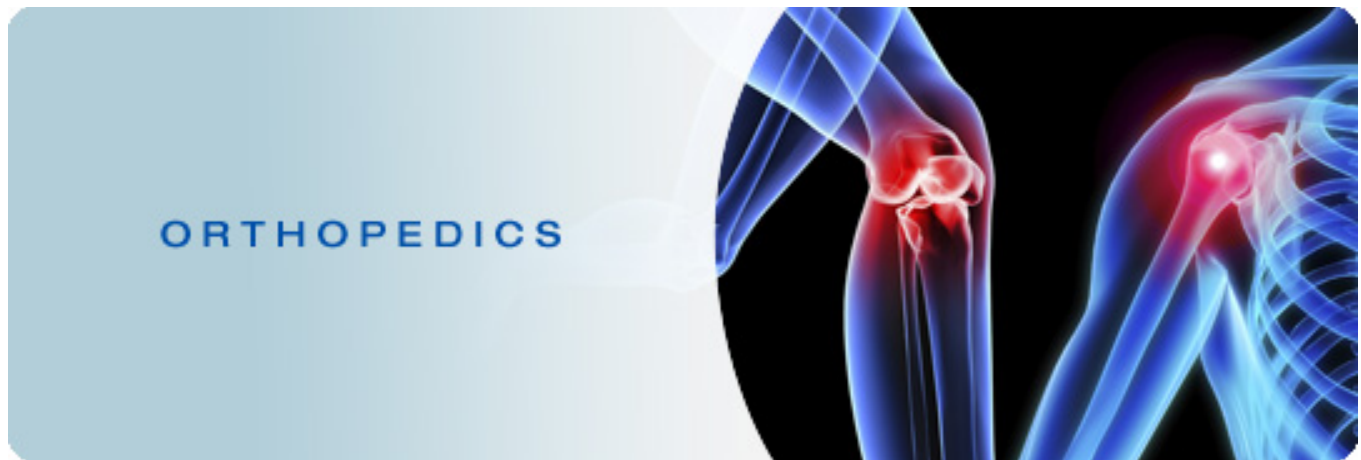


Isn't it funny how someone can say "I believe in Allah " but still follow the Satan who by the way also, " believes " in Allah...

430 ORTHOPEDICS TEAM



Lecture : Sports and soft tissue Injuries.

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Team Leader:

Ayedah Al-Ruhaimi.

-The slides were provided by the doctor.

-429 team group A-1 in **blue**.

-Important notes in **Red**.

-Copied slides in **Black**.

Doctor's notes in **green**.

By the end of this teaching session the students should be able to

- Specify the symptoms, signs and potential immediate complications of common sport and soft tissues injuries involving muscles, tendons, and ligaments for commonly injured joints; like shoulder, knee, and ankle.
- Outline the assessment and appropriate investigation and to outline the immediate and long term management of patients with muscles, tendons, ligaments and meniscus
- Demonstrate knowledge of indications for non-operative and operative treatment and to know the most common non-operative and operative measurements used for sport/soft tissue injuries.

Soft tissues injuries

- Muscle
- Tendon
- Ligament
- Meniscus
- Knee
- Shoulder
- Ankle

Muscle injury

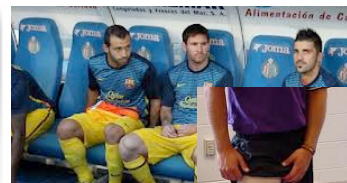
- The muscles most at risk are those in which the origin and the insertion **cross two joints** e.g. **quadriceps, hamstring muscles**.
- Frequently injured muscles act in an **eccentric** fashion (i.e., **lengthening** as they contract). (eg. **Squats: contracted quads while knee is flexed**).
- **Frequently injured muscles have a relatively high percentage of type II (fast-twitch) fibers.**
- **Muscle strain**
- **Muscle Contusion**
- **Muscle Laceration**
- **Delayed-onset soreness**

Most of muscle injury management is conservative, rarely need surgery.



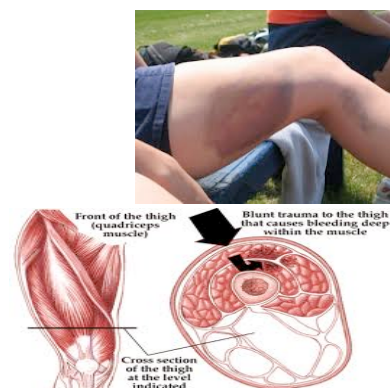
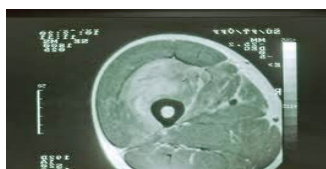
1: Muscle Strain تمزق عضلي

- The **most common** muscle injury suffered in sports.
- Immediate pain associated with diminished function.
- Both complete and incomplete muscle tears can occur by passive stretch of an activated muscle.
- Muscle tears also **typically occur at or near to the myotendinous junction**.
- Treatment
 - **RICE, immediate measurement (to decrease edema).**
 - NSAID
 - physical therapy



2: Muscle Contusion

- Caused by a nonpenetrating blunt injury (**direct blow**) to the muscle resulting in hematoma and inflammation.
- **Quadriceps and Brachialis** muscles are common involved regions.
- Clinical features:
 - Pain with active and passive motion +/- swelling.
 - Decreased range of motion of joints



spanned by the injured muscles.

- Occasionally a permanent palpable mass(hematoma).

- Treatment:

- **Short period of immobilization (remember RICE).**
- Followed by early mobilization and Physiotherapy
- NSAID

3: Muscle Laceration

- I&D followed by suture repair of the fascia, if possible.

4: Delayed-onset soreness

- Structural muscle injury leads to progressive edema formation and resultant increased intramuscular pressure.
- Is primarily associated with **eccentric loading–type exercise. (eg. Squats)**
- Clinical features: muscular pain that occurs 1-3 days after vigorous exercise.
- Treatment :
 - Will resolve in a few days
 - NSAID

Complications of muscle injuries:

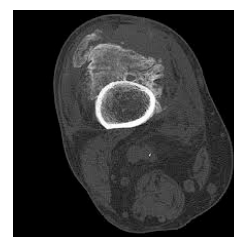
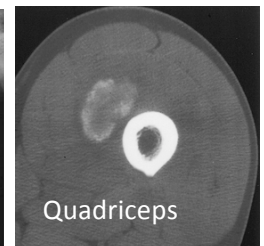
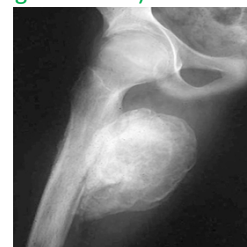
1) **Scar** formation and muscle weakness.

2) **Compartment syndrome**

- At the level of the muscle fibers, capillary bleeding and edema can lead to hematoma formation and can cause compartment syndrome in areas in which the volume is limited by the fascial envelope.
- Pt with **Bleeding disorders** is at **high risk.**(hemophilia, anti-coagulants use).

3) **Myositis ossificans (IMP)**

- Bone formation within muscle secondary to blunt trauma.
- **It happens more frequently with muscle contusion because of hematoma→ ossification.**
- Clinical Features:
 - **Early:**
 - **Pain**, swelling and decreased ROM
 - Erythema, warmth, induration, tenderness,
 - **Late: painless swelling with decreased ROM**
- **This sometimes mimics osteogenic sarcoma on radiographs and biopsy.**
- Increased ESR and serum alkaline phosphatase.
- Myositis ossificans becomes apparent approximately 2 to 4 weeks post-injury.



Myositis ossificans near the bone.



Brachialis

Overuse Tendon injuries

- Function—To transfer force from muscle to bone to produce joint motion.
- Type of injuries

1) **Overuse tendinopathies**

2) **Tendon rupture**

1: Overuse tendinopathies

- **Osteotendinous junction** is the **most common site** of overuse tendon injury.
- Tendons are relatively hypovascular proximal to the tendon insertion. This hypovascularity may predispose the tendon to hypoxic tendon degeneration and has been implicated in the etiology of tendinopathies.
- Tendinopathy not tendinitis.

Most Common Diagnoses and Locations of Chronic Tendinopathies:

Diagnosis	Location
Rotator cuff Tendinopathy	Supraspinatus tendon insertion
Lateral epicondylitis (tennis elbow)	Common wrist extensor tendon origin (mainly involved ECRB)
Medial epicondylitis ("golfer's elbow")	Common wrist flexor tendon origin
Hamstring Tendinopathy	Hamstring tendon origin
Quadriceps Tendinopathy	Quadriceps tendon insertion
Patellar Tendinopathy (jumper's knee)	Patellar tendon origin
De Quervain's disease	Sheath/pulley of abductor pollicis longus
Achilles Tendinopathy	Sheath, midsubstance, or calcaneal insertion

Do empty can test.

❖ Treatment Goal: reduce pain and return function.

- **Mainly is conservative Rx**
 - Rest
 - Ice (Cryotherapy)
 - PT (stretching and eccentric strengthening)
 - Analgesics
 - Corticosteroids injection
 - Orthotics and braces
 - Other modalities: U/S, ESWT, iontophoresis and phonophoresis.
- Surgical treatment:
 - Failed conservative treatment (at least 3-6 months)
 - Excision of abnormal tendon tissue and performance of longitudinal tenotomies to release areas of scarring and fibrosis.

2: Tendon rupture

- Knee extensor mechanism
 - Quadriceps tendon
 - Patella tendon
- Achilles tendon
- Partial vs complete

Patella/Quadriceps tendon rupture

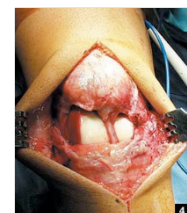
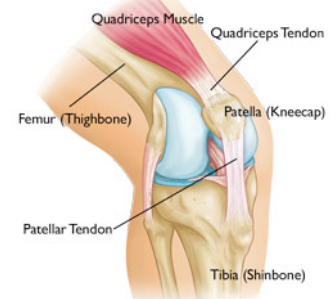
- Predisposing factors:
 - **Steroid**, chronic disease, and tendinopathy.
- Age: Patella <40> Quads
- Location: at the tendon attachment to the patella.

Physical examination:

- Tenderness at the site of the injury, hematoma, and a **palpable defect** in the tendon. **Above patella if quads tendons and below patella if patella tendon rupture.**
- They have **extension lag**: active extension is limited but passive extension is okay.
- Unable to extend the knee against resistance or to perform a straight-leg raise.
- Xray
 - Patella-alta (**supra**) > P.T rupture
 - Patella-infra > Q.T rupture



High riding patella indicate patella tendon rupture.



- RX: usually **surgical**.

Achilles tendon rupture (remember David Beckham)

- **Most ruptures (75%) occur during sporting activities.**
- Usually due to **eccentric load**, rupture occurs while performing actions requiring acceleration e.g. jumping, pushing off.
- Injuries happen during **dorsiflexion** with contracted gastrocnemius muscle.
- History:
 - The patient reports a **“pop”** or the sensation of being **kicked in the heel** during the injury.
 - weakness and difficulty walking.
- Examination:
 - Increased resting dorsiflexion with the knees flexed, a palpable gap, weak plantar flexion, and an **abnormal Thompson test** (lack of plantar flexion when squeezing the calf).
- **Diagnosis is clinical**, but MRI or ultrasound can confirm.
- Rx: usually surgically.



Knee ligaments injuries

mid- substance tear of ligaments usually occurs in adult.

proximal **avulsion** usually occurs in **pediatric** age group in tibia because ligament is stronger than bone.

Anterior cruciate ligament injuries: common in soccer players

Anatomy

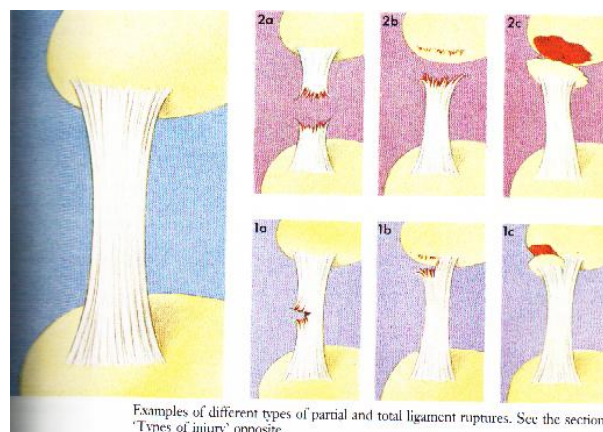
originates from between the tibial eminences to the medial surface of the lateral epicondyle. Needed when you change direction immediately or performing rough movements.

Mechanism of Injury

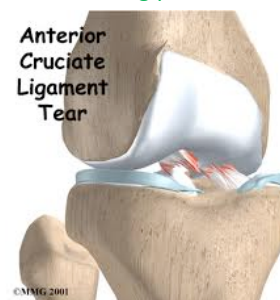
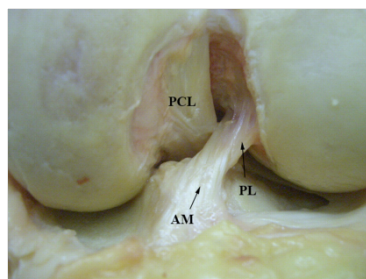
- **Noncontact (70%) most common.** twist knee (valgus and external rotation) or jump and land in wrong position.
 - Cutting or Pivoting (**zig-zag movement**)
 - Contact = MCL
- **Sports-Related (80%) soccer sport.**
- **“Pop” sound (70%)**
- Female: 2-4x > Male

Diagnosis

- Symptoms:
 - Acute: **“pop” sound & swelling** (Hemarthrosis) is noted within a 1-2 days of the injury.
 - **Chronic: Instability** “giving way episodes” – تخوني رجلي
 - Pain if associated with meniscus tear
 - **If the patient is walking straight on flat floor s/he will have no complain even with injured ACL. The problem when suddenly changing direction or walking on uneven floor → instability.**
- Physical examination
 - The patient need to be relaxed and comfortable.



Examples of different types of partial and total ligament ruptures. See the section 'Types of injury' opposite.



- Must be compared with those of the normal knee.
- A moderate to severe effusion is usually present
- ROM: in acute injury the range of motion may be limited by:

- Pain
- Effusion
- Hamstring spasm,
- ACL stump impingement,
- Meniscal pathology.

- Special tests:

- Lachman's test
- Anterior drawer test.
- **Pivot shift test : is pathognomonic for ACL injury (best in the chronic setting).**

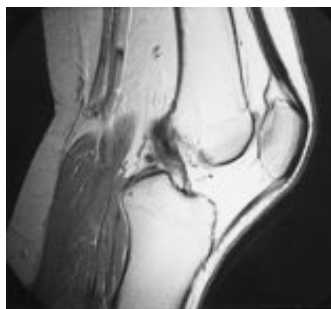
- Investigations:

- In acute stage: X-ray will be **normal**, it is done to **rule out fractures**.
- MRI (**ACL injury is a clinical diagnosis**, no need for MRI except if suspecting other injuries).
- In the skeletally mature patient, the femoral insertion or midsubstance is usually the site of disruption.
- In the skeletally immature patient, the tibial attachment may be avulsed with or without a piece of bone.



Tibial spine avulsion in pediatric (wedge shaped), ACL is intact but the tibial attachment is avulsed, same symptoms and signs of torn ACL.

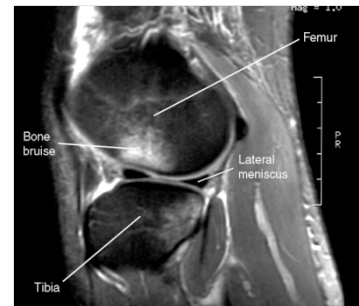
Second fracture Avulsion of antrolateral capsulotibial attachment, pathognomonic of ACL injury but it's a rare finding in x-ray. **most common finding in ACL injury is**



Normal ACL



Torn ACL



performed in acute stage and shows: bone bruise, posterior part of tibia hits the lateral femoral condyle (kissing lesion).

Injuries associated with ACL disruption

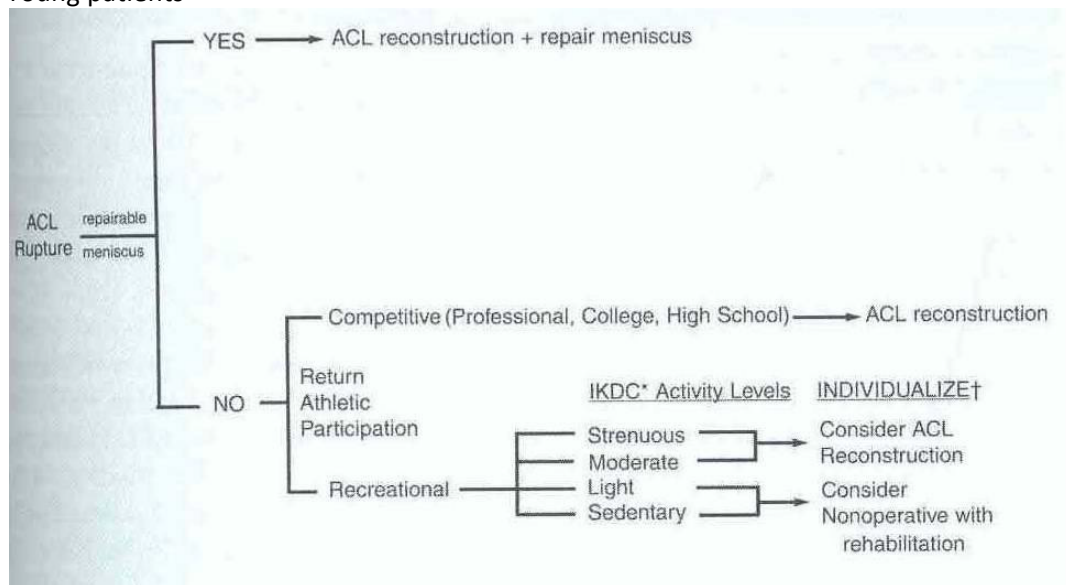
- Injuries of the ACL rarely occur in isolation. The effects of other injuries, including:
 - Other ligament sprains (MCL)
 - Meniscal tears
 - Articular cartilage injuries
 - Bone bruises,
- Complicate the treatment and eventual outcomes of ACL disruptions.
- **Long term complications with meniscal damage results in early osteoarthritis (meniscal injury in young patients is major cause for ACL reconstruction in all young people).**

❖ Treatment

Nonsurgical treatment

- Appropriate for **asymptomatic or old patients** with partial injuries to the ACL.
- Older or less physically active may elect to modify their activities and proceed with nonsurgical treatment.
- Nonsurgical treatment involves rehabilitation to strengthen hamstrings and quadriceps, as well as proprioceptive training.
- Activity modification is also an important part of nonsurgical management, as patients who avoid cutting and pivoting sports are at lower risk for knee instability.

- ACL sports braces have not been shown to prevent abnormal anterior tibial translation.
- ✚ **Surgical** (done for young and symptomatic patients)
- **Reconstruction not repair.**
- Athletes with ACL injuries rarely return to cutting and pivoting sports (e.g. basketball, football, soccer) without first undergoing surgery.
- For individuals who wish to return to such sports, surgery is generally recommended to avoid instability and secondary meniscal and/or articular cartilage damage.
- Individuals who work in occupations that may involve physical combat, such as police officers, or risk, such as firefighters, should have ACL reconstruction before returning to work.
- Most patients can function well and perform activities of daily living (ADLs) without instability after a complete ACL injury. However, some have difficulty performing even simple ADLs because of ACL deficiency-related instability, and they may require surgery.
- Young patients



Medial collateral ligament

- The main function of this complex is to resist valgus and external rotation loads.
- **The tibial MCL is the most commonly injured** ligament of the knee.
- Usually result from contact injury like a direct blow to the lateral aspect of the knee.
- Concomitant ligamentous injuries (95% are ACL)
- Concurrent meniscal injuries have been noted in up to 5% of isolated medial ligamentous injuries.

Physical examination

- **Valgus stress test** should be performed with the knee at 0° and 30° of flexion.
 - Laxity at 30°: isolated MCL
 - Laxity at both 0° and 30°: concurrent injury to the posteromedial capsule and/or cruciate ligaments.
- Rule out associated injuries (ACL and M. Meniscus)

Investigation

- Is a clinical diagnosis and most of the time dose not need further investigation.
- If the injury is severe or suspecting associated injuries (e.g. significant knee effusion) then the **MRI** will be modality of choice.



- Xray: to R/O fracture (lateral tibia plateau fracture)

Treatment

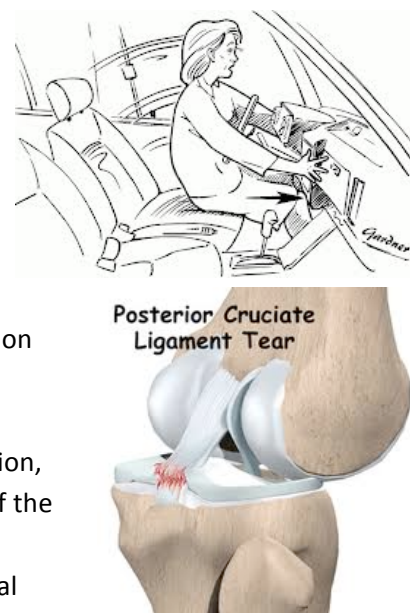
- **Conservative Rx**
 - Is the mainstay of treatment for the isolated MCL injuries
 - Crutches, RICE, and anti-inflammatory/pain medication.
 - No brace is usually required for partial tear
 - A knee brace is recommended for complete tear.
- Surgical Rx:
 - if failed conservative Rx + complete tear + associated with other ligaments injury

Lateral Collateral Ligament

- The LCL is the primary restraint to varus stress at 5° and 25° of knee flexion.
- Less commonly injuries than MCL
- Injuries to the lateral ligament of the knee most frequently result from motor vehicle accidents and athletic injuries.
- Rx:
 - Isolated injury: non operative
 - Combined injury: surgical

Posterior Cruciate Ligament

- **Originates from lateral surface of medial epicondyle to posterior aspect of tibia.**
- The PCL is the primary restraint to posterior tibial translation in the intact knee.
- Mechanism of injury
 - A direct blow to the proximal aspect of the tibia is the most common cause of PCL injury.
 - **Dashboard injury**
 - In athletes >a fall onto the flexed knee with the foot in plantarflexion, which places a posterior forces on the tibia and leads to rupture of the PCL.
- PCL insufficiency significantly increased the risk of developing medial femoral condyle and patellar cartilage degeneration over time.
- Rx
 - Non operative
 - Surgical if combined ligament injury



Knee dislocation

Multiligament Knee Injuries

Knee dislocation (**IMP because it's a limp threatening condition**)

- Multiligament knee injuries are usually caused by high-energy trauma and are often considered knee dislocations.
- Less frequently, low-energy trauma or ultra-low-velocity trauma in obese patients can also result in this injury pattern.
- **Most patient will have spontaneous reduction.**
- **A bicruciate (ACL+PCL) injury or a multiligament knee injury involving three or more ligaments should be considered a spontaneously reduced knee**



dislocation.

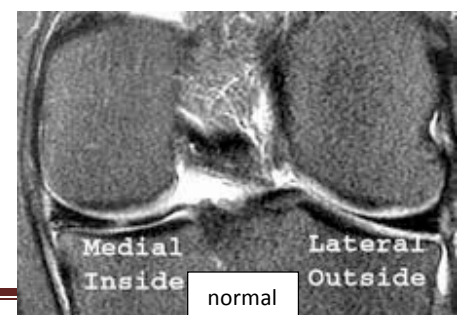
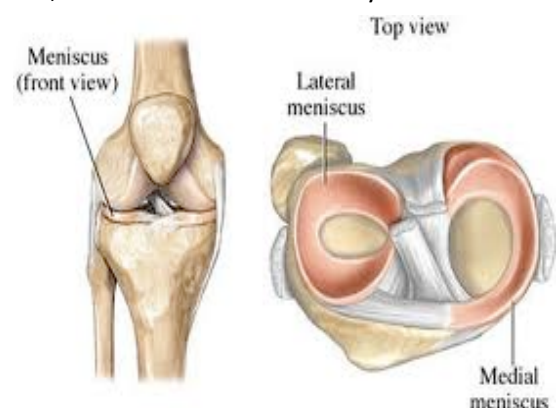
- A knee dislocation should be considered a **limb-threatening injury**, and careful **monitoring of vascular status** after the injury is imperative.
- Popliteal artery (estimated at 32%) or peroneal nerve injury (20% to 40%) also can occur.
- Vascular examination is critical in an acutely dislocated knee.
 - **Pulse and ankle-brachial index (ABI) should be carefully assessed.** An ABI of less than 0.90, and most certainly less than 0.80, should be considered abnormal.
 - **If there is any concern about an abnormal vascular examination**, there should be a low threshold for **ordering an angiogram.**
 - If pulses are still abnormal or absent following reduction of the dislocation, immediate vascular surgery consultation with intraoperative exploration should be the next step in management.
 - A vascular injury in a knee dislocation is a limb-threatening injury and needs to be corrected within 6 to 8 hours. If not corrected, amputation may be required.
- **Neurologic examination is also critical**, as peroneal nerve injury can occur with multiligament injuries, particularly in concomitant lateral/posterolateral corner injuries.
- **emergent closed reduction** and splinting or bracing should be performed immediately. Postreduction radiographs should be taken to confirm knee reduction.



Meniscus Tear

Anatomy

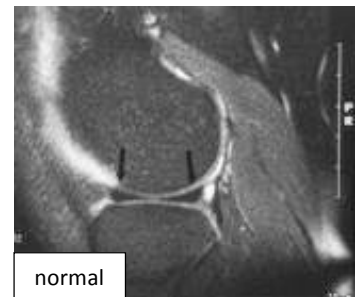
- The menisci are crescent-shaped, with a triangular appearance on cross-section.
- The lateral meniscus covers 84% of the condyle surface; it is 12 to 13 mm wide and 3 to 5 mm thick.
- The medial meniscus is wider in diameter than the lateral meniscus; it covers 64% of the condyle surface and is 10 mm wide and 3 to 5 mm thick.
- Meniscus function
 - The meniscus provides stability, absorbs shock, increases articular congruity, aids in lubrication, prevents synovial impingement, and limits flexion/extension extremes.
 - **The most important function of the meniscus is load-sharing across the knee joint**, which it accomplishes by increasing contact area and decreasing contact stress.
- Epidemiology of meniscus injuries
 - Meniscus injuries are among the most common injuries seen in orthopaedic practices.
 - Arthroscopic partial meniscectomy is one of the most common orthopaedic procedures.



- Meniscus tears are unusual in patients younger than age 10 years.
- Most meniscus tears in adolescents and young adults occur with a twisting injury or with a change in direction.
- Middle-aged and older adults can sustain meniscus tears from squatting or falling.

History:

- With an acute meniscus tear, an effusion may develop slowly several hours after injury. This differs from an anterior cruciate ligament (ACL) injury, where swelling develops rapidly within the first few hours.
- Patients with meniscus injuries localize pain to the joint line or posterior knee and describe mechanical symptoms of locking or catching.
- Pain in weight bearing and knee pending position e.g. squats. (في الصلاة التشهد)
- Chronic meniscus tears demonstrate intermittent effusions with mechanical Symptoms
 - In acute ACL lateral meniscal injury, in chronic ACL medial meniscal injury.



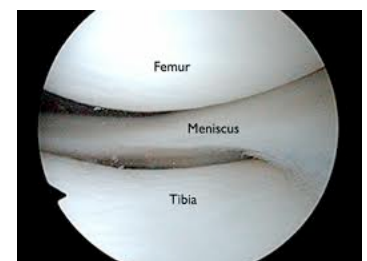
Physical examination

- Small joint effusions and joint line tenderness with palpation are common findings with meniscus tears.
- Manipulative maneuvers, including the McMurray and Apley tests, may produce a palpable or audible click with localized tenderness, but they are not specific for meniscal pathology.
- Range of motion is typically normal, but longitudinal bucket-handle tears may block full extension of the knee joint.
- Standard knee radiographs should be obtained for evaluating for
 - Bone injuries or abnormalities.
 - Osteoarthritis.
- MRI remains the noninvasive diagnostic procedure of choice for confirming meniscal pathology.



Differential diagnosis

- Differential diagnosis Prior to MRI, several large studies demonstrated accuracy of the clinical diagnosis of meniscus tears to be 70% to 75%.
- The differential for meniscus tears includes intra-articular and extra-articular diagnoses.
 - Intra-articular possibilities include osteochondritis dissecans, medial patella plica, patellofemoral pain syndromes, loose bodies, pigmented villonodular synovitis, inflammatory arthropathies, and osteonecrosis.
 - Extra-articular possibilities include collateral ligament injuries, slipped capital femoral epiphysis, bone or soft-tissue tumors, osteomyelitis, synovial cyst, pes or medial collateral ligament bursitis, injury, reflex sympathetic dystrophy, lumbar radiculopathy, iliotibial band friction, and stress fracture.

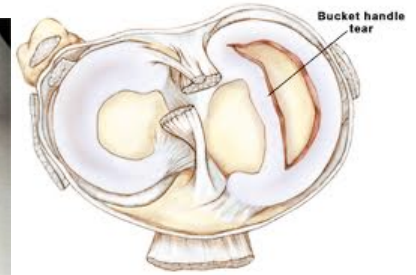


Treatment

Nonsurgical Management

- Not all meniscus tears cause symptoms, and many symptomatic tears become asymptomatic.

- Nonsurgical management can include ice, nonsteroidal anti-inflammatory drugs, or physical therapy for range of motion and general strengthening of the lower extremities, **weight reduction**.
- Surgical indications:**
 - Failure of conservative treatment (more than 6 months).
 - Locked knee.
 - Concomitant ACL surgery.
 - Bucket-handle tear.
- Type of surgical intervention:
 - Excision (Arthroscopic partial/subtotal/ or total meniscectomy)
 - Repair



Ankle Sprain

- Ankle sprain is a common sports related injury.
- Lateral sprains (inversion) accounting for 85% of all such injuries.**

Classification of Acute Lateral Ankle Sprains:

Grade	Description
I	Mild injury to the lateral ligamentous complex . No frank ligamentous disruption is present. Mild swelling, little or no ecchymosis on the lateral aspect of the ankle, and no or mild restriction of active ROM. Difficulty with full weight bearing is sometimes seen. No laxity on examination.
II	Moderate injury and partial tear to the lateral ligamentous complex. Restricted ROM with localized swelling, ecchymosis, hemorrhage, and tenderness of the anterolateral aspect of the ankle. Abnormal laxity may be mild or absent. May be indistinguishable from a grade III injury in the acute setting.
III	Complete disruption of the lateral ligamentous complex. Diffuse swelling, tenderness and ecchymosis on the lateral side of the ankle and heel. ++ instability

History and physical examination

- History suggestive of inversion injury
- Localized tenderness, swelling, and ecchymosis over the lateral ankle.
- The anterior drawer test may demonstrate anterior talar subluxation.**
- The talar tilt stress test may demonstrate positive tilt to inversion stress.
- If pain and patient can't walk do x-ray to rule out fractures.**



Treatment

- Nonsurgical
 - Initial treatment consists of **RICE**.
 - Early weight bearing and use of a protective **brace** during functional activities facilitates recovery better than non-weight bearing or



immobilization.

- Functional instability may result and should be treated with a course of physical therapy and proprioceptive training.
- Residual mechanical instability may be managed effectively with bracing or taping.
- Patients may return to unrestricted activity when cutting, running, and hopping on the affected leg are no longer painful.
- Ninety percent of acute ankle sprains resolve with RICE and early functional rehabilitation.
- Surgical—Surgery is a reasonable option when an adequate trial of nonsurgical treatment fails to control symptoms for grade III.

