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Lower Extremity Injuries in sport



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Hip Injuries

- Femoro Acetabular Impingement (FAI)
- Labral Tears
- Slipped Capital Femoral Epiphysis
- Avulsion Fractures
- 'Groin injuries'



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Hip Injuries

- **Femoro-acetabular impingement (FAI)**
- **3 main types:**

- **Pincer.** This type of impingement occurs because extra bone extends out over the normal rim of the acetabulum. The labrum can be crushed under the prominent rim of the acetabulum.
- **Cam.** In cam impingement the femoral head is not round and cannot rotate smoothly inside the acetabulum. A bump forms on the edge of the femoral head that grinds the cartilage inside the acetabulum.
- **Combined.** Combined impingement means that both the pincer and cam types are present.

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Femoro-Acetabular Impingement



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Hip Injuries

- **Femoro-acetabular impingement (FAI)**
 - Likely to occur due to repeated contact between the Acetabulum and the Femur
 - This will in the short term cause synovitis and associated pain
 - In the longer term it may cause Labral tears and progressive damage to the articular surface
 - OA has been thought to be a progression of FAI, however CAM lesion is often regarded as a deformity thus not necessarily caused by sport



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Hip Injuries

- **Femoro-acetabular impingement (FAI)**
 - **History**
 - **Symptoms are often insidious**
 - Intermittent anterior hip pain
 - Lateral trochanteric pain (or both)
 - Pain may be referred to the low back, gluteal region or knee
 - **20-50 years of age (Average age: 33-35 years)**
 - **Increases with activity, especially flexion and rotation**
 - **Feels stiff and difficult to stretch**



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Slide 5

ua1 This in the short term will
cause synovitis and associated
pain

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Hip Injuries

History contd.

- **Femoro-acetabular impingement (FAI)**
- **As labrum and articular cartilage degenerate, symptoms gradually worsen, exacerbated by:**
 - continued athletic activity
 - prolonged sitting
 - prolonged walking



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Hip Injuries

History contd.

- **Dull ache or a sharp pain in the anterior groin**
- **Episodes of catching, locking or giving way**
these findings are pathognomonic for labral pathology
- **Feeling of discomfort or apprehension**
especially with prolonged sitting when the seat is low



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Hip Injuries

- **Femoro-acetabular impingement (FAI)**
 - **Examination:**
 - **Decreased internal rotation, often asymptomatic**
 - **If athlete is symptomatic – pain on flexion and internal rotation**
 - **Investigation/Imaging**
 - **X-Ray or CT**
 - **For Labrum : MRI and MRI Arthrography**



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Hip Injuries

- **Femoro-acetabular impingement (FAI)**

FADIR test

The FADIR (flexion, adduction, and internal rotation) test is a passive motion test to help diagnose hip impingement. The patient lies on his or her back, with the legs straight and relaxed, then:

1. The doctor raises the affected leg so that the knee and hip are bent at 90 degrees.
2. Supporting the knee and ankle, the doctor gently pushes the entire leg across the midline of the patient's body (adduction).
3. While keeping the knee in position, the doctor moves the foot and lower calf away from the body (abduction).

People who have hip impingement typically feel pain during step three. Some people who do not have hip impingement also experience pain during this test, so the doctor may examine the unaffected hip for comparison.



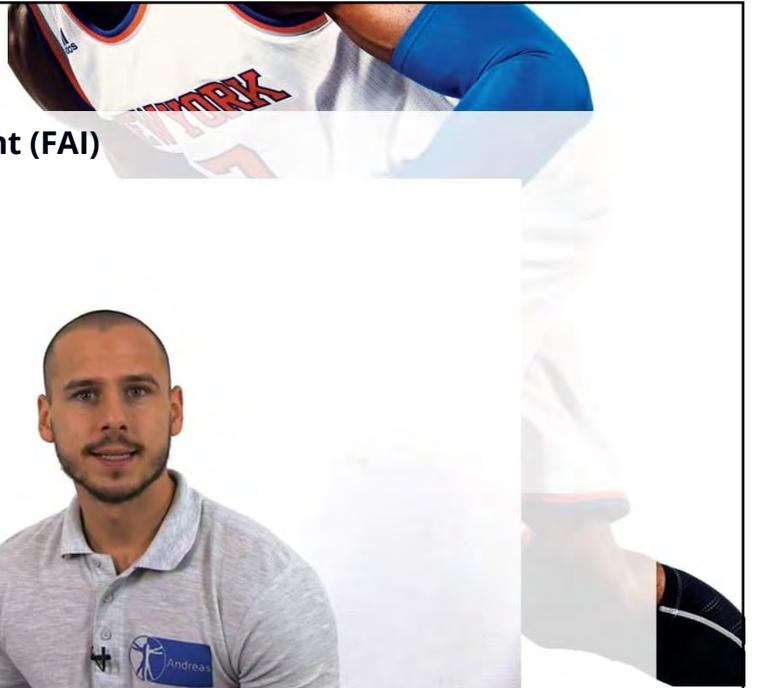
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Hip Injuries

- Femoro-acetabular impingement (FAI)



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Hip Injuries

- Femoro-acetabular impingement (FAI)
 - Other tests includes
 - McCarthy
 - Faber



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Hip Injuries

- Femoro-acetabular impingement (FAI)

- Other tests i

- McCarthy
- Faber



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Hip Injuries

FAI - AP Radiographic Exam



- ▶ AP pelvis provides visualization of the contour of the lateral femoral head-neck junction
- ▶ Should be routinely evaluated for the:
 - ▶ Cam lesion
 - ▶ pistol-grip or tilt deformity
 - ▶ Acetabular protrusion
 - ▶ Acetabular retroversion
 - ▶ Pincer lesion
 - ▶ Excessive arching of the acetabular roof

Jarosz 2012 - Cam and Pincer lesion



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Hip Injuries

FAI - Lat Radiographic Exam



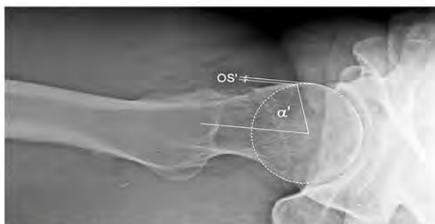
Jarosz 2012 - Cam and Pincer lesion

- ▶ Lateral hip view will allow visualization of:
 - ▶ Subchondral sclerosis
 - ▶ Early subchondral cyst formation within the anterior acetabular rim
 - ▶ Joint space narrowing
 - ▶ Acetabular overcoverage of the femoral head.

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Hip Injuries

FAI - Lat Radiograph Alpha Angle



Jarosz 2012 - Alpha Angle - Normal above, increased below

- ▶ FAI can be further quantified on the lateral hip view, through measurement of the alpha angle.
- ▶ A line is drawn along the axis of the femoral neck and a second line drawn from the centre of the femoral head through the femoral head-neck junction.
- ▶ It has been concluded that an alpha angle of greater than or equal to 55° is an indicator of FAI.

