



ORTHOPAEDIC

KNEE DISORDER

DONE BY :

AYA ABU SAMRA

RITA ALQAISI



1. Anterior Cruciate Ligament

- **Function**

prevents anterior translation of the tibia relative to the femur
(prevent posterior translation of femur in relation to tibia)

we describe the distal in comparison to the proximal we describe the distal in comparison to the proximal



- **Anatomy**

Origin:

medial surface of lateral femoral condyle

Insertion :

anterior and between the intercondylar eminences of the tibia

Structure:

anteromedial (tight in flexion and loose in extension)

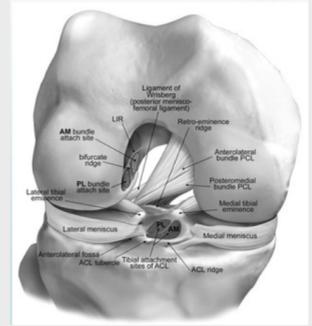
posterolateral (tight in extension, loose in flexion)

Blood supply:

middle genicular artery

Innervation:

tibial nerve (the ACL 's nerve supply is more for proprioception)



- **Mechanism of injury**

➢ Non-contact pivoting injury.(usually)

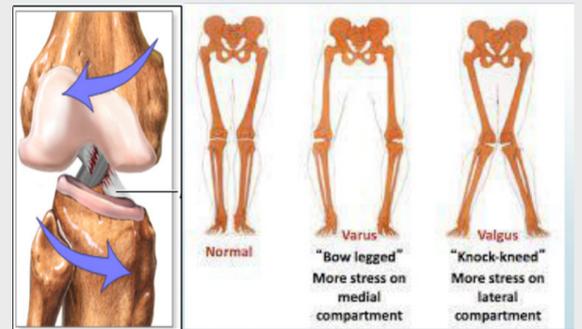
(tibia translates anteriorly while knee is in slight flexion and valgus)

“.Injury occurred due to a fall; no external force from another individual was involved”

➢ Blow to the lateral aspect of the knee

Clinical scenario

“While playing football, the patient twisted his leg, felt a pop, and fell.”



- **Symptoms**

➢ Pain(very severe)

➢ Swelling(Hemarthrosis)

Rapid swelling and appear within 24hr from injury due to its supply from middle geniculate artery

➢ Felt a POP

➢ Giving way (after period ,for example 2 wks)

- **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.

2.anterior drawer sign:



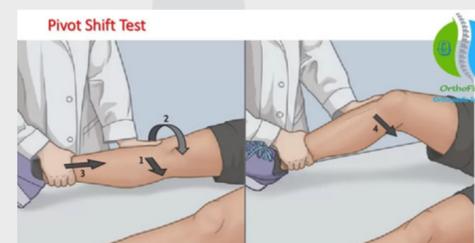
3. Pivot shift test:

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:



- **Imaging**

- X -ray

Usually normal , but some cases in children appear like in the avulsion fracture

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 (Second Fxs)

- **MRI: (gold standard)**



• Treatment

Depend on age and life style:

- 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



- 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)

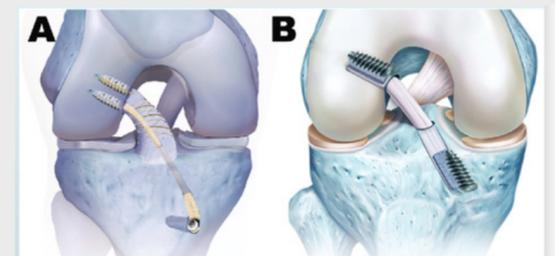
- older active patients (age >40 is not a contraindication if high demand athlete)

- 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: from same pt, from hamstring tendon

-Allograft: cadaver Synthetic graft: not strong

-xenograft : rare and not used

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



Operative and non operative both are associated to osteoarthritis but it more associated with non operative treatment

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

- **Mechanism 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-ligamentous injury

- **Symptoms**

-posterior knee pain

-instability

-often subtle or asymptomatic in isolated PCL injuries.

