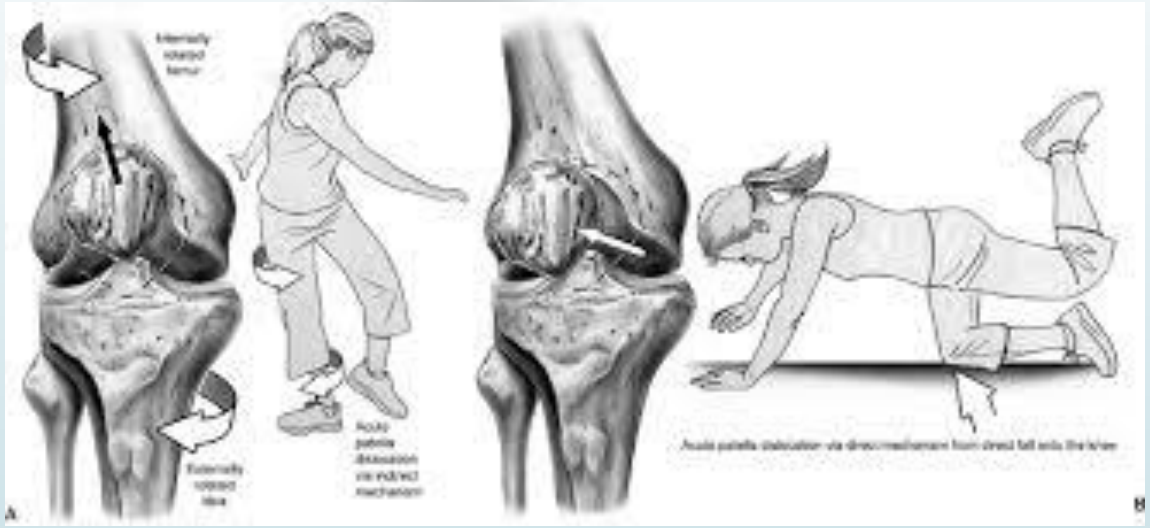


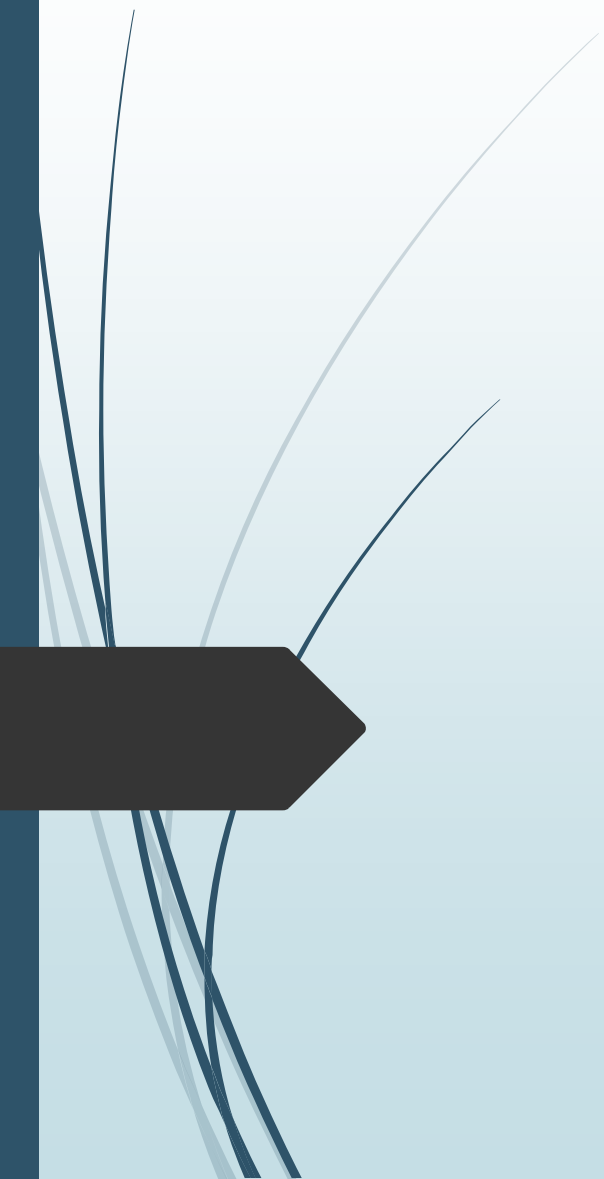
Patellofemoral Dislocation

Mechanisim of Injury

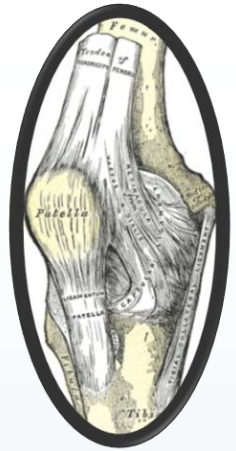


- 1.**Noncontact twisting** injury with the knee extended and foot externally rotated
  - patient will usually reflexively contract quadriceps thereby reducing the patella
- **2.Direct blow**
  - less common
  - ex. knee to knee collision in basketball, or football helmet to side of knee

