



17-Sport and Soft Tissue Injuries

Objectives:

1. 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.
2. Outline the assessment and appropriate investigation and immediate and long-term management of patients with muscles, tendons, ligaments and meniscal injuries
3. Demonstrate knowledge of non-operative and operative measurements used for sport/soft tissue injuries and their indications




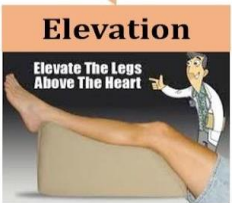
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Revised by: Abdulaziz ALmohammed

References: Team 435, Slides, Notes

Introduction Soft tissues injuries

Soft tissues injuries, include:	Initial Management:
<ul style="list-style-type: none"> ➤ Muscle ➤ Tendon ➤ Meniscus ➤ Ligament ➤ Knee ➤ Shoulder (discussed in other lecture) ➤ Ankle 	<div style="text-align: center; margin-bottom: 10px;"> R I C E </div> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <div style="background-color: #90EE90; padding: 5px; font-weight: bold; margin-bottom: 5px;">Rest</div>  <p style="font-size: 0.8em;">rest: damage control: detect the side of injury, protection from further injury</p> </div> <div style="text-align: center;"> <div style="background-color: #ADD8E6; padding: 5px; font-weight: bold; margin-bottom: 5px;">ICE</div>  <p style="font-size: 0.8em;">Ice: pain relief, relief swelling, decrease damage *it's golden period: 1st 72 Hrs*</p> </div> <div style="text-align: center;"> <div style="background-color: #FFFF00; padding: 5px; font-weight: bold; margin-bottom: 5px;">Compression</div>  <p style="font-size: 0.8em;">compression: relief swelling, decrease damage</p> </div> <div style="text-align: center;"> <div style="background-color: #FFDAB9; padding: 5px; font-weight: bold; margin-bottom: 5px;">Elevation</div>  <p style="font-size: 0.8em;">elevation: above heart level</p> </div> </div>

Muscle injuries

<p>General characteristic:</p>	<ul style="list-style-type: none"> ➤ The muscles most at risk are those in which the origin and the insertion cross two joints (For Example: quadriceps and Hamstrings Muscles are usually injured because they cross two joints: Hip and knee) ➤ Frequently injured muscles act in an eccentric fashion (i.e., lengthening as they contract). For Example: when u r doing a dumbbell bicep extension (u actually lengthen the muscle while it contracts) also for Example: when you flex your knee and contract your quadriceps “ the function of quadriceps is to extend the knee. when you flex it, it will stretch” <p style="font-size: 0.8em;">دايم تشوفون ان الشخص القصير اصابته بالعضلات قليلة لان السيرفس ايريا حفته قليلة بعكس الطويل الي معرض أكثر للاصابة عشان كذا قبل ما تتمرنوا وقت الاحماء يختلف من شخص لشخص يعني القصير عشر دقائق تكفيه بس الطويل يحتاج ثلث ساعة وهكذا</p>
<p>Types of muscle injuries:</p>	<ul style="list-style-type: none"> ➤ muscle strain ➤ muscle contusion ➤ muscle laceration ➤ delayed onset soreness

Types of muscle injuries

<p>muscle strain</p>	<ul style="list-style-type: none"> ➤ The most common muscle injury suffered in sports. ➤ Immediate pain associated with diminished function <ul style="list-style-type: none"> يمشي او يجري وفجاه شدت عليه رجليه وماقدر يتحرك غالباً الشخص الطويل في الكالف مسل How it's happen? overuse, or improper use of a muscle result in → muscle overstretched (muscle strain) → could lead to muscle tear ➤ 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 (the connection between muscle and tendon)
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	<ul style="list-style-type: none"> ➤ Treatment: ⇒ RICE ⇒ NSAID ⇒ Physical therapy
<p>muscle contusion</p>	<ul style="list-style-type: none"> ➤ Caused by a non-penetrating blunt injury (direct blow) to the muscle resulting in hematoma and inflammation. لاعب دخل على لاعب برجله ➤ Quadriceps and Brachialis muscles are common involved regions. ➤ Clinical features: <ul style="list-style-type: none"> ⇒ Pain with active and passive motion +/- swelling. ⇒ Decreased range of motion of joints spanned by the injured muscles. ⇒ Occasionally a permanent palpable mass. ➤ Treatment: <ul style="list-style-type: none"> ⇒ Short period of immobilization ⇒ Followed by early mobilization and Physiotherapy ⇒ NSAID <div data-bbox="1193 331 1519 1008" style="text-align: right;"> <p>The white area in this image is hematoma</p> </div>
<p>muscle laceration</p>	<p>Muscle cut by sharp object</p> <ul style="list-style-type: none"> ➤ I&D (irrigation & debridement) followed by suture repair of the fascia, if possible.
<p>delayed onset soreness</p>	<p>يمكن كلكم حسيتم فيها هو اجهاد نفس اكثر من المعدل الطبيعي التي متعود عليه مارح تحس بالامه نفس اليوم او اللحظة لكن تبدا معك الاعراض بعد يومين كذا زي مثلا التي يسافرون ويكند ويبيون يستغلون كل ساعة من سفرتهم تلقاهم يروحون ويمشون ويكرو فون نفسهم ومايحسون باي الم بعد ما يرجعوا، احد الاسباب ان المخ ذلك الوقت يكون مشغول باشيا ثانية والسبب الثاني انه اجهد نفسه. * غالباً بالاشخاص الغير رياضيين *</p> <ul style="list-style-type: none"> ➤ Structural muscle injury leads to progressive edema formation and resultant increased intramuscular pressure. ➤ Clinical features: muscular pain that occurs 1-3 days after vigorous exercise. ➤ Treatment: <ul style="list-style-type: none"> ⇒ Will resolve in a few days ⇒ NSAID

Complications of muscle injuries:

Scar formation and muscle weakness: scars will lead to muscle weakness

mainly due to laceration

How the scar formed inside the muscle!!? the space between ruptured muscle fibers fills with blood which clots and gradually converted into connective tissue, which converted into scar tissue. This leaves the muscle with areas of varying elasticity, and further injury may occur if too hard and too soon. In some cases this scar tissue may need surgical excision.

Compartment syndrome:

- **Mainly due to contusion BC hematoma**
- 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.
- **Patients with Bleeding disorders is at high risk**

Let's revise the pathophysiology of compartment syndrome:
Swelling/injury/hematoma →

Increased interstitial compartment pressure Obstruction of capillary → perfusion → Direct transfer of oxygenated blood from arterial to venous system without oxygenation of the tissues → Ischemia and necrosis of the compartment structures

- In general, all the types of compartment syndrome:
 - ⇒ Acute (fracture or soft tissue injury) medical emergency!!!!
 - ⇒ Chronic (activity related) reversible once the exercise stop

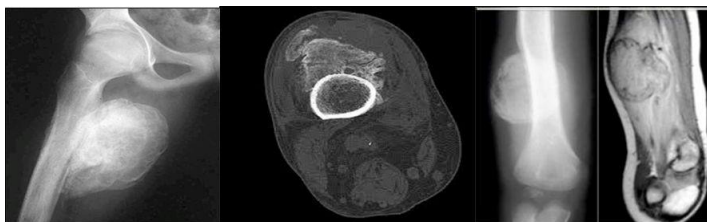
Myositis ossificans:

AKA heterotopic calcification

you should take a good history bc it will confuse you with osteogenic sarcoma

how to differentiate?
history of trauma

- Mainly due to contusion
- **What is it?** Bone formation (calcification) within muscle secondary to blunt trauma
- Clinical features:
 - ⇒ Early: **usually due to blunt trauma**
 - ✚ 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



- **conservative treatment**




Overuse Tendon injuries

General Characteristic:

- The Function of tendon? To transfer force from muscle to bone to produce joint motion.
- Type of injuries:
 - ⇒ overused tendinopathies
 - ⇒ tendon rupture

overused tendinopathies:

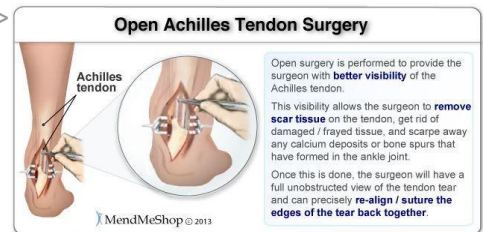
- Osteotendinous junction is the most common site of overuse tendon injury. why?
 - ⇒ Tendons are relatively hypovascular proximal to the tendon insertion. This hypovascularity may predispose the tendon to hypoxic tendon degeneration and has been implicated in the etiology of tendinopathies.
- **Tendinopathy NOT tendinitis we do not call it bc is not a true inflammation**
the doctor said you should know it (important)

Most common Diagnoses and Locations of Chronic Tendinopathies:	
Diagnosis	Location
Rotator cuff Tendinopathy	Supraspinatus tendon insertion
Lateral epicondylitis (tennis elbow) BC the overuse for arm extensor will lead to tear in tendon	Common wrist extensor tendon origin (mainly involved ECRB) extensor carpi radialis brevis 
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

scenario: when pt has supraspinatus tendinopathy he will not be able to elevate his arm “empty can test”


treatment:


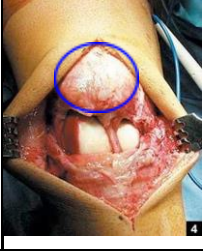
- **Goal: reduce pain and return function.**
- Mainly is conservative Rx:
 - ⇒ Rest
 - ⇒ Ice (Cryotherapy)
 - ⇒ Physiotherapy (stretching and eccentric strengthening)
 - ⇒ Analgesics
 - ⇒ Corticosteroids injection **don't give it on the tendon, you should inject around it bc it can cause weakness and rupture of the tendon except tennis elbow**
 - ⇒ Orthotics and braces
 - ⇒ Other modalities: U/S, ESWT(extracorporeal shockwave therapy)
- 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. EXTRA PIC->



rupture tendon:

- Knee extensor mechanism: Quadriceps tendon, and Patellar tendon
- Achilles tendon (more common than patellar tendon)
- Partial vs complete

Patellar/Quadriceps tendon rupture	
Predisposing factors:	<ul style="list-style-type: none"> ➤ Steroid ➤ chronic disease ➤ tendinopathy
Age:	<ul style="list-style-type: none"> ➤ Patellar <40 usually in young ➤ Quads >40 <p style="text-align: center;">that's why if u examined randomly ppl with patellar pain you'll find: 40+: pain above patella 40-: pain below patella</p>
Location:	<ul style="list-style-type: none"> ➤ at the tendon attachment to the patella. 
Physical examination:	<ul style="list-style-type: none"> ➤ Tenderness at the site of the injury, hematoma, and a palpable defect in the tendon. ➤ Unable to extend the knee against resistance or to perform a straight-leg raise. ➤ can't extend the knee, gap on palpation: above or below patella depending on the affected tendon

X-ray:	<ul style="list-style-type: none"> ➤ Patella-alta: Patellar tendon rupture ➤ Patella-infera(baja): Quadriceps rupture ➤ u don't need MRI for diagnosis, but u may use it to exclude other injuries or to determine how will u reconstruct in the surgical treatment 	 <p>2009 J 14:45:05 Patella-alta (high riding patella) seen with patella tendon rupture</p>	
<p>Notice here the patella is above its normal position which indicate patellar tendon rupture *patella-alta*. while in* patella baja it will be lower than its normal place</p>			
Treatment:	<ul style="list-style-type: none"> ➤ Usually Surgical 		
Scenario:	<p>20 y boy came to ER with inability to rise his right lower limb*knee extension*. wt is ur DDX? knee ligament tear, fracture of patella, quadriceps or patellar tendon rupture, femoral nerve injury or psychology</p>		

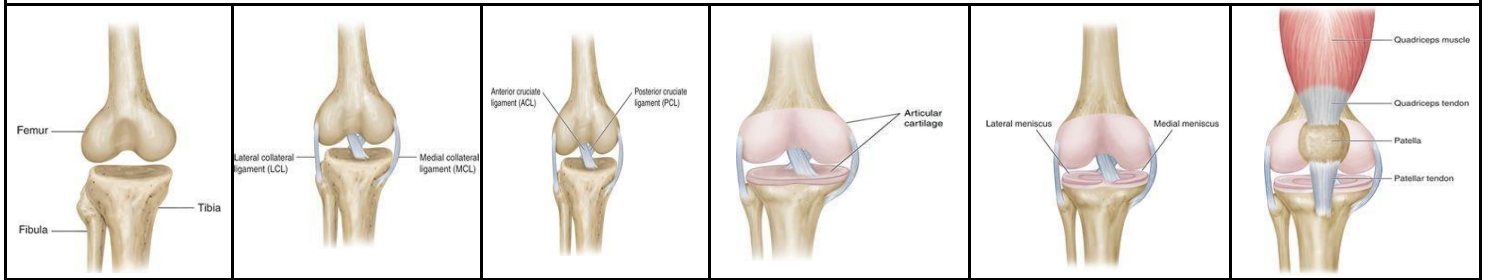
Achilles tendon rupture

Occurrence:	<ul style="list-style-type: none"> ➤ Most ruptures (75%) occur during sporting activities. common 		
History:	<ul style="list-style-type: none"> ➤ the during heel the in kicked being of sensation the or فرقة قويه "pop" a reports patient the injury ليس البيشنت يحسون او حتى يسمعون بوب لما يتقطع التندن؟ لن الاكيليس تندون من اقوى التندنز الي بالجسم قوي جدا فيتطاب طاقه قويه جدا جدا عشان تقطعه فلما يتقطع the stored energy will be released suddenly, creating what the patient perceives as a pop. ➤ weakness and difficulty walking. 		
Physical examination:	<ul style="list-style-type: none"> ➤ 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). <div style="display: flex; justify-content: space-around; align-items: center;">    </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> Negative test positive test </div>		
Diagnosis:	<ul style="list-style-type: none"> ➤ Diagnosis is clinical, but MRI or ultrasound can confirm. 		
Treatment:	<ul style="list-style-type: none"> ➤ Usually surgical 		

Injuries of Knee

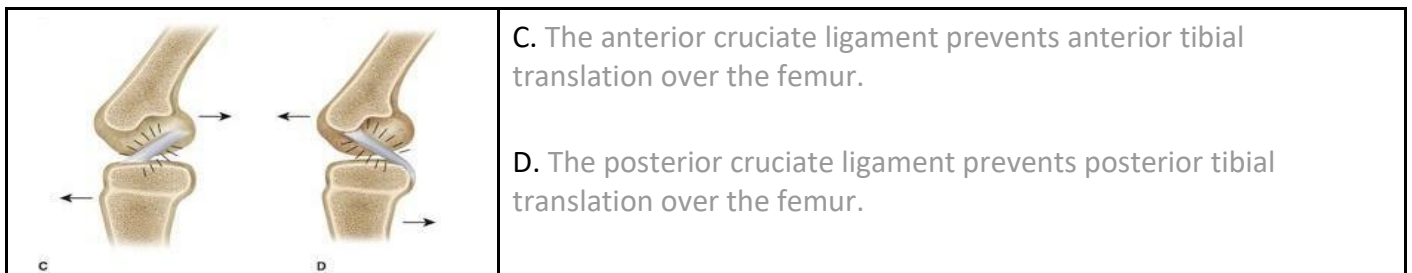
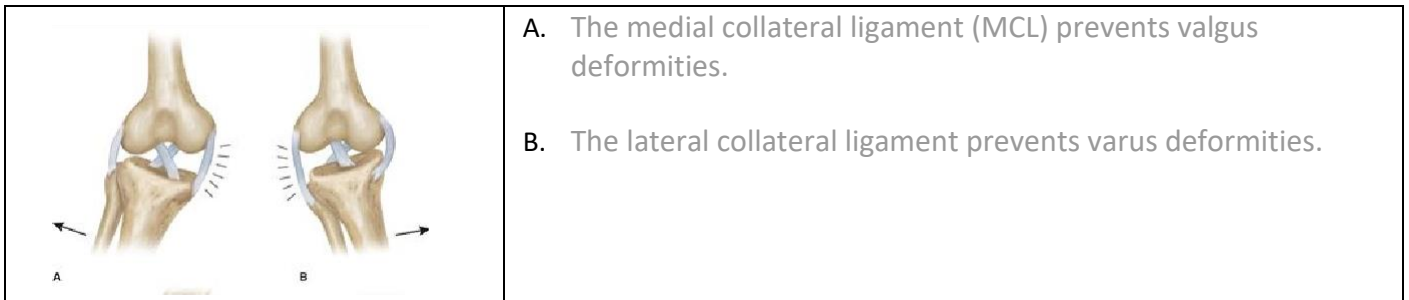
Refresh your anatomy (Knee):

تأملوا شكل الركبة من الصور اليسار لليمين كأنها قاعدة تتلبس مع كل صورة، تفرجوا عالصور الي اخترتها لكم بعناية



- Joint stability: bone stability + soft tissue
- ⇒ Dynamic stabilizer: Tendons/Muscles
- ⇒ Static stabilizer: Ligaments ± meniscus
- Complex synergy leading to a FUNCTIONAL and STABLE joint

The functions of the knee ligaments:

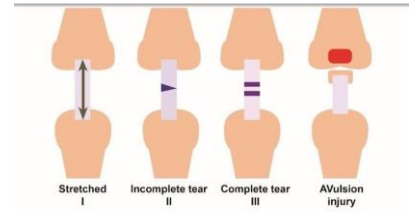


Types of Knee injuries:

- 1-Ligaments injuries (ACL, MCL, LCL, PCL)
- 2-Menisci
- 3-Knee Dislocation ***red flag***

Ligaments injuries:

Patients with ligament injuries are usually easy to separate from other patients with knee complaints. The role of the knee cruciate and collateral ligaments is to stabilize the joint. These structures connect the bones in a way that allows normal motion (flexion and extension) but resists the forces that create abnormal motion (hyperextension; varus/valgus; anteroposterior translation and rotation).



A grading of ligamentous injury In type I, there is injury and pain but no instability. In type II, there is more motion but clear endpoint on manual testing. Type III is characterized by instability, is associated with capsular injury, and lacks an endpoint. Avulsion is reflection that ligament is stronger than bone in the immature child.

Common signs & symptoms:

- Some patients will offer that they felt, or even heard, a “pop” when the ligament was injured. Knee ligaments are very strong structures. They can store a tremendous amount of energy before failing. If the load is big enough to fail the ligament, then the ligament will rupture, and that stored energy is released suddenly, creating what the patient perceives as a pop.
- Many patients present a long time after injury with symptoms of instability. In these patients, the pain and swelling from the initial injury have resolved, but, because the ligament did not heal, they are prone to intermittent episodes of instability.
- Ligaments are more vascular than meniscal tissue, and patients with ligament injuries tend to develop effusions within an hour of their injury. In patients with meniscus tears, effusions usually develop much more slowly.

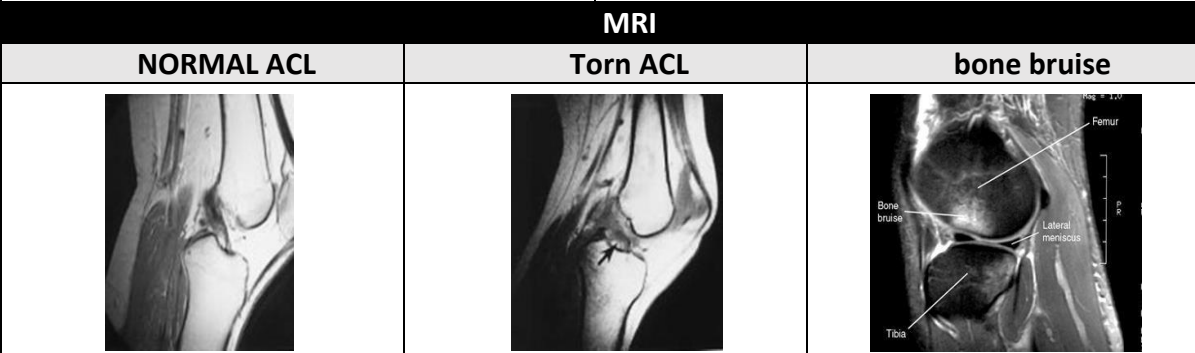
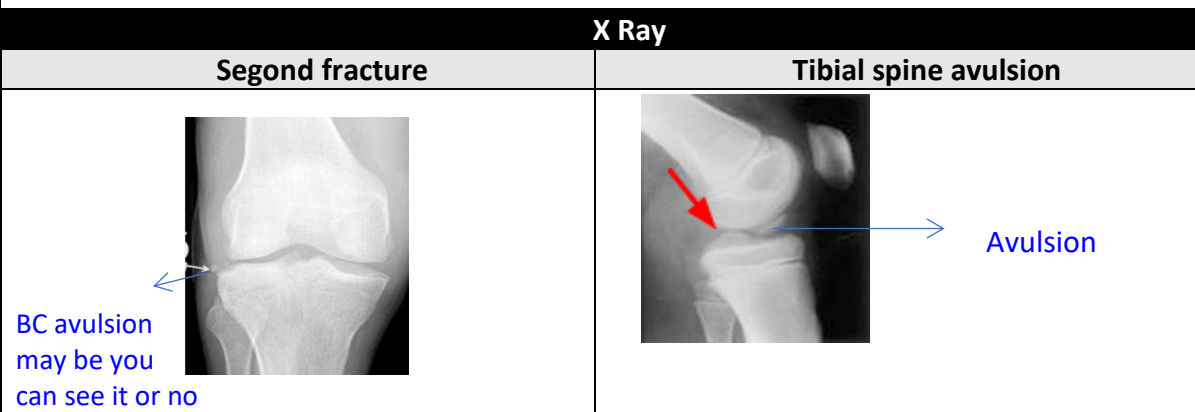
الرباط المتصالب الامامي ACL injury:	
Toronto notes Kaplan notes	
Mechanism of injury:	<ul style="list-style-type: none"> ➤ Noncontact (about 70% of ACL): Cutting or Pivoting(rotation) sport such as basketball, football, soccer. ➤ Sports-Related (80%) ➤ “Pop” (70%) ➤ Female: 2-4x > Male. but in Saudi Arabia is less than male ➤ Why it’s more common in female? bc (1) their notch “the place where the ACL & PCL cross -between the 2 condyles” is narrower than the males, so any over activities makes the ACL more prone to injury. (2) the pre period hormones change so they develop laxity. (3) the way they have it: they always jump with valgus so there is stress on ACL.
symptoms:	<ul style="list-style-type: none"> ➤ With an acute ACL rupture, the patient will be unable to play on and may have to be carried from the field. if they have pain with the time of injury meaning the pain bc of contusion bone ➤ Swelling (Hemarthrosis) is noted within a 1-2 days of the injury. ➤ Many patients present a long time after injury with symptoms of episodes” way “giving instability ➤ Pain if associated with meniscus tear <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p style="text-align: center;">يصير يحس المريض رجله تفلت منه خصوصا لمن يغير الاتجاه او يمشي على ارض مو مستويه</p> </div> <p>ليه اللاعب إذا اصاب حتى لو نون كونتاكت يقول غيروني؟ بسبب البروبريوسيشن، لو ما عندك البروبريوسيشن شبيصير؟ البروبريوسيشن اللي في اللور لمب يمثل تسعين بالمية Proprioceptionis we which though sense the body our of movement and position the perceive يمشي عشان كذا يقول بدولوني بس بعد نص ساعة كذا يبدأ جسمه بطور طريقة ثانية للاحساس فيرجع يقول رجعوني حيكون يعرج ع رجله بس بقدر يمشي مو زي اول ما اصاب ماكان قادر يتحرك خير شر فشالوه ذاتز واي بعد مانسوي الريبير نخطه ع سبلنت لمدة ست اسابيع لانه في البداية اللقمنت يصير لها ريفاسكلريزيشن وبعدها يبدأ يرجع البروبريوسيشن شوي شوي فست اسابيع عشان يتعود</p>

Physical examination:

- The patient needs to be relaxed and comfortable.
- Must be compared with those of the normal knee.
- A moderate to severe effusion is usually present in the acute cases
- **ROM:** in acute injury the range of motion may limited by: Pain, Effusion, Hamstring spasm, ACL stump impingement *قطع الرباط الممزق تتكدس بالمفصل وتعيق الحركة*, or Meniscal pathology.
- **Special tests:**
 - ⇒ Lachman’s test
 - ⇒ Anterior Drawer test
 - ⇒ Pivot shift test : is pathognomonic for ACL injury (best in the chronic setting).

Investigation:

- ⇒ X ray, **MRI** *اهم شيء الام ار أي لأنه حيوريني القطع الكلي او جزئي او فيه انجري ثاني*
- ⇒ 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.



Injuries Associated With ACL Disruption:

- Injuries of the **ACL rarely occur in isolation**. The effects of other injuries, including:
 - ⇒ Other ligament sprains (MCL)*Contact injury= MCL*
 - ⇒ **Meniscal tears(=pain)(40% -30%)**
 - ⇒ Articular cartilage injuries
 - ⇒ Bone bruises
- Complicate the treatment and eventual outcomes of ACL disruptions.

Nonsurgical treatment

- Appropriate for asymptomatic patients with partial injuries to the ACL.
- Patients who are older or less physically active may elect to modify their activities and proceed with nonsurgical treatment. *If non-surgical treatment fails or knee instability*

	<p>persists, surgery can be performed.</p> <ul style="list-style-type: none"> ➤ 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 treatment	<ul style="list-style-type: none"> ➤ in summary: Surgery needed if unstable during activities or اللي رجليه مصدر رزقه حتى لو ماوصل لمرحلة الانستيبيلاتي ➤ Athletes with ACL injuries rarely return to cutting and pivoting sports (e.g. basketball, football, soccer) <u>without</u> first undergoing <u>surgery</u>. ➤ 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: age is not a good factor in deciding the treatment bc sometimes u'll see 60 yo man who can exercise better than a 20 yo boy

الأشياء المهمة التي ابغاكم تعرفونها عن الACL

- 1) common injury
- 2) non-contact sport is more than contact
- 3) female > male
- 4) surgical treatment is the ideal Tx
- 5) we can consider conservative if the pt. doesn't exercise
- 6) ACL always came with other injury (menisci, MCL, LCL)
- 7) if u treat ACL with other injury treat the other injury or there is no benefit of the treatment

PCL Injury (not as common as ACL):	
Kaplan notes Toronto notes	
PCL function	➤ The PCL is the primary restraint to posterior tibial translation in the intact knee.
Mechanism of injury: rare to have instability in grade 1 & 2	➤ A direct blow to the proximal aspect of the tibia is the most common cause of PCL injury. ➤ Dashboard injury : التي يركب قدام بالسيارة لما يصير فيه تسارع بعده فرملة تروح ركبته تضرب بدرج السيارة فتدخل داخل خصوصاً اللي جالس ٩٠ درجة فتقطع ➤ In athletes >a fall onto the flexed knee with the foot in plantar flexion , which places a posterior force on the tibia and leads to rupture of the PCL.
Complication:	○ PCL insufficiency significantly increased the risk of developing medial femoral condyle and patellar cartilage degeneration over time.
Treatment:	➤ Non operative they do healing without surgical intervention, it won't affect ur performance ➤ Surgical if combined ligament injury, rarely bc it's hard to get there, it doesn't cause frank instability, if it does, we do surgery ➤ if the extensive physiotherapy doesn't succeed we do surgery

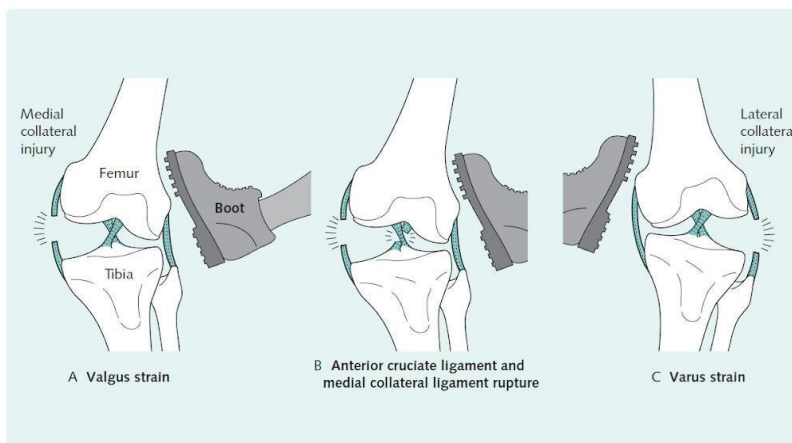


Fig. 24.5 Mechanism of injury in collateral ligament tears.

Injury: MCL الرباط الجانبي الداخلي	
Toronto notes	
Anatomy:	➤ The main function of this complex is to resist valgus and external rotation loads. مكان اللقمنت وخصو صًا لما تسوي السترس تستت موست لايكلي انه حصلها انجري اذا كان في تندر نس في
Occurrence:	➤ The tibial MCL is the Most coMM only injured ligament of the knee.
Mechanism of injury:	➤ Usually result from contact injury like a direct blow to the lateral aspect of the knee.
Associated injuries:	➤ Concomitant ligamentous injuries (95% are ACL) ➤ Concurrent meniscal injuries have been noted in up to 5% of isolated medial ligamentous injuries
Physical examinations:	➤ 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 (ACL). ➤ Rule out associated injuries (ACL and M. Meniscus)



Investigation:	<ul style="list-style-type: none"> ➤ 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 to confirm will be modality of choice. ➤ X Ray: to rule out fracture (lateral tibia plateau fracture)
MCL Treatment: when i have ACL and MCL i will treat ACL surgical and MCL conservative	<ul style="list-style-type: none"> ➤ Conservative Rx: <ul style="list-style-type: none"> ⇒ 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 <u>brace</u> is recommended for <u>complete tear</u>. ➤ Surgical Rx: if failed conservative Rx + complete tear + associated with other ligaments injury

menisci injuries :

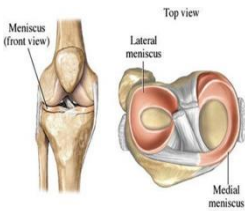
Injury: LCL الرباط الجانبي الخارجي

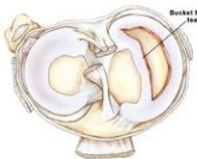
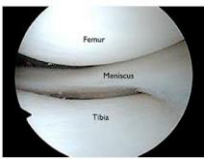



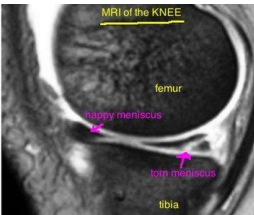

Toronto notes

LCL Function:	➤ The LCL is the primary restraint to varus stress at 5° and 25° of knee flexion.
Occurrence:	➤ Less commonly injuries than MCL
Mechanism of injury:	➤ Varus strain: Injuries to the lateral ligament of the knee most frequently result from motor vehicle accidents and athletic injuries.
Treatment:	<ul style="list-style-type: none"> ➤ Isolated injury: non operative usually the healing in the lateral side of the body is slower than the medial side. ➤ Combined injury: surgical

Meniscal injuries

Toronto notes Kaplan notes

Meniscus anatomy:	<ul style="list-style-type: none"> ➤ 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:	<ul style="list-style-type: none"> ➤ The meniscus provides stability, absorbs shock, increases articular congruity, aids in lubrication, prevents synovial impingement, and limits extremes flexion/extension. ➤ 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. 	

<p>Epidemiology of meniscus injuries:</p>	<ul style="list-style-type: none"> ➤ Meniscus injuries are among the most common injuries seen in orthopaedic practices. ➤ Arthroscopic partial meniscectomy is one of the most common orthopaedic procedures. <div style="display: flex; justify-content: space-around; align-items: center;">     </div> <p> Bucket handle tear Normal Mechanical block Torn (rupture) cartilage </p>
<p>Incidence:</p>	<ul style="list-style-type: none"> ➤ Meniscal 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. In young patients, the meniscus is tough and durable, and it is hard for a person under the age of 25 to tear their meniscus without some element of knee trauma. Usually, this is a weight-bearing, twisting injury. ➤ Middle-aged and older adults can sustain meniscus tears from squatting or falling. As we age, the meniscus cartilage becomes more fragile, and it is possible to tear the meniscus cartilage by simply squatting. ➤ in elderly it's associate with degeneration
<p>History:</p>	<ul style="list-style-type: none"> ➤ With an acute meniscal 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 meniscal injuries localize pain to the joint line or posterior knee and describe mechanical symptoms of locking or catching ➤ pain with deep bending ➤ Chronic meniscal tears demonstrate intermittent effusions with mechanical symptoms
<p>Physical examination:</p>	<ul style="list-style-type: none"> ➤ Small joint effusions and joint line tenderness with palpation are common findings with meniscus tears. palpation with pt. has osteoarthritis isn't useful ➤ Manipulative maneuvers, including the <u>McMurray</u> and <u>Apley tests</u>, 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. one of the mechanical symptoms
<p>Imaging:</p>	<ul style="list-style-type: none"> ➤ Standard knee radiographs should be obtained for evaluating for: <ul style="list-style-type: none"> ⇒ Bone injuries or abnormalities. ⇒ Osteoarthritis. ➤ MRI remains the noninvasive diagnostic procedure of choice for confirming meniscal pathology <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>everything usually looks great on x-ray but its not the same story on MRI</p>  <p>(side view) aka lateral</p> </div> <div style="text-align: center;"> <p>MRI of the KNEE</p>  <p> bucket meniscus torn meniscus femur tibia </p> </div> <div style="text-align: center;"> <p>this is a diagram of what the MRI is showing (its a side view)</p>  <p> femur meniscus tear tibia </p> </div> </div>

Differential diagnosis:	<ul style="list-style-type: none"> ○ 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: <p>Intra-articular possibilities include: osteochondritis dissecans, medial patella plica, patellofemoral pain syndromes, loose bodies, pigmented villonodular synovitis, inflammatory arthropathies, and osteonecrosis.</p> <p>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.</p>
Nonsurgical Management:	<ul style="list-style-type: none"> ➤ Not all meniscus tears cause symptoms, and many symptomatic tears become asymptomatic. ➤ Nonsurgical management include: ice, NSAIDs, or physical therapy for range of motion and general strengthening of the lower extremities. they respond well
Surgical Management:	<ul style="list-style-type: none"> ➤ Surgical indications: <ul style="list-style-type: none"> ⇒ Failure of conservative treatment ⇒ Locked knee ⇒ Concomitant ACL surgery ⇒ no need for surgery unless it disturbs his life *his daily activities not his hobbies* or there is pain or mechanical block? ➤ Type of surgical intervention: <ul style="list-style-type: none"> ⇒ Excision (Arthroscopic partial/subtotal/ or total meniscectomy can cause OA) ⇒ Repair first choice

Knee Dislocation:

Toronto notes

Multiligament Knee Injuries Knee dislocation:

ليه؟ لان بالدسلوكيشن يا انت رايج ميديال او رايج لاترال. انتيريور، بوستييريور، وواحد من الكولاترال: اقل حاجة عندك ثلاث لقمنت راحت

- 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.



Important consideration Neurovascular status:

- 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. **Look for perfusion sign :1-swelling 2-hotness 3 -tenderness**

- 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*the golden period***. 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.



: انا ماهمني كل هالدش اللي يهمني

بعضهم يجون يسحبونها عشان كذا انا لما اشوف ان الركبة رايحة اي اسبوم انها دسلوكيشن انتل بروفن او ذروايز. ليه؟ لان لو شفت الرجل ممتدة حتى لو كان فيها نبض او وورم هذا جاي من الكولاترال اللي مارح يقعد وقت طويل فلازم ع طول اي ادمت هم فور كلوز اوبزرفيشن او اذا كنت لفل 1 ترواما سنتر وعندي الفاسكولار اكسس موجود وبعد الانجيو اتظمن ان الفلزز كلها موجودة هنا اقدر اتظمن واحط له سبلنت واقوله تعال لي ثاني يوم

or I'm very good at ABI which normally will be 0.8-1.2 * around the neck of the fibula *
فخوفي من الفاسكلار انجري والشيء الثاني لو راحت الركبة لاترال خوفي من الكومون بيرونيال نيرف انجري

- golden period is 6 hrs or you'll have irreversible damage

Management: u should do prophylactic fasciotomy

- **NEED EMERGENT REDUCTION do not wait for investigations**

⇒ emergent closed reduction and splinting or bracing should be performed immediately. Post reduction radiographs should be taken to confirm knee reduction.



ankle sprain:

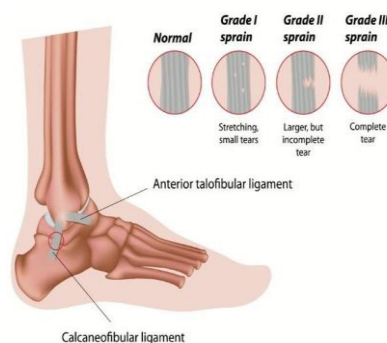
Characteristics:

- Ankle sprain is a common sports related injury. more than ACL
- Lateral sprains accounting for 85% of all such injuries.
- we have something called anterior fibular ligament which is more common to be injured than the ACL. especially in female but they can live with it to the point that the stress start to develop upon the bones so she can't handle it anymore.
- females more common bc of laxity and high heel shoes



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:

- History suggestive of **inversion** injury: bad habit like wearing heels which will eventually lead to irreversible damage



Physical examination:

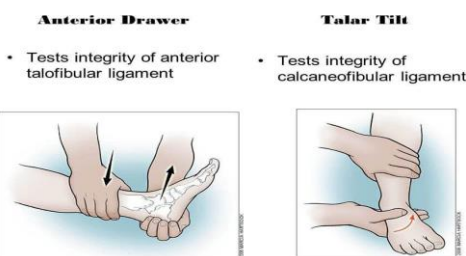
- Localized tenderness, swelling, and ecchymosis **over the lateral ankle.**

طبيعي لانه ماتخوف تطلع اللي هالالوان القرافيتي كلها عليها وهي اخر منطقة موجودة ما في شي يرجعها وبتروح بنفسها اذا مرة ماتقدر تتحمل المنظر تلبس شراب لا ليزر ولا شيء



Special tests:

- ⇒ The anterior drawer test may demonstrate anterior talar subluxation.
- ⇒ The talar tilt stress test may demonstrate positive tilt to inversion stress.



➤ Treatment:

- **Non-surgical management:** for any ankle sprain u should start with Conservative management which consists of four things (RICE-proper shoes - brace - physiotherapy)
 - ⇒ 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 management:** Surgery is a reasonable option when an adequate trial of nonsurgical treatment fails to control symptoms for grade III.



Extra Tables will help you in taking history of a knee injury

Table 4-2 Key Historical Points That Indicate Mechanism of Injury	
HISTORY	SIGNIFICANCE
Pain after sitting or climbing stairs	Patellofemoral cause
Locking or pain with squatting	Meniscal tear
Noncontact injury with "popping" sound/sensation	ACL tear, patellar dislocation
Contact injury with "popping" sound	Collateral ligament tear, meniscal tear, fracture
Acute swelling	ACL tear, peripheral meniscal tear, osteochondral fracture, capsule tear
Knee "gives way"	Ligamentous laxity, patellar instability
Anterior force: dorsiflexed foot	Patellar injury
Anterior force: plantar-flexed foot	PCL injury
Dashboard injury	PCL or patellar injury
Hyperextension, varus angulation, and tibial external rotation	Posterolateral corner injury

Table 3-1. History of a Knee Injury.	
Did an injury occur?	Yes: possible ligament tear or meniscus tear. No: overuse problem or degenerative condition.
Was it a noncontact injury?	Yes: often the ACL is the only ligament torn.
Was it a contact injury?	Yes: possible multiple ligament injuries, including ACL and MCL, ACL and LCL, ACL, PCL, and a collateral ligament.
Did the patient hear or feel a pop?	Yes: a pop often occurs with ACL tears.
How long did it take to swell up?	Within hours: often an ACL tear. Overnight: often a meniscus tear.
Does the knee lock?	Yes: often a meniscus tear flipping into and out of the joint.
Does it buckle (trick knee)?	Yes: not specific; may arise from quadriceps weakness, trapped meniscus, ligament instability, or patella dislocating.
Is climbing or descending stairs difficult?	Often patellofemoral problems.
Are cutting maneuvers difficult?	ACL tear.
Is squatting (deep knee bends) difficult?	Meniscus tear.
Is jumping difficult?	Patellar tendinitis.
Where does it hurt?	Medial joint line: medial meniscus tear or medial compartment arthritis. MCL: MCL sprain. Lateral joint line: lateral meniscus tear, injury, iliotibial band tendinitis, popliteus tendinitis.

MCQ and SAQ

Check the [MCQs & SAQ](#)

Summary

Check the [Summary](#)