- **Examination**

1. Posterior drawer test



- **Imaging**

1. X-ray: usually normal

Its good to repair : ORIF with wires

ORIF: Open Reduction, Internal Fixation



2. MRI

incontinently of the ligament



- **Treatment**

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

Brace for 6-12 week

Operative:

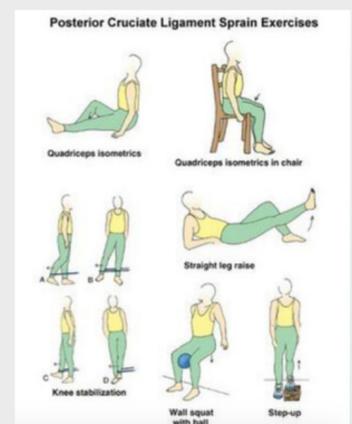
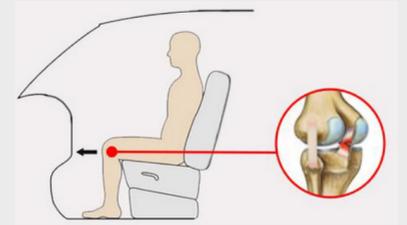
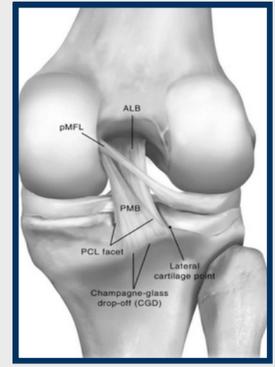
PCL repair of bony avulsion fractures or reconstruction

- **indications**

- combined ligamentous injuries

- isolated Grade II or III injuries with bony avulsion

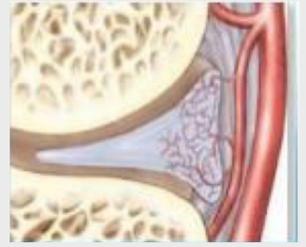
- isolated chronic PCL injuries with a functionally unstable knee



3. Menisci

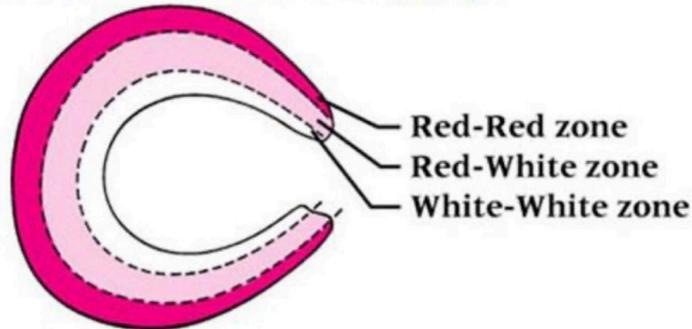
- **Anatomy**

- 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.



Meniscal Blood Supply

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

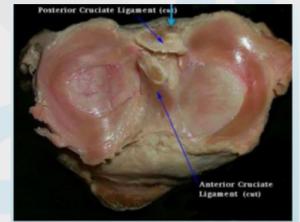


Its nutrition from fibrous capsule capillaries .

- 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.

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 medial

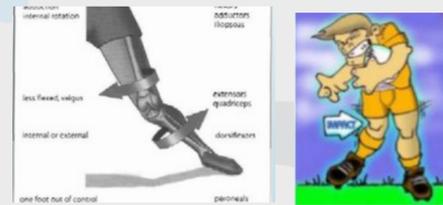


- **Mechanism of injury**

- ☐ 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(تذكر مثال القميص المهري والجديد)

- 1: acute: can be repaired
- 2: degenerative: usually associated with osteoarthritis: difficult to repair



- **Symptoms**

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

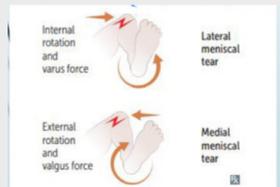


- ☐ **Note!!!**

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

- **Examination**

- 1.Joint Line tenderness :is the most sensitive physical examination finding.
- 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



- 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 tes To examine if associated with ligamentous injury
Non-specific, non-sensitive

4. Thessaly test: stand on the painful knee and start hip rotation

Positive if elicit pain



• Classification

➤ location

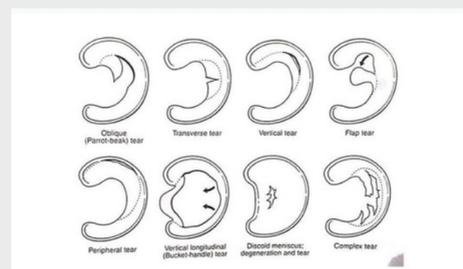
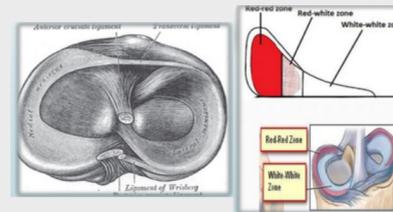
- red zone (outer third, vascularized)
- red-white zone (middle third)
- white zone (inner third, avascular)

➤ Position (anterior, middle, posterior third, root)

➤ Size

➤ Pattern

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

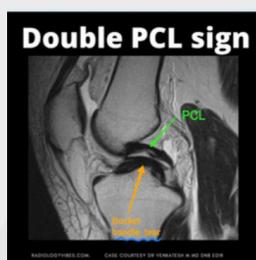


• Imaging

🔍 MRI

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

Note: Menisci appear black!



Kissing lesion

• Treatment

🔍 Nonoperative

(Rest, NSAIDS, Rehabilitation)

🔍 indicated as first line treatment for degenerative tears

*Outcomes:

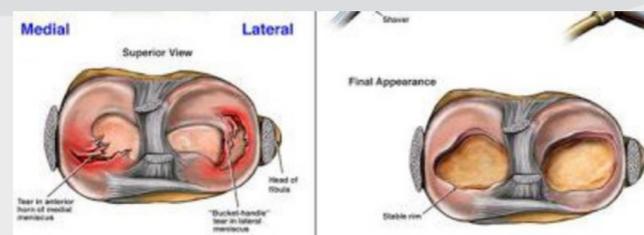
- 🔍 improvement in knee function following physical therapy
- 🔍 "noninferior" when compared to arthroscopic partial meniscectomy

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



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

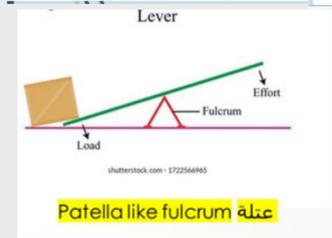
• Anatomy

Patella make power extension more 7 times and it's stabilised by :

1. bone configuration (by lateral femoral condylar)
2. Muscle (vastus medialis muscle)
3. ligments (medial patello-femural ligment).

All prevent patella goes lateraly , why ?Because the patella is naturally pulled laterally , due to :

1. Q-angle directs the quadriceps force upward and laterally
2. Quadriceps line of pull runs from ASIS → patella → tibial tubercle
3. Physiologic valgus of the knee increases lateral force



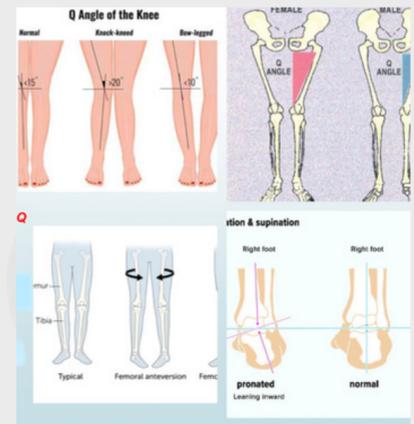
• Risk factors

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



• Mechanism 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

• Imaging

x - ray :



• 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. Swelling around the knee

- Swelling of the entire joint
- swelling behind of the joint
- swelling behind the joint
- swelling at the side of the bone
- bony swelling
- Swelling of the entire joint

Acute (Less than 6 week and some source consider as 12week)

- ☐ Hemarthrosis
- ☐ Septic arthritis

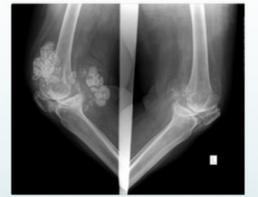
Chronic (More than 6 week and some source consider as 12week)

- ☐ 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

Pigmented villonodular synovitis



Synovial chondromatosis



(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 in front of the knee

☐ Prepatellar bursitis (HOUSEMAID'S KNEE)

Infrapatellar bursitis(CLERGYMAN'S KNEE)



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
 - ☐ Tx:(observation)
 Need 3week to resolve and we don't remove it due to high recurrence , it has one complication which is if it reapture and make symptoms like DVT
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)

Osteochondrosis or traction apophysitis of tibial tubercle. Young adolescence complaining of ant. Knee pain mainly after exercise.

Male > female
Male 12-15 y
Female 8-12

• Physical exam

- Inspection
- ☐ enlarged tibial tubercle
 - ☐ tenderness over tibial tubercle
- Provocative test
- ☐ pain on resisted knee extension
 - ☐ X-ray: calcification on tibial tuberosity



- 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



قال ابن عباس: "التوكل هو الثقة بالله، وصدق التوكل أن تثق في الله وفيما عند الله، فإنه أعظم وأبقى مما لديك في دنياك"

الطبيب والجراحة

لجنتنة