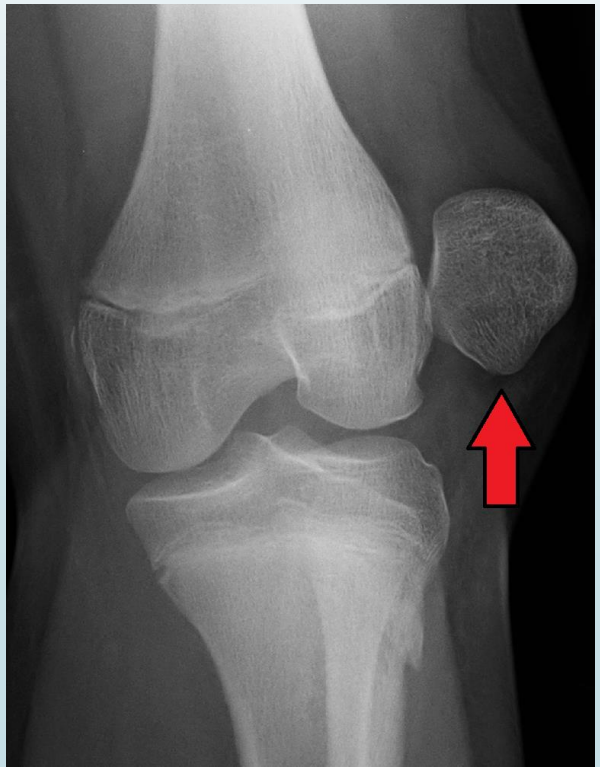




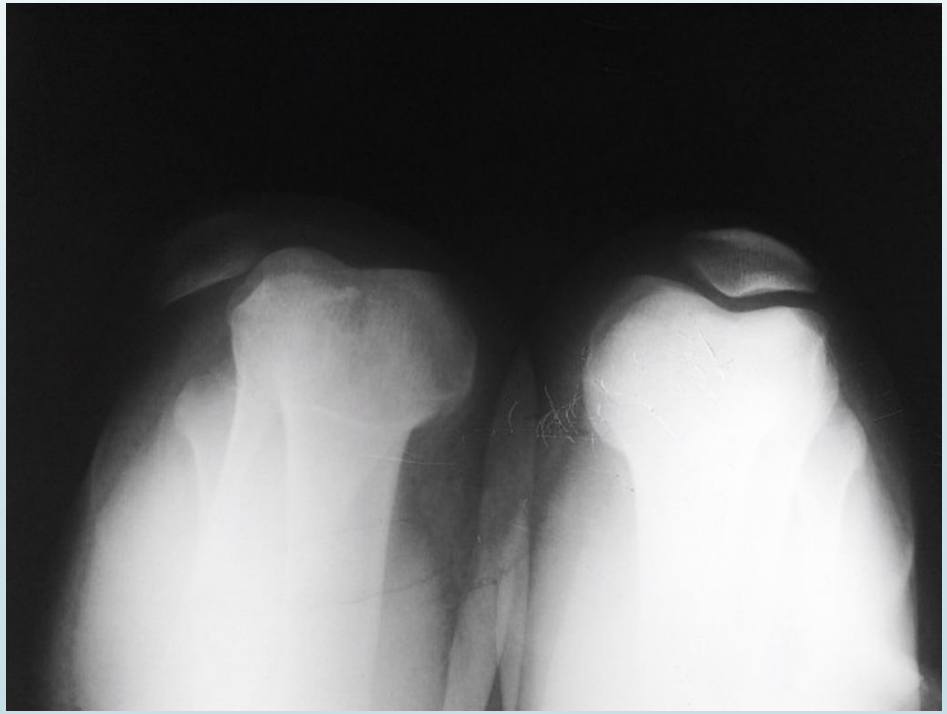
Patellofemoral Dislocation
Imaging



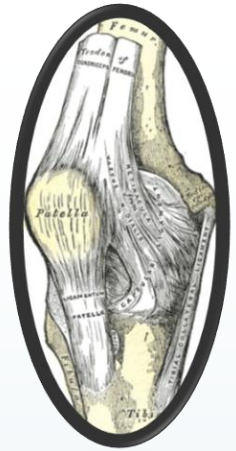
- X- ray:



skyline view



Patellofemoral Dislocation
Treatment



- **Nonoperative(one dislocation)**

(NSAIDS, activity modification, and physical therapy)

- **Operative: RECURRENT**

-MPFL repair

-MPFL reconstruction with autograft vs allograft

-Fulkerson-type osteotomy (anterior and medial tibial tubercle transfer)

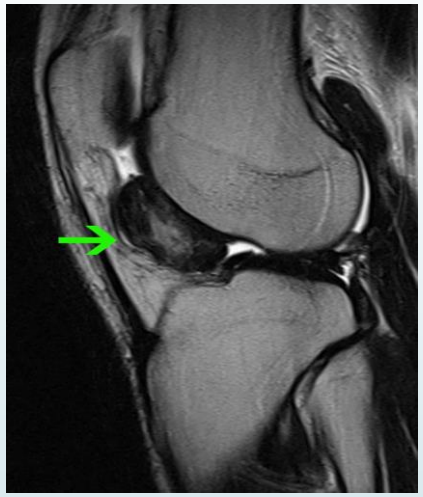
-lateral release
-trochleoplasty

5.Swellings around the knee

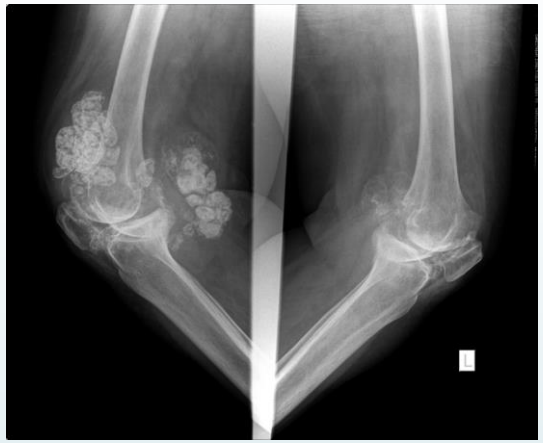
- *Swelling of the **entire** joint .*
- *Swellings **in front** of the joint.*
- *Swellings **behind** the joint.*
- *Swelling **at the side** of the bone.*
- ***bony** swellings.*

Swelling of the entire joint

Pigmented villonodular synovitis



Synovial chondromatosis



Acute

- Hemarthrosis
- Septic arthritis

Chronic

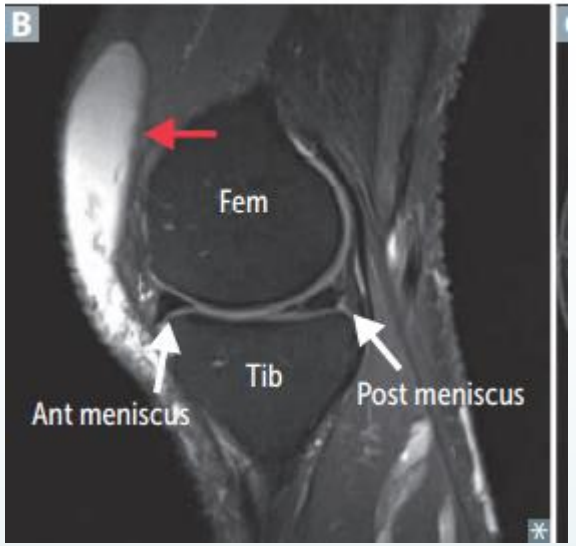
- Non infective arthritis(RA)
- Chronic Infective arthritis(TB)
- Synovial chondromatosis. ***Benign tumor***

(multiple, pearly cartilaginous loose bodies enveloped in synovial folds)

- Pigmented villonodular synovitis *Benign tumor*

(synovial tumour which causes erosion and excavation of the articular surfaces; at operation the synovium is seen to be swollen, often covered in villi and golden-brown in colour – the effect of ***haemosiderin*** *deposition)*

Swelling infront of the knee



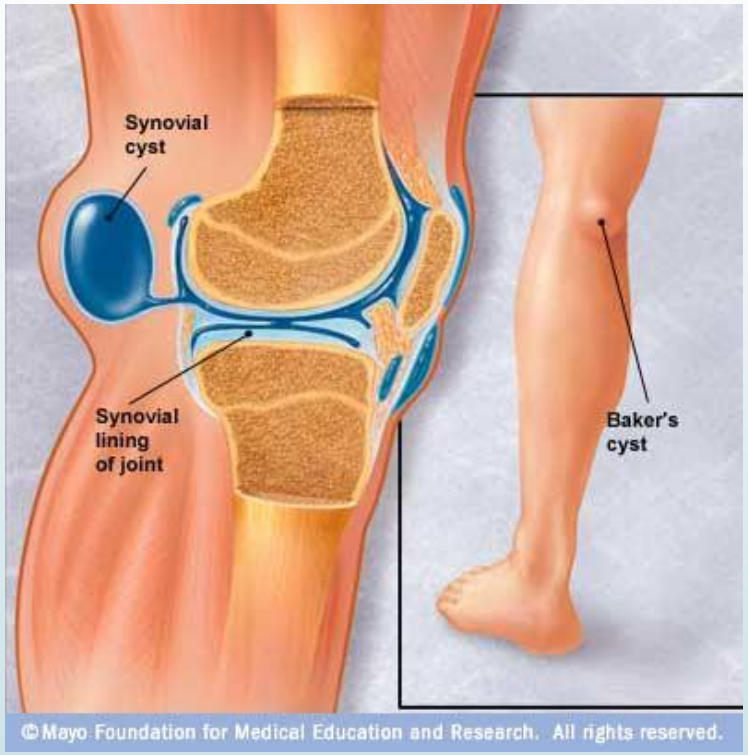
- **Prepatellar bursitis (HOUSEMAID'S KNEE):** Inflammation of the prepatellar bursa in front of the kneecap (red arrow in B). Can be caused by repeated trauma or pressure from excessive kneeling (also called "housemaid's knee").

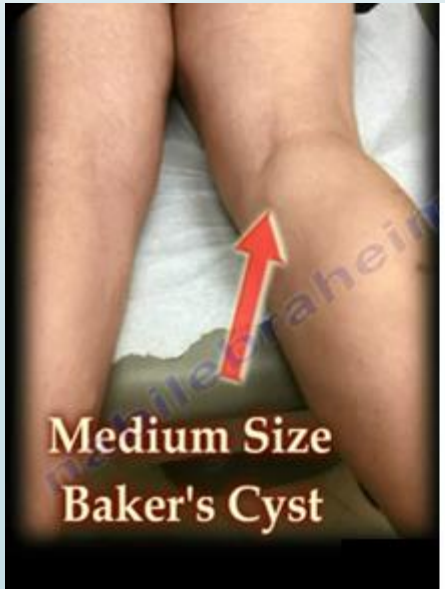
- **Infrapatellar bursitis(CLERGYMAN'S KNEE)**

Note: **bursa** :small fluid-filled sacs that **reduce friction between moving parts in your body's joints**

Swelling at the back of the knee

- **1.Semimembranosus bursa**
- **2.Popliteal cyst(*Baker's cyst*)(most common). Defective in posterior capsule, its like hernia,**
- The pain due to compression
- Txs:(observation)
- **3.Popliteal aneurysm(pulsatile cyst)**





Swelling at the side of the knee

- Meniscal cyst
- Calcification of the collateral ligament
- Bony swellings (exostosis)

6.Osgood Schlatter's Disease (Tibial Tubercle Apophysitis)

Also called traction apophysitis.
Overuse injury caused by repetitive strain and chronic avulsion of the secondary ossification center of proximal tibial tubercle.

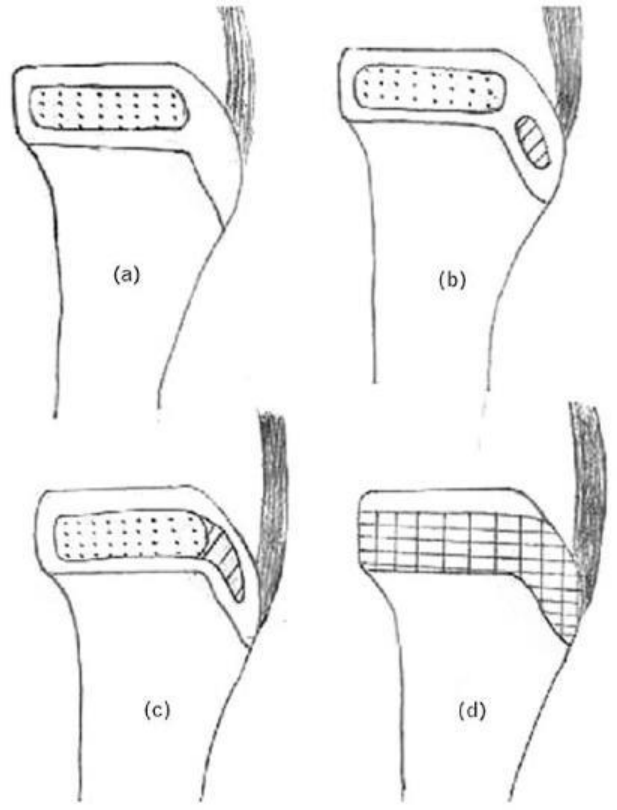
Occurs in adolescents after growth spurt(cause of power of quadriceps muscle).

Common in running and jumping athletes.

Presents with progressive anterior knee pain

Male > female

Male 12-15 y
Female 8-12



Osgood Schlatter's Disease (Tibial Tubercle Apophysitis)

- Physical exam

Inspection

- **enlarged tibial tubercle**
- **tenderness over tibial tubercle**

Provocative test

- pain on resisted knee extension

- **X-ray: calcification on tibial tuberosity**

Osgood Schlatter's Disease (Tibial Tubercle Apophysitis)

- Treatment:
  - **Nonoperative**

(NSAIDS, rest, ice, activity modification)

cast immobilization x 6 weeks(**to weaken the quadriceps muscle)**

(severe symptoms not responding to simple conservative management above)

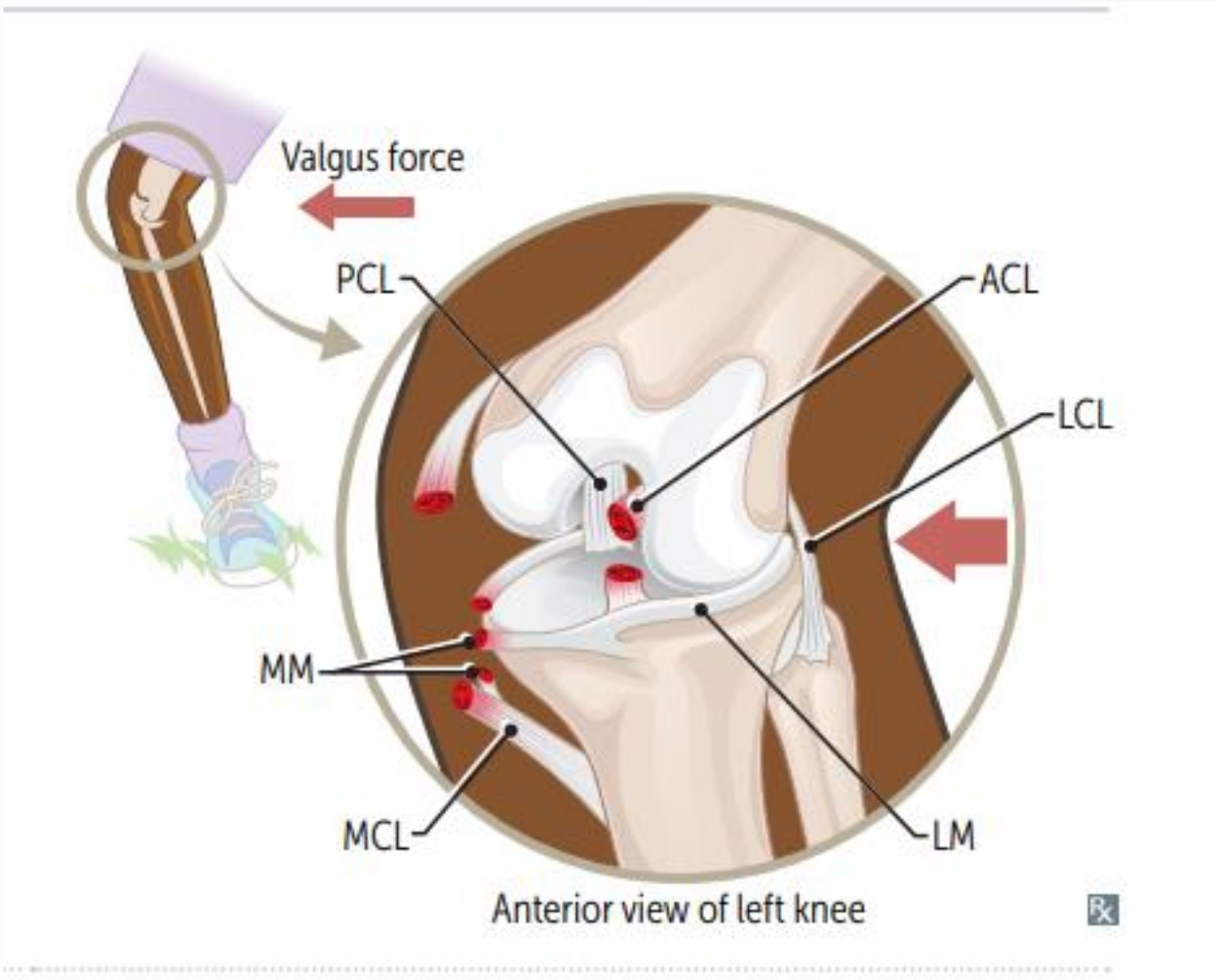
  - **Operative**

Ossicle excision:

Refractory cases (10% of patients)
In **skeletally mature patients** with persistent symptoms

Extra!!!

- Common injury in contact sports due to laterally directed force to a planted foot.
- Consists of damage to the ACL , MCL, and medial meniscus (attached to MCL).
- However, lateral meniscus involvement is more common than medial meniscus involvement in conjunction with ACL and MCL injury.
- Presents with acute pain and signs of joint instability.



Thank you