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ua4 0 G Running

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Hip Injuries

- ▶ Jarosz BS. Femoroacetabular impingement and its relevance to chiropractors. Part I: a commentary. Chiropr J Aust. 2012;42(3):91-97
- ▶ Jarosz BS. Femoroacetabular impingement and its relevance to chiropractors. Part 2: a case series. Chiropr J Aust. 2012;42(4):126-136



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Hip Injuries

- **Femoro-acetabular impingement (FAI)**
 - **Treatments:**
 - **Modify activities (decrease loading activities)**
 - **Hip Mobility (Stretches)**
 - **Increase hip strength, Proprioception**
 - **Rest**
 - **NSAIDS**
- **If no response in 3 months, consider surgery i.e. osteoplasty (FIFA)**



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ua3 Pool workouts

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Hip Injuries

Labral Tears

- **FAI and developmental dysplasia of the hips have both been shown to increase the likelihood of labral tears.**
- **They usually develop gradually due to repetitive micro trauma**
- **Around 25% occur from a single event trauma i.e hip dislocation, RTA, hard fall onto the hip.**



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Hip Injuries

Labral Tears

- **History taking is important:**
- **Pain and mechanical symptoms - deep and localised pain in the anterior groin/inguinal region**
 - May refer to medial thigh, Greater Trochanter or buttock
- **Episodes of sharp pain on pivoting or twisting**
- **Catching on getting up from sitting**



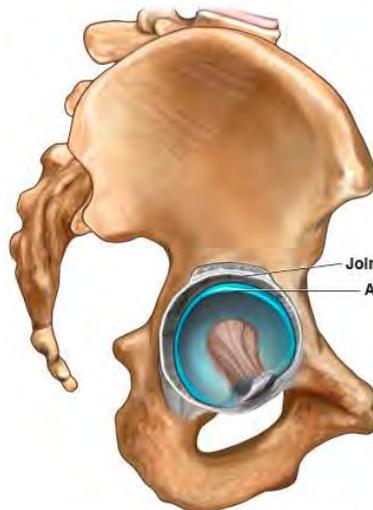
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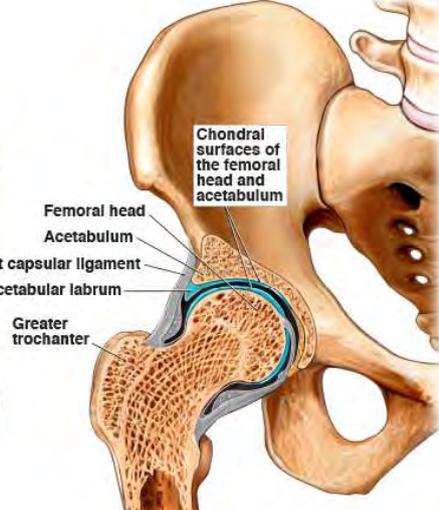
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Hip Injuries

Anatomy of the Hip and Acetabular Labrum



Lateral (side) view with femur removed of right hip and acetabulum



Anterior (front) cut-away view of right hip and acetabulum



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Hip Injuries

Labral Tears

- **Examination**
 - Pain on combined Flexion, Adduction and Internal rotation
 - FABER
 - FADIR
 - McCarthys



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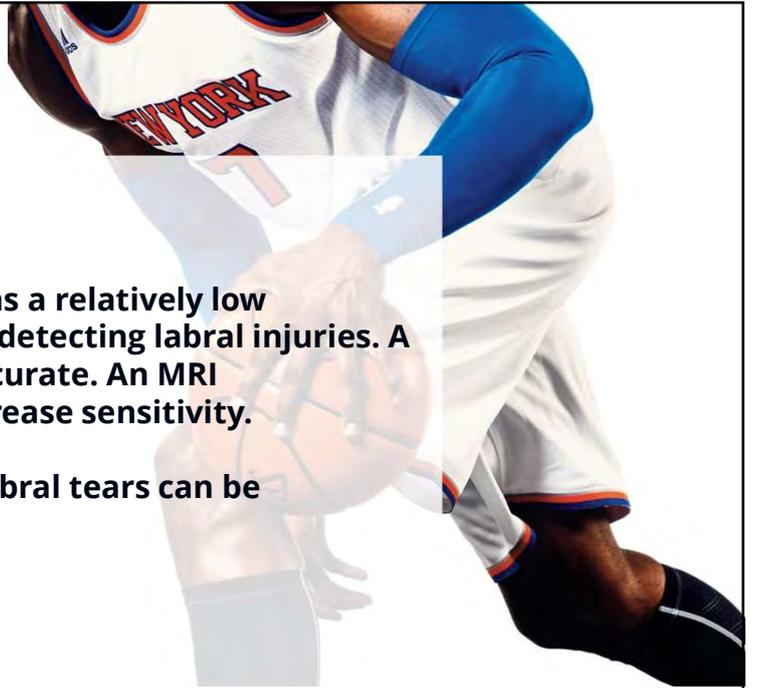
Hip Injuries

Labral Tears

Imaging:

X-Rays or MRI. Pelvic MRI has a relatively low specificity and sensitivity for detecting labral injuries. A dedicated hip MRI is more accurate. An MRI arthrography will further increase sensitivity.

We need to remember that labral tears can be asymptomatic



Hip Injuries

Labral Tears



Hip Injuries

Labral Tears

- Treatment
- Can respond to conservative treatment if there is little or no FAI involved
- A trial of altered loading, hip strengthening and proprioceptive exercises would be appropriate in most cases.
- Surgery can be successful if the bony issues for FAI are addressed at the same time (FIFA)



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Hip Injuries

Slipped Capital Femoral Epiphysis

- Usually happens in early adolescence ~12-15 y.o.
- Often either overweight or tall and thin
- A gradual onset of hip and knee pain
- In early stages there may only be pain on walking and passive hip movements
- If patient cannot weight bear - need more intense management
- X-rays; AP and Frogleg
- Usually need surgical fixation



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Hip Injuries

Avulsion fractures of the pelvis

- Relatively common in the adolescent athlete, due to the relative weakness of the apophysis compared with the tendon.
- Can occur when an explosive muscular contraction, such as sprinting, kicking or jumping causes the tendon to pull at the apophysis and cause a separation of the apophysis from the bone.
- Males are affected more often than females.



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Hip Injuries

Avulsion Fractures of the Pelvis

ossification and fusion		
apophysis	appears	closes
iliac crest	13-15	21-25
anterior superior iliac spine	13-15	21-25
anterior inferior iliac spine	13-15	16-18
ischial tuberosity	13-15	20-25
lesser trochanter	9-13	15-17



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Hip Injuries

Avulsion fractures of the pelvis

- The most frequently affected sites are the Anterior Superior Iliac Spine, Anterior Inferior Iliac Spine, and Ischial Tuberosity.
- Avulsion fractures accounts for up to 16% of sports injuries in kids (BMB)

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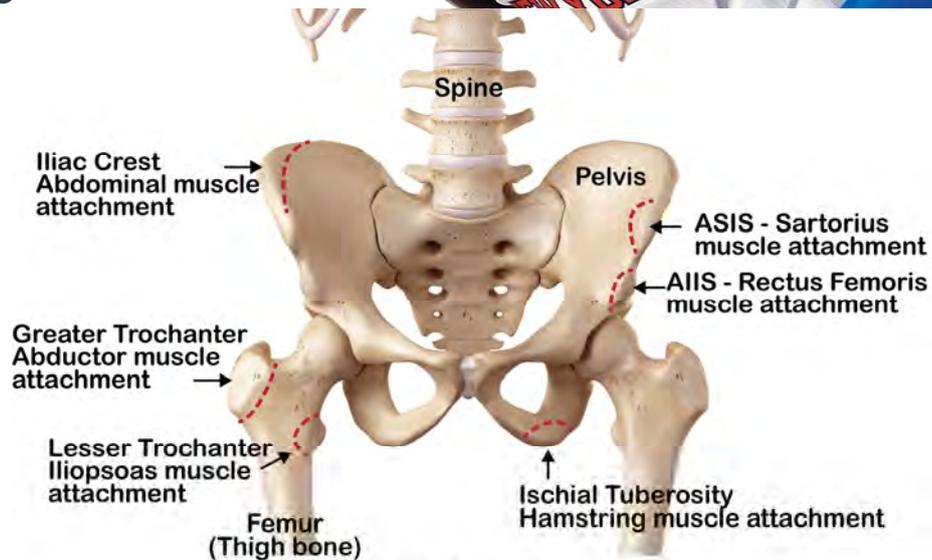


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Hip Injuries



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ua6 Rossi F, Dragoni S. Acute avulsion fractures of the pelvis in adolescent competitive athletes: prevalence, location and sports distribution of 203 cases collected. *Skeletal Radiol* 2001;30:127-31.

user account40, 3/06/2021

Hip Injuries

Avulsion Fractures of the Pelvis

- The adolescent patient will present with a history of a sudden pain during forceful muscle contraction, for example whilst kicking a ball, sprinting, or doing gymnastics.
- It may be associated with a 'popping' sound or sensation.
- The acuity of this history helps make the diagnosis

On examination the patient will have local tenderness and pain at the site exacerbated by passive stretching or activity (or active contraction) of the associated muscle groups and is relieved by rest. British Medical Bulletin Dec 2016



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Hip Injuries

Avulsion Fractures of the Pelvis

X-rays are excellent in visualising the fractures

Treatment: Usually surgical intervention is not needed. Rest and a gradual recovery/rehabilitation programme is needed

If displacement is more than 30mm surgical fixation should be considered



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ua5 Apophyseal injuries in
children's and youth sports
Umile Giuseppe Longo, Mauro
Ciuffreda, Joel Locher, Nicola
Maffulli, Vincenzo Denaro
British Medical Bulletin, Volume
120, Issue 1, 1 December 2016,
Pages 139–159,
user account40, 3/06/2021

Hip Injuries



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Hip Injuries



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Hip Injuries

Avulsion Fractures of the Pelvis

- **Prevention**
 - **Involvement of sport coaches is important too: training loads should be reduced during the rapid growth period. This period may be identified through careful and correct measurements of the height of the young athlete, possibly every 3 months. Training programmes should involve the use of a variety of drills and activities, avoiding repetitive movements responsible for overuse injuries. Quality of workout is more important than training volume. (BMB)**



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Hip Injuries

“Groin Injuries”

- **According to the World Conference of Groin Pain in Athletes in 2014: We need a systematic approach**
- **Location of pain:**
 - **Anterior (mid portion of thigh is often Ilio-Psoas**
 - **Medial Groin often Adductors**
 - **Groin and Buttock, could indicate hip**
 - **Posterior groin, Posterior hip or Lowback**
 - **Stress fractures are rare but possible Femoral Neck or Pubic bone**



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Hip Injuries

“Groin Injuries”

- **Injury Mechanism**
 - High force, subtle, sound, ‘had to stop’
- **Training History**
 - If no acute pain/injury
 - Changes to volume, equipment
- **Systemic Changes**
 - Weight loss, fatigue, fever, recent infections (Synnovitis or malignancy)



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Hip Injuries

“Groin Injuries”

- **Examination**
 - Movement, palpation of all muscles, strength, stability, flexibility, basic neuro examination, check groin, lower extremity and low back.
- **Investigation**
 - X-ray, MRI, Ultrasound
 - Especially consider MRI in acute injuries and suspecting avulsions/growth plate injuries



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Hip Injuries

"Groin Injuries"

Adductor related

- **History:** often longstanding medial groin pain, often down medial thigh
- **Examination:** Sharp pain to palpation, pain on resisted adduction (Supine extended legs)
- **Investigation if suspect tear or non responding to treatment:** X-ray, MRI, Ultrasound
- **Treatment:** strength gradual build up, dynamic stabilisation of the pelvis.
- **Often 6-12 weeks RTP**



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Hip Injuries

"Groin Injuries"

Ilio-Psoas related

- **History:** Flexion and External rotation of the hip most painful, problem sprinting and kicking, Pain in the anterior groin
- **Examination:** Pain on palpation of the lower abdomen, inferior Inguinal ligament and anterior hip. Pain Thomas Test, decreased strength (90° hip flexion)
- **Investigation:** MRI or Ultrasound
- **Treatment:** No evidence based treatment, strength and stability, pelvic function.



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Hip Injuries

“Groin Injuries”

Inguinal related

- **History:** Groin pain, often abdominal pain or pubic tubercle. Many times no pain on adductor tests, often pain on increased abdominal pressure
- **Examination:** Pain on palpation of the abdomen and inguinal canal, especially on or near the bony insertion, Compare sides.
- **Investigation:** Possibly MRI or Ultrasound
- **Treatment:** Pelvic stability, occasionally surgery

Hip Injuries

“Groin Injuries”

Pubic related

- **History:** Generally central groin pain, occasionally the adductor region, often a diffuse pain.
- **Examination:** Localised tenderness on Symphysis Pubis
- **Investigation:** X-ray or MRI
- **Treatment:** Rehabilitation, Pelvic strength and stability
- **Commonly in kicking sports there can be radiological changes with no pain**

Hip Injuries

Sports Related Groin Pain, Return to play (FIFA)

- Very common in many sports
- The goal is to return the athlete to sport without putting them at risk for injury.
- Soft tissues and bones should have been healed
- Gait should be normalised
- Full pain-free motion
- Full strength
- Muscle length within normal ranges
- Joint stability should be good
- No effusion or Pain



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Hip Injuries

Sports Related Groin Pain, Return to play (FIFA)

- Phase 1
 - When athlete can weight bear
 - Very Basic sports specific warm ups



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Hip Injuries

Sports Related Groin Pain, Return to play (FIFA)

- Phase 2
 - Increase intensity of exercises and increase duration of aerobic exercises.
 - Perform individualised sports specific movements



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Hip Injuries

Sports Related Groin Pain, Return to play (FIFA)

- Phase 3
 - Individual and partner work
 - Increase to 60 minutes conditioning and increase intensity
 - Some interval work - No contact



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Hip Injuries

Sports Related Groin Pain, Return to play (FIFA)

- Phase 4
- Team drills - No contact
- Conditioning exercises may resume



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Hip Injuries

Sports Related Groin Pain, Return to play (FIFA)

- Phase 5
- Full practice and contact
- A full sports "cycle or event" should be simulated before returning to competitions



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Hip Injuries

Sports Related Groin Pain, Return to play (FIFA)

Prevention

'Promising' results on building strength of hips especially Adductors

Limit/manage training volume especially during periods of rapid growth



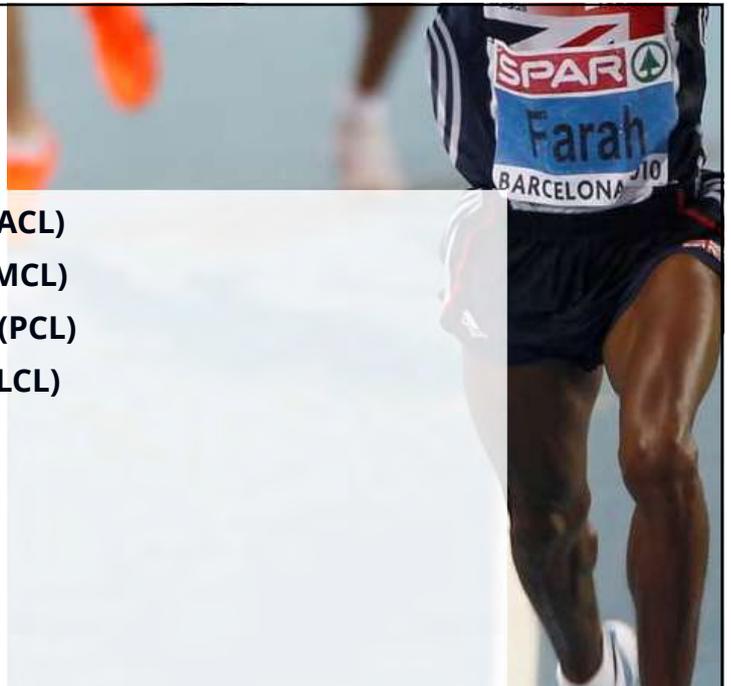
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Knee Injuries

- **Anterior Cruciate Ligament (ACL)**
- **Medial Collateral Ligament (MCL)**
- **Posterior Cruciate Ligament (PCL)**
- **Lateral Collateral Ligament (LCL)**
- **Patella-Femoral Maltracking**
- **Patellar Tendinopathies**
- **Patellar Dislocation**
- **Osgood-Schlatter**



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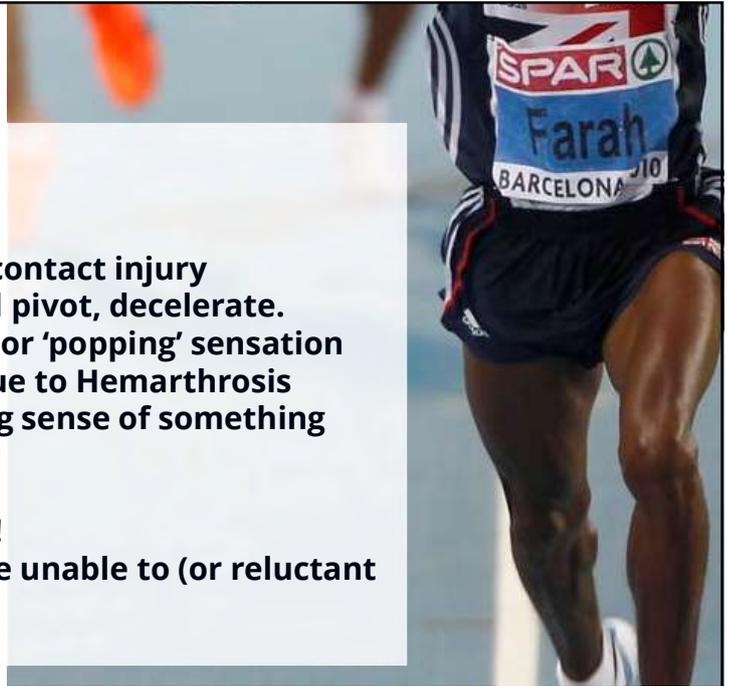
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Knee Injuries

Anterior Cruciate Ligament (ACL)

History

- Often no significant trauma – non-contact injury
 - Typically a twisting injury; land and pivot, decelerate.
 - Often accompanied by a ‘snapping’ or ‘popping’ sensation
 - Usually extensive, rapid swelling due to Hemarthrosis
 - The athlete often describes a strong sense of something ‘going out of place’
- All or none of these can be present!
 - Pain is variable but the majority are unable to (or reluctant to) weight bear after the injury



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Knee Injuries

Anterior Cruciate Ligament (ACL)



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Knee Injuries



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Knee Injuries

Anterior Cruciate Ligament (ACL)

- Examination
 - Most useful tests are :
 - Lachmans
 - Anterior Drawer
 - Pivot shift

Always compare sides



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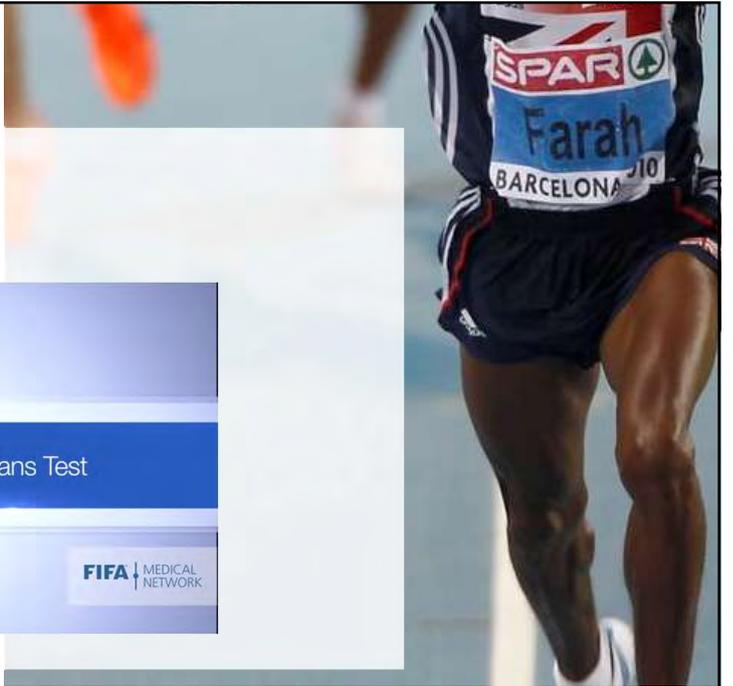
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Knee Injuries

Anterior Cruciate Ligament (ACL)

Lachmans



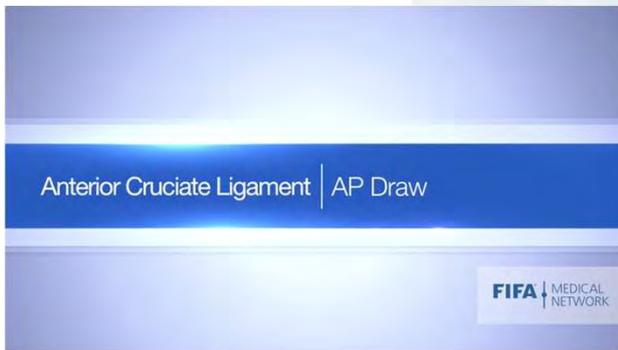
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Knee Injuries

Anterior Cruciate Ligament (ACL)

Anterior Drawer



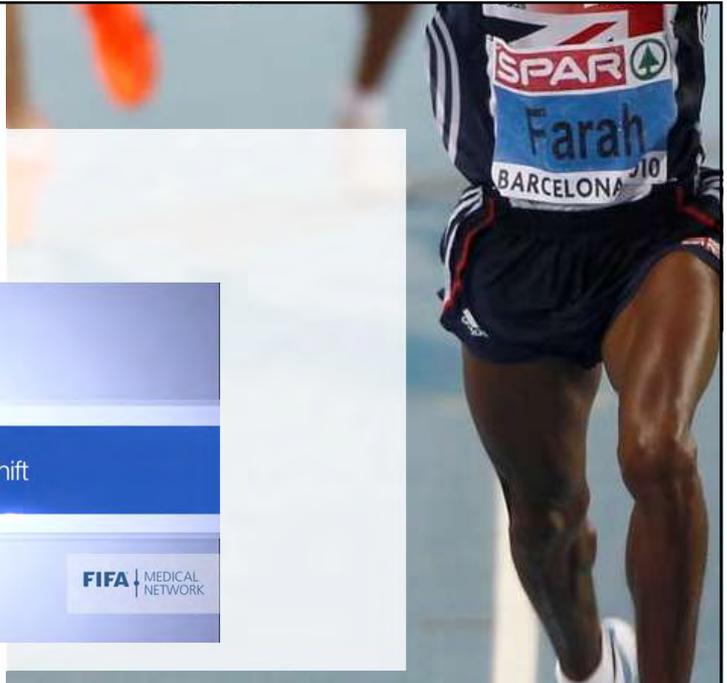
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Knee Injuries

Anterior Cruciate Ligament (ACL)

Anterior Pivot



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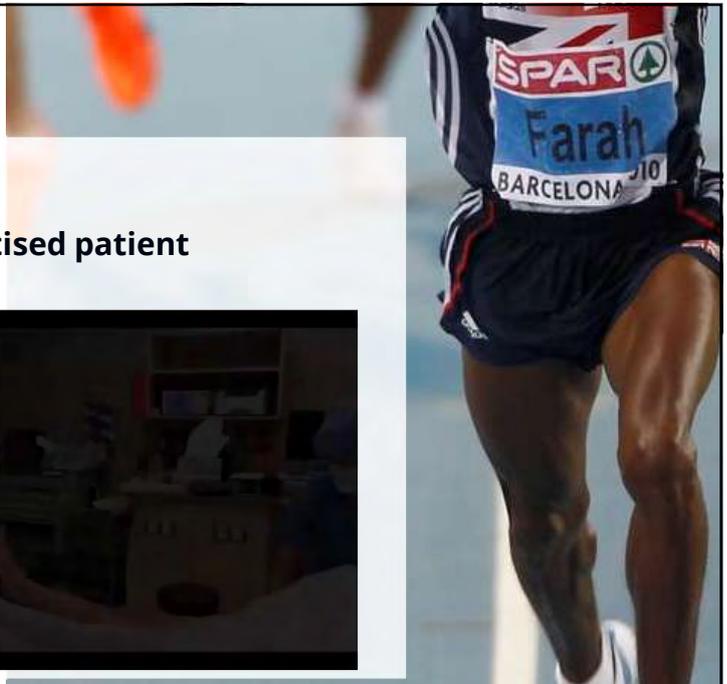
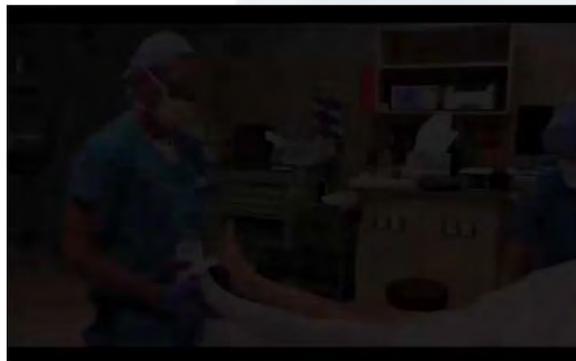
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Knee Injuries

Anterior Cruciate Ligament (ACL)

Examination of torn ACL in anaesthetised patient



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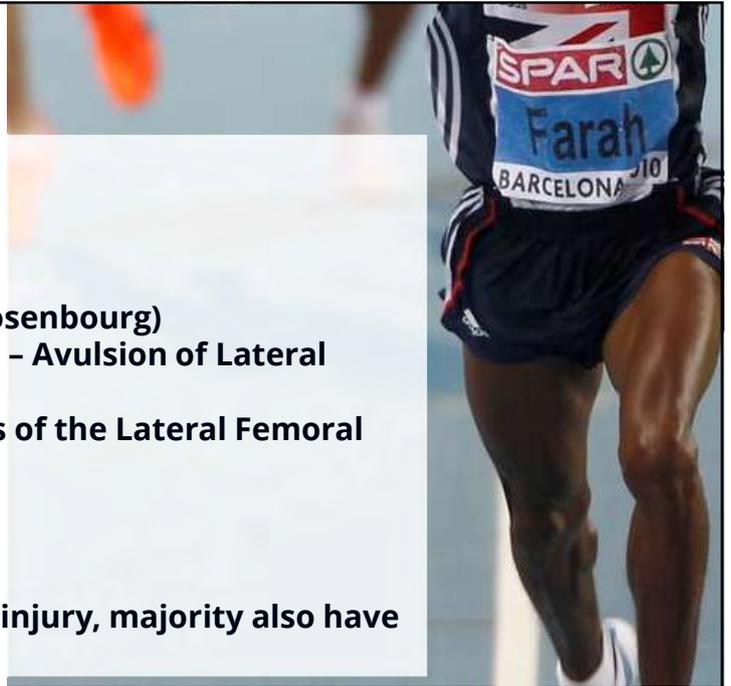
Knee Injuries

Anterior Cruciate Ligament (ACL)

Investigations:

- X-Rays (AP, Lateral, Skyline and Rosenbourg)
 - On AP check for Segond fracture – Avulsion of Lateral Tibial Plateau
 - Lateral – check for impact sulcus of the Lateral Femoral Condyle
- MRI

Uncommon to have an isolated ACL injury, majority also have bone bruising and meniscal injury



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Knee Injuries

Anterior Cruciate Ligament (ACL)

Treatment:

The ACL does not heal, especially due to it's intra articular location and predispose to instability.

Key goal is to restore a sense of stability – some people manage very well without surgery, especially people who do not do quick change of direction sports



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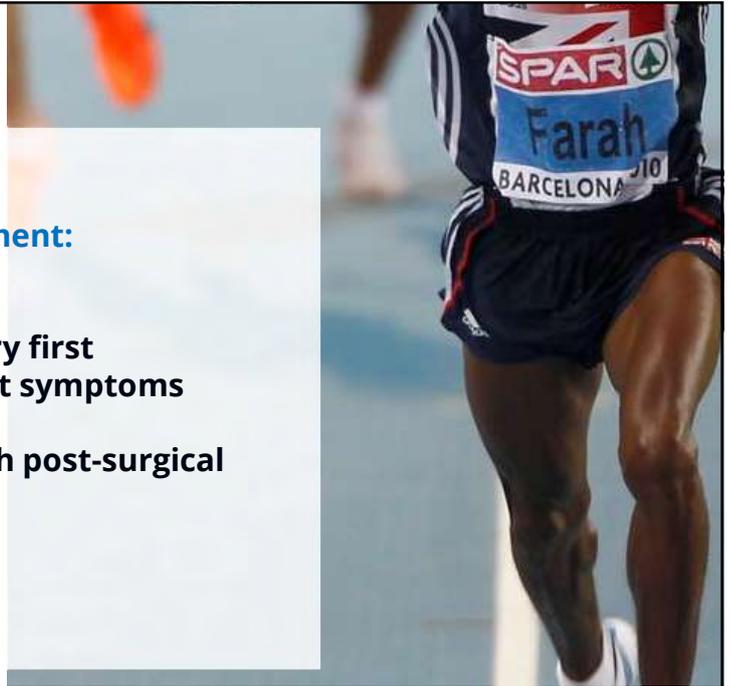
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Knee Injuries

Anterior Cruciate Ligament (ACL)

Indications for non-surgical management:

- The knee is stable
- Patient has a desire to avoid surgery first
- Prepared to modify activities to suit symptoms
- Less physically active patients
- Likely to have poor compliance with post-surgical rehab



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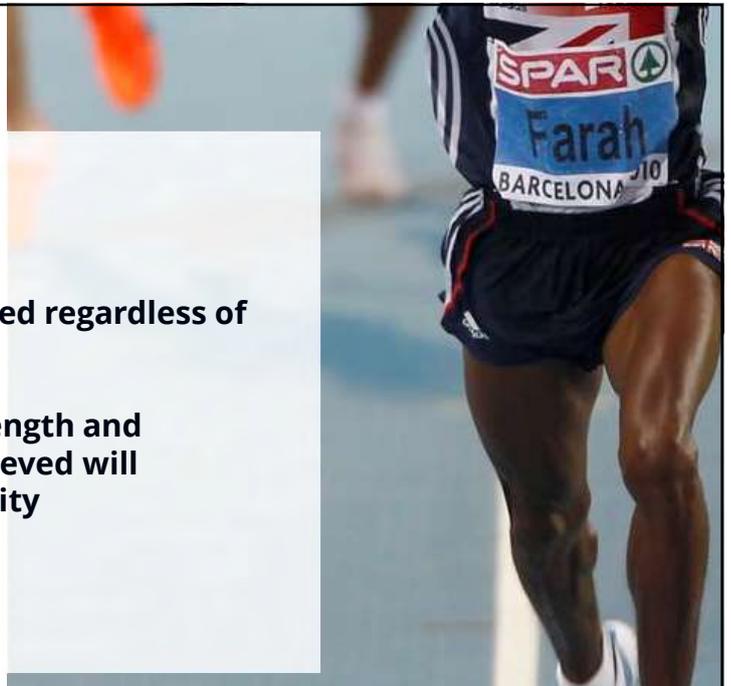
Knee Injuries

Anterior Cruciate Ligament (ACL)

Rehab:

A comprehensive programme is needed regardless of treatment

If return to play before adequate strength and neuromuscular control has been achieved will predispose athlete to further instability



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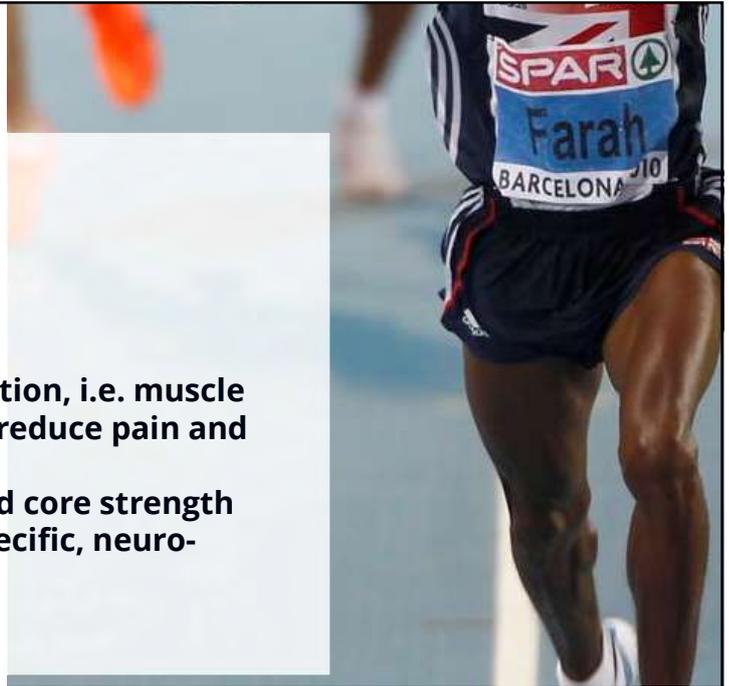
Knee Injuries

Anterior Cruciate Ligament (ACL)

Rehab:

Generally 4 phases:

1. Protected and controlled mobilisation, i.e. muscle stimulation of the Quadriceps, to reduce pain and swelling and restore AROM
2. Controlled training; lower limb and core strength
3. More intensive training, sports specific, neuromuscular retraining,
4. Return to Play



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Knee Injuries

Meniscal Injuries

Very high prevalence; up to 15% of all sports injuries

FIFA say 8% of all football injuries are meniscal

70% are medial meniscus

Healthy articular cartilage is necessary for optimum function in the knee joint. Damage affects the athletes ability to compete and predispose to further joint degeneration and possible OA



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Knee Injuries

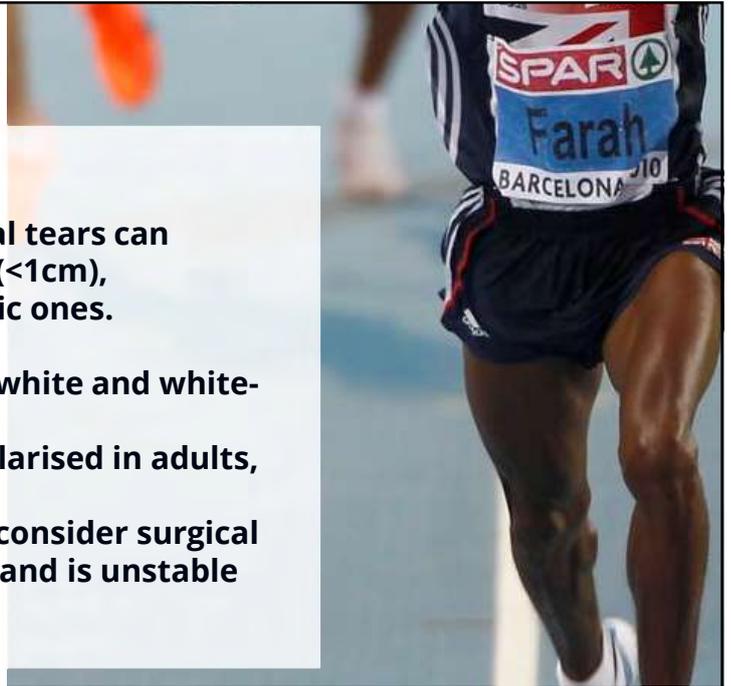
Meniscal Injuries

It has been shown that some meniscal tears can spontaneously heal, especially short (<1cm), longitudinal, stable and asymptomatic ones.

3 circumferential zones: red-red, red-white and white-white.

Only the peripheral 10-25% are vascularised in adults,

If a locked knee is presented, should consider surgical repair as it goes across several zones and is unstable



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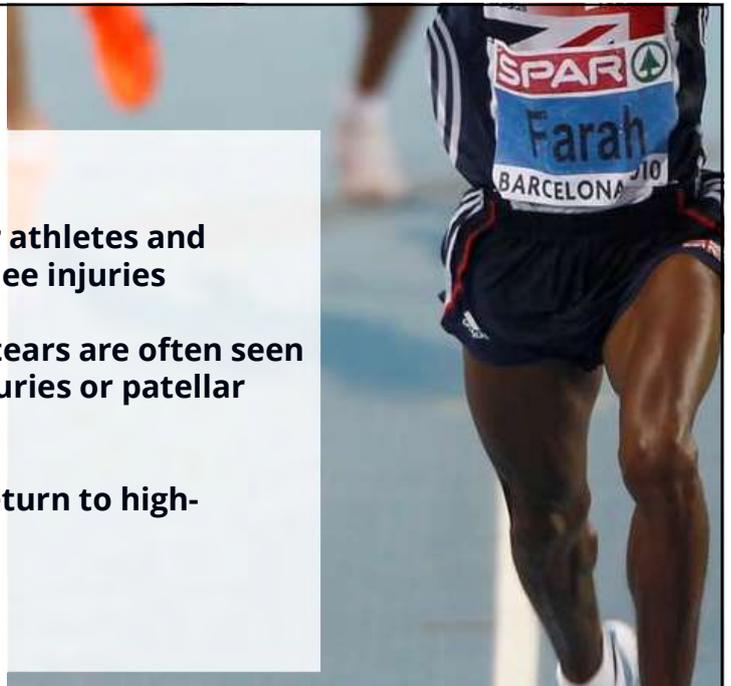
Knee Injuries

Meniscal Injuries

Prevalence is higher in females, older athletes and athletes with a history of previous knee injuries

Both chondral injuries and meniscal tears are often seen in association with knee ligament injuries or patellar dislocations.

Approximately 75% of athletes will return to high-impact activities (non-surgical)



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Knee Injuries

Meniscal Injuries

Mode of injury:

Usually from a shearing injury or high compressive loads.

Often twisting is involved.

Risk factors:

Tackling, land after jump, kick to knee, diving for the ball, over rotation of knee, rapid and repetitive stepping or squatting on an uneven surface..

In younger athletes it is usually caused by trauma



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Knee Injuries

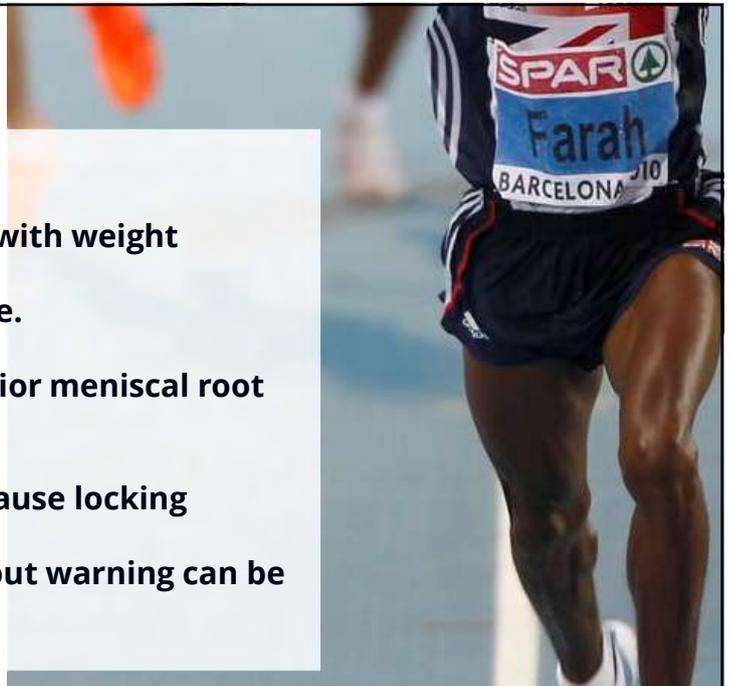
Meniscal Injuries

Pain is intermittent - typically occur with weight bearing, squatting, twisting, cutting.
Usually localised to medial joint space.

Posterior pain can occur if the posterior meniscal root tears.

A displaced Bucket-handle tear can cause locking

Instability; the knee giving way without warning can be a sign of an unstable meniscal tear



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Knee Injuries

Meniscal Injuries

Examination:

Look for effusion

Check ROM

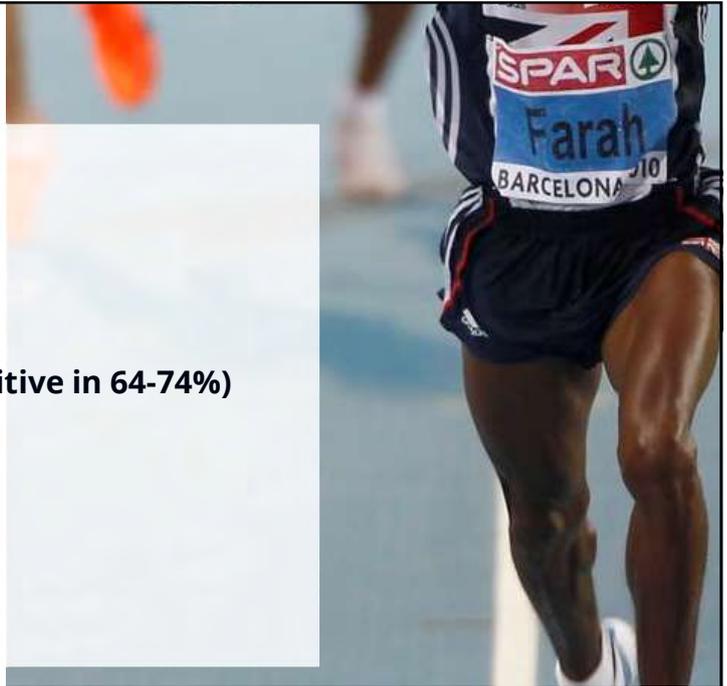
Palpate joint line for tenderness (positive in 64-74%)

Tests are specific but not sensitive;

Thessaly

McMurrays

Grind

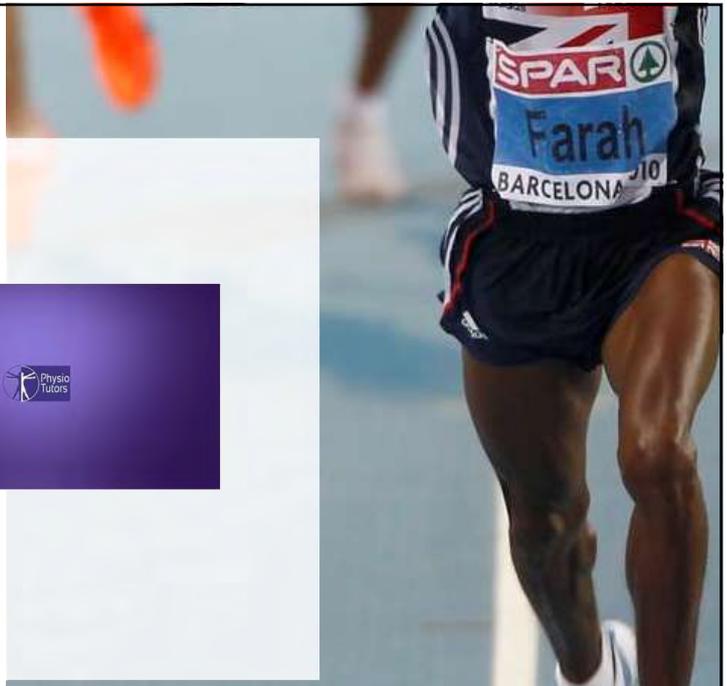


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Knee Injuries

Meniscal Injuries



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Knee Injuries

Meniscal Injuries

Meniscus | McMurray Test

FIFA | MEDICAL NETWORK



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Knee Injuries

Meniscal Injuries

Meniscus | Grind Test

FIFA | MEDICAL NETWORK



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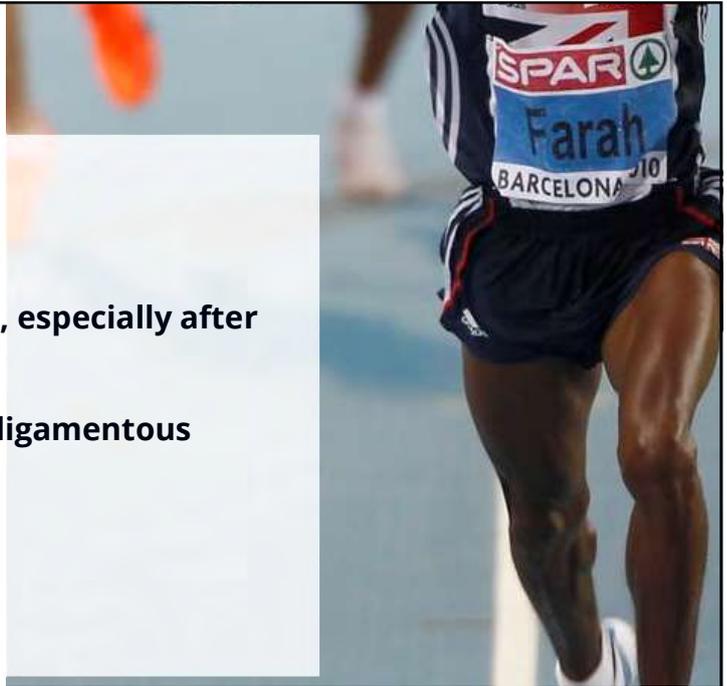
Knee Injuries

Meniscal Injuries

Investigations

Investigation of choice is an MRI scan, especially after trauma.

This will also identify and associated ligamentous injuries or bone bruising



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Knee Injuries

Meniscal Injuries



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Knee Injuries

Meniscal Injuries

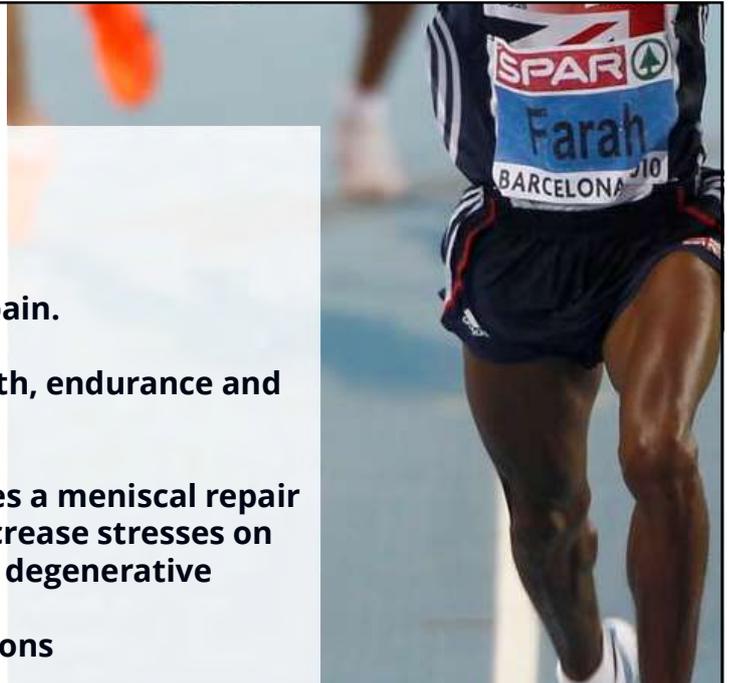
Treatment/Rehabilitation

Avoid or decrease activities causing pain.

Rehabilitation programