

# Sport & Soft tissues injuries



# Objectives

**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

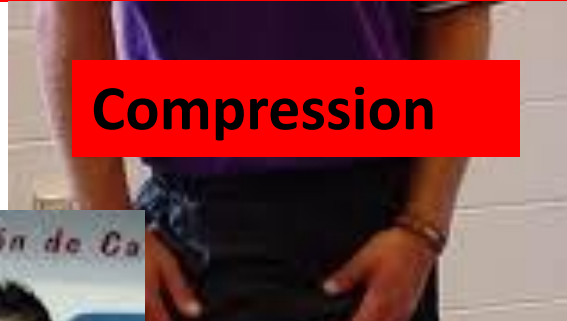
- Muscle
- Tendon
- Ligament
- Meniscus
- Knee
- Shoulder
- Ankle

# R.I.C.E

**Rest**



**Compression**



**Elevation**



# Muscle injury

- The muscles most at risk are those in which the origin and the insertion **cross two joints**.
- Frequently injured muscles act in an **eccentric** fashion (i.e., lengthening as they contract)



# **Muscle injuries**

- **Muscle strain**
- **Muscle Contusion**
- **Muscle Laceration**
- **Delayed-onset soreness**

# Muscle Strain

- 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
  - NSAID
  - physical therapy

# Muscle Contusion

- Caused by a non-penetrating injury to the muscle resulting in bruising.
- Quadriceps and hamstring regions.
- Clinical features
  - Pain with activity
  - Decreased range of motion
  - Occasionally a palpable mass
- Treatment:
  - **Short** period of rest
  - Followed by gentle stretching
  - NSAID





# Muscle injuries

- **Muscle Laceration**
  - I&D followed by suture repair of the fascia, if possible.
- **Delayed-onset soreness**
  - Structural muscle injury leads to progressive edema formation and resultant increased intramuscular pressure.
  - Is primarily associated with eccentric loading-type exercise.
  - Clinical features: muscular pain that occurs 1-3 days after vigorous exercise.
  - Treatment :
    - Will resolve in a few days
    - NSAID

# Complications of muscle injuries

- **Scar formation and muscle weakness.**
- **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
- **Myositis ossificans**

# Myositis ossificans

- Bone formation after trauma
- CF:
  - Early
    - Pseudotumor
    - Erosive
  - Late
- This so-called radiographic
- Increased
- Myositis ossificans  
to 4 weeks post-trauma



# Overuse Tendon injuries

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

# 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 tendenitis

# 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

# Overuse tendinopathies 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.

# 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.



# Patella/Quadriceps tendon rupture

## Physical examination:

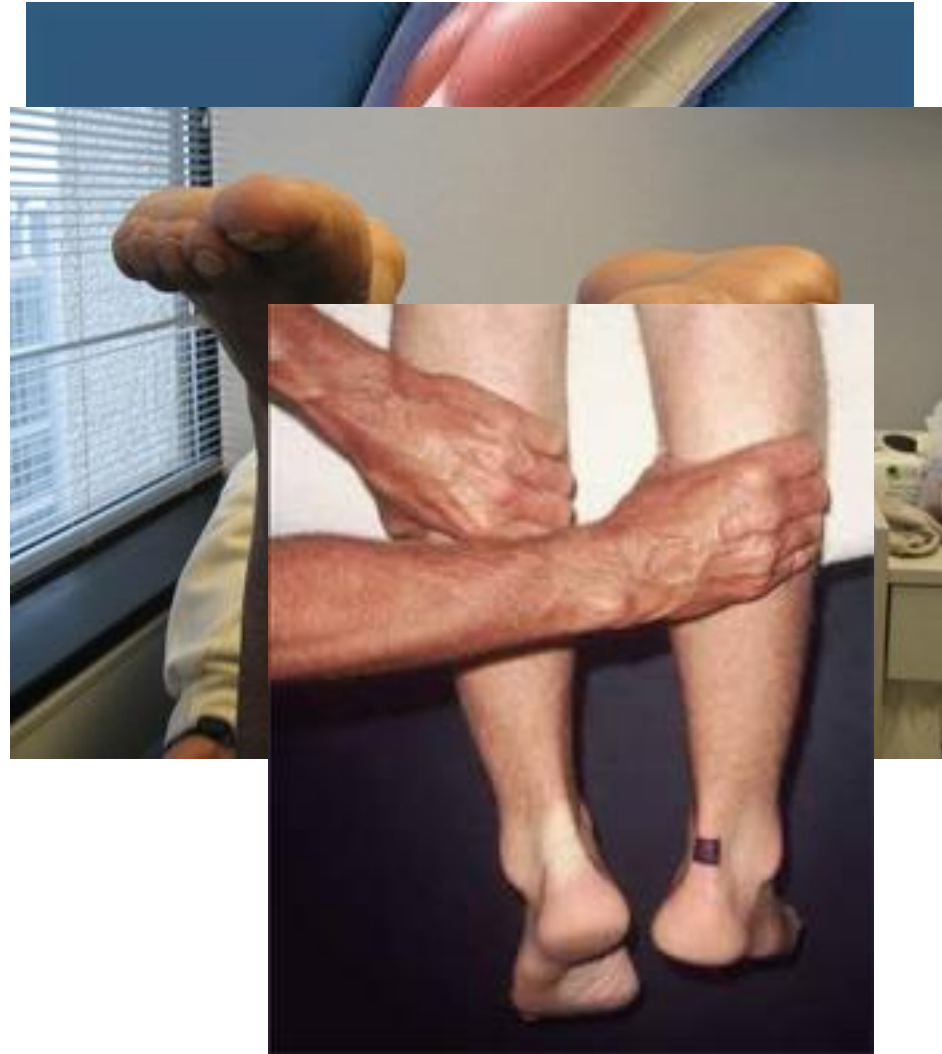
- Tenderness at the site of the injury, hematoma, and palpable defect in the tendon.
- Unable to extend the knee against resistance or to perform a straight-leg raise.
- Xray
  - Patella-alta > P.T rupture
  - Patella-inferior > Q.T rupture
- **Rx:** usually surgical



Patella-alta (high riding patella)  
seen with patella tendon rupture

# Achilles tendon rupture

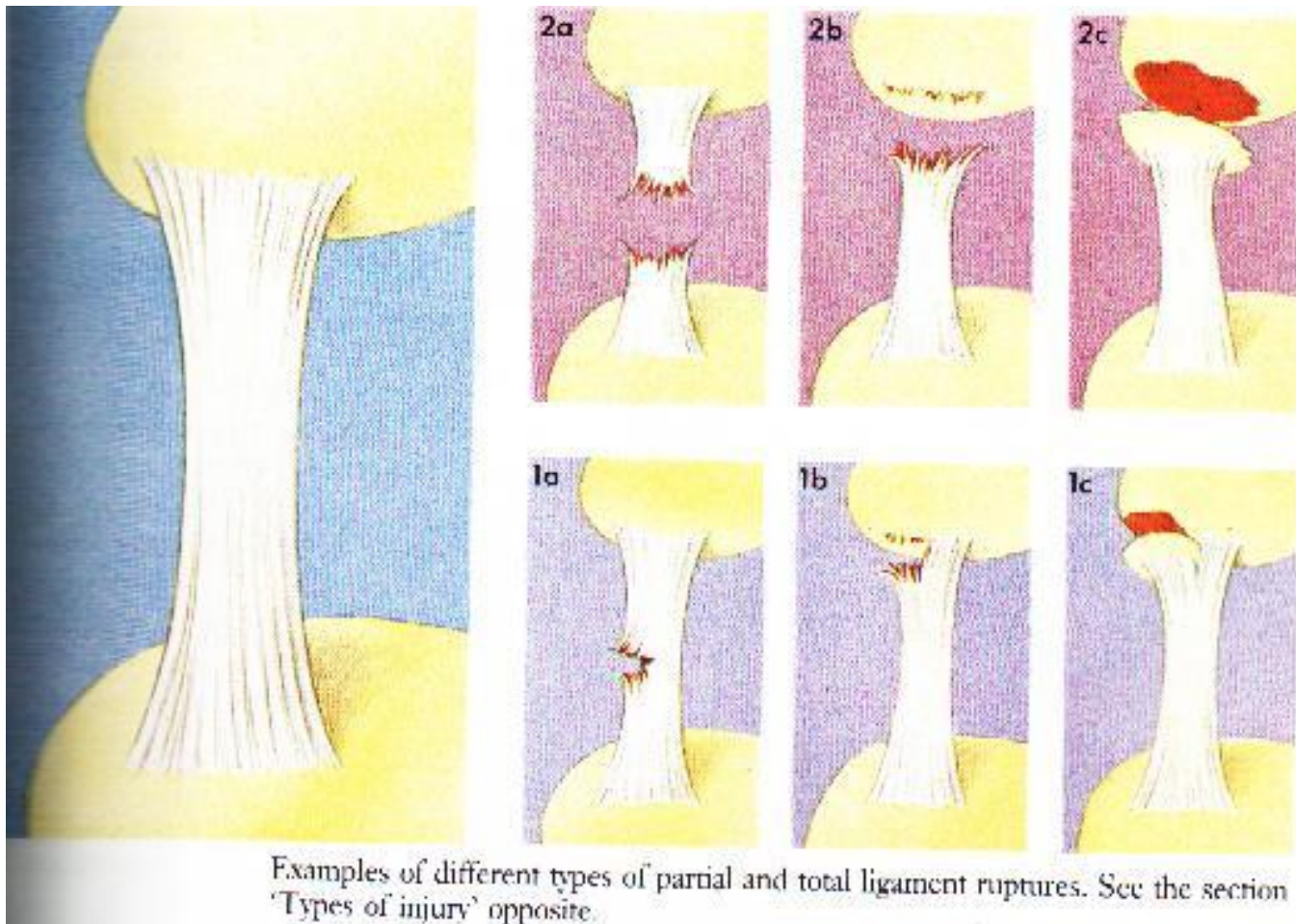
- Most ruptures (75%) occur during sporting activities.
- History:
  - The patient reports a “pop” or the sensation of being kicked in the heel during the injury.
  - weakness and difficulty walking.
- Examination:
  - Increased resting dorsiflexion with the knees flexed, a palpable gap, weak plantar 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

- ACL
- MCL
- LCL
- PCL
- Menisci
- Knee dislocation

# Ligament injury



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

# ACL injury

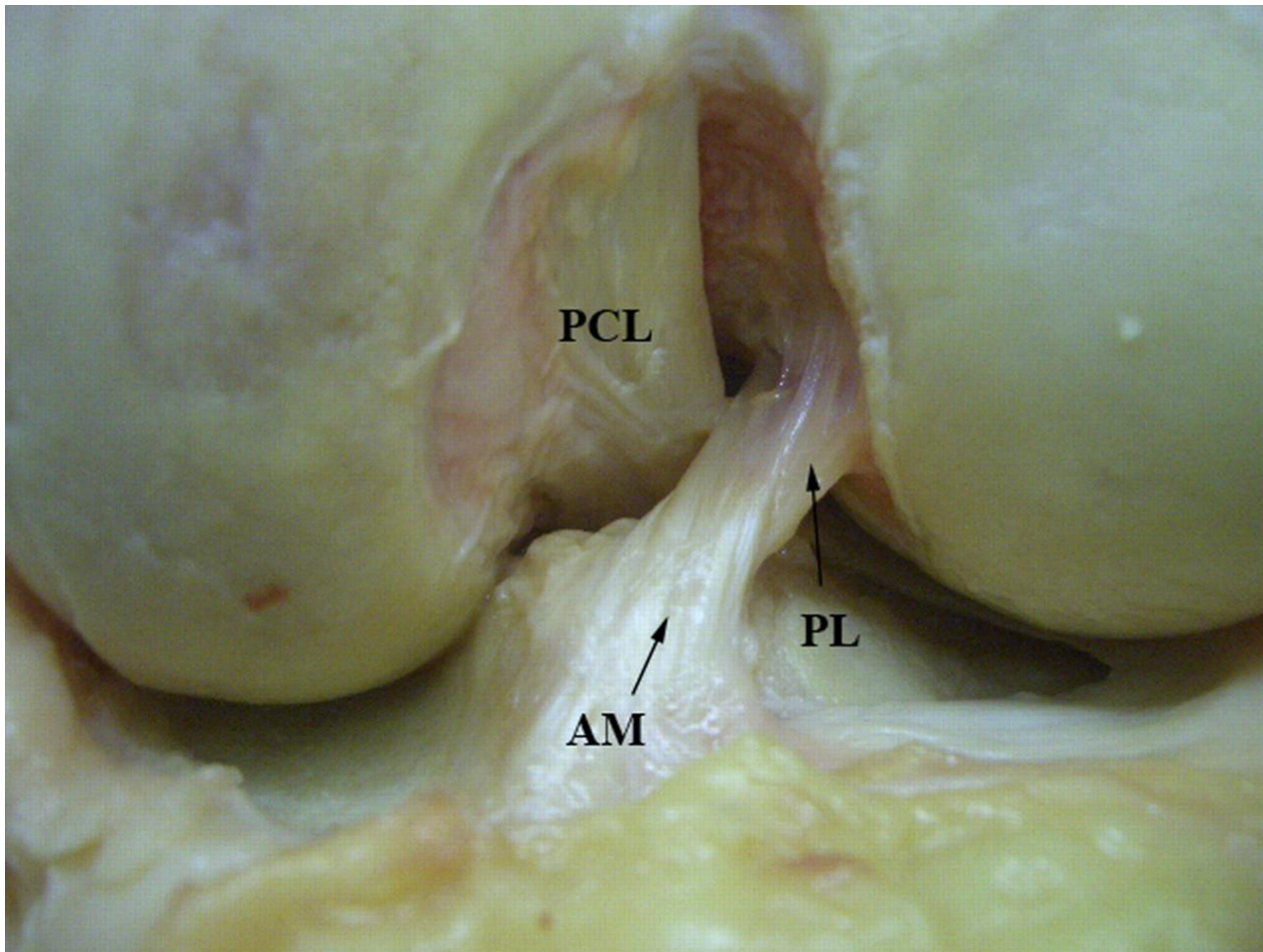
Anterior  
Cruciate  
Ligament  
Tear



# ACL

- Anatomy
- Mechanism of injury
- Diagnosis
- Principles of management

# ACL Anatomy





# Mechanism of Injury

- Noncontact (70%)
  - Cutting or Pivoting
  - Contact = MCL
- Sports-Related (80%)
- “Pop” (70%)
- Female: 2-4x > **Male**

# Diagnosis

- Symptoms:
  - Instability “giving way episodes”
  - Swelling (Hemarthrosis) is noted within a 1-2 days of the injury.
  - Pain if associated with meniscus tear

# Diagnosis

## Physical examination

- The patient need to be relaxed and comfortable.
- 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 limited by:
  - Pain
  - Effusion
  - Hamstring spasm,
  - ACL stump impingement,
  - Meniscal pathology.
- Special tests:
  - Lachman's test
  - ADT
  - Pivot shift test : is pathognomonic for ACL injury (best in the chronic setting).

# Diagnosis

- Investigations:
  - X-ray
  - MRI
- 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.`

# Xray

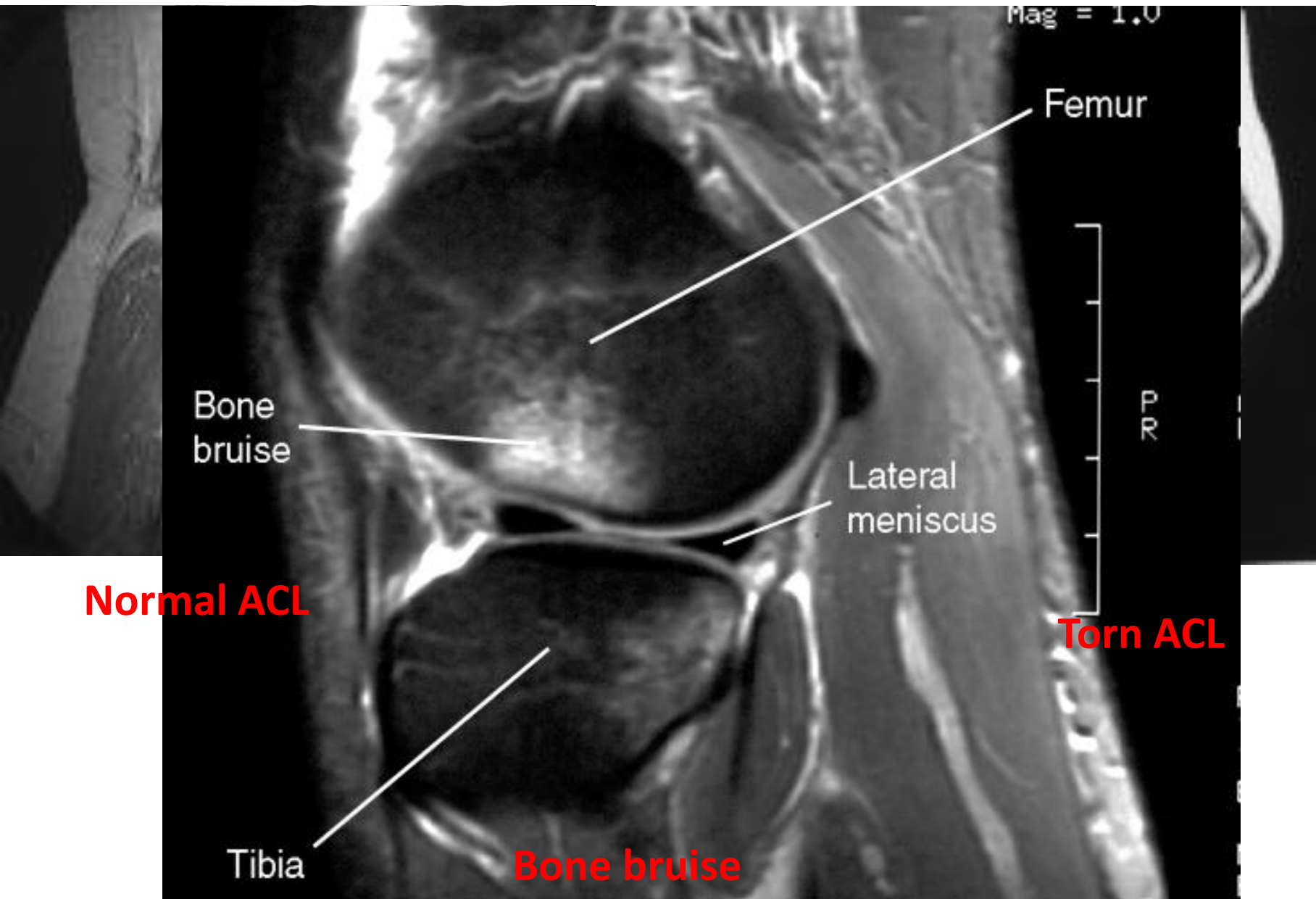
**Segond fracture**



**Tibial spine avulsion**



# MRI



# 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.

# Treatment

## **Nonsurgical treatment**

- Appropriate for asymptomatic 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.



# Treatment

## Surgical

- 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

# MCL

- The main function of this complex is to resist valgus and external rotation loads.



# MCL

- 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.

# MCL

## 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.
- R/O associated injuries (ACL and M. Meniscus)



# MCL

## Investigation

- Is a clinical diagnosis and most of the time does 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)

# MCL

## 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

# LCL

- 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

# PCL

Posterior Cruciate  
Ligament Tear





# PCL

- 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 ligamnet injury



# Knee dislocation



# Multiligament Knee Injuries

## Knee dislocation

- 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.
- 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



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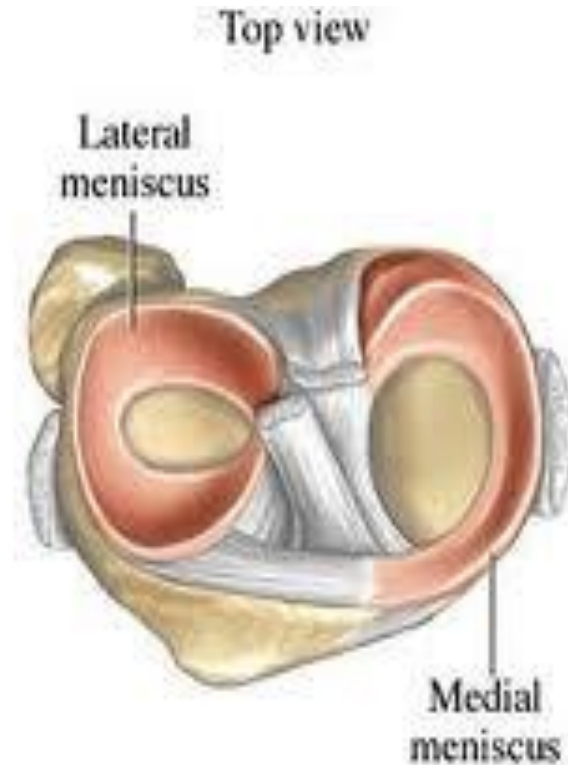
# NEED EMERGENT REDUCTION

- emergent closed reduction and splinting or bracing should be performed immediately



# Meniscus 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 tear

- 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 tear

## **Incidence:**

- 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:**

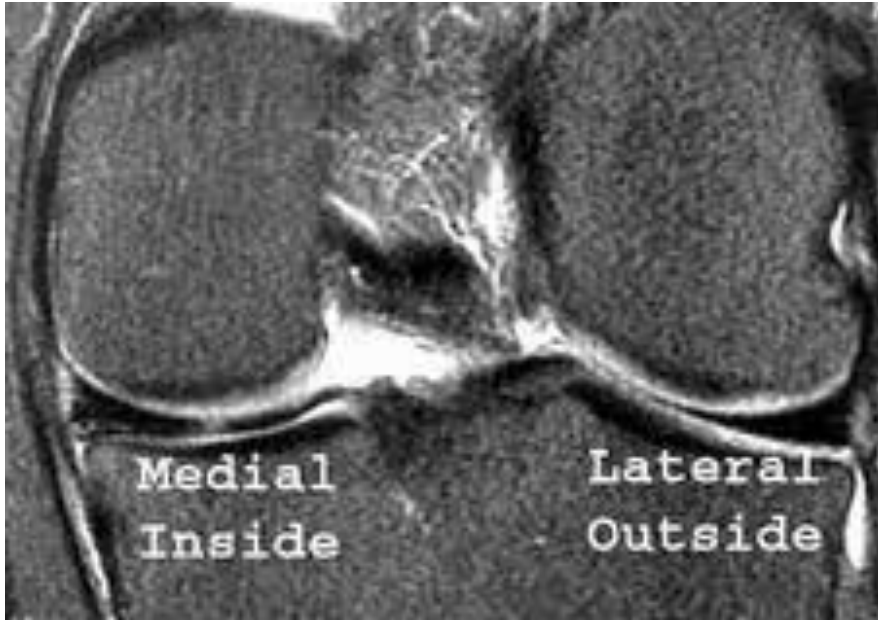
- With an acute meniscus tear, an effusion may develop slowly several hours after injury. This differs from an anterior cruciate ligament (ACL) injury, where swelling develops rapidly within the first few hours.
- Patients with meniscus injuries localize pain to the joint line or posterior knee and describe mechanical symptoms of locking or catching.
- Chronic meniscus tears demonstrate intermittent effusions with mechanical symptoms



# Meniscus tear

## 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.

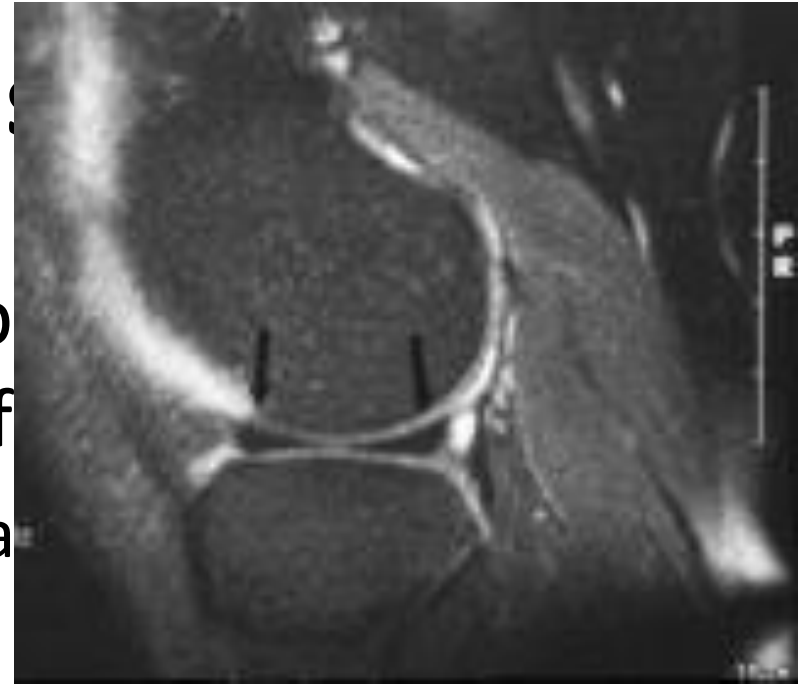


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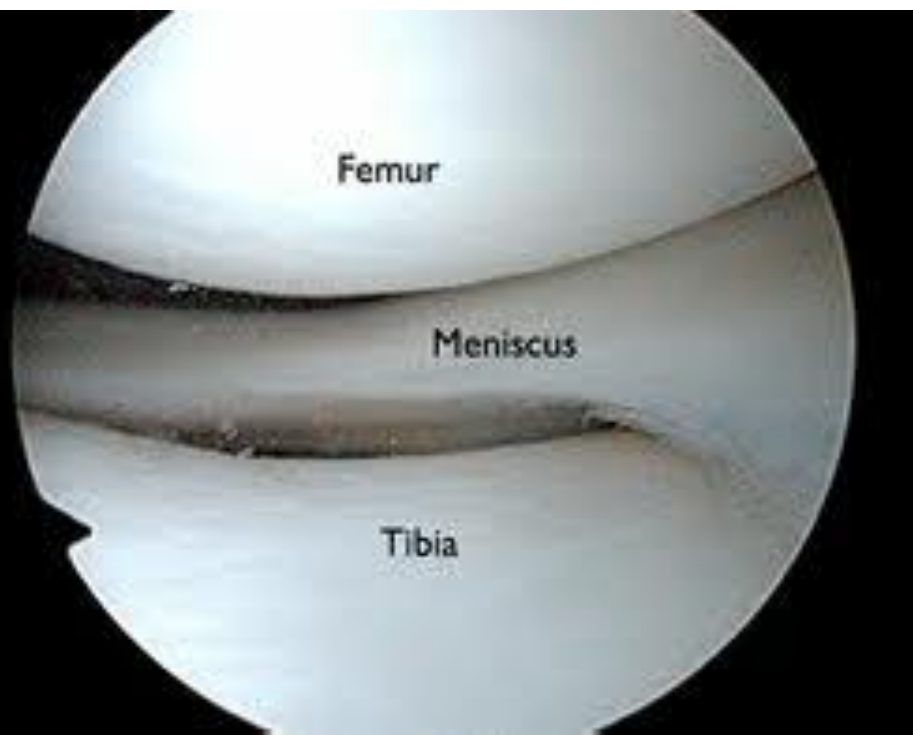
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# Differential diagnosis

- 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.

# Treatment

- Surgical indications:
  - Failure of conservative treatment
  - Locked knee
  - Concomitant ACL surgery
- Type of surgical intervention:
  - Excision (Arthroscopic partial/subtotal/ or total meniscectomy)
  - Repair

# **Ankle sprain**

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

# Classification of Acute Lateral Ankle Sprains

Grade	Description
I	<b>Mild</b> 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. <b>No laxity</b> on examination.
II	<b>Moderate</b> 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	<b>Complete</b> 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
- Localized tenderness  
ecchymosis over
- The anterior  
anterior talar
- The talar tilt  
positive tilt t



# 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.



A



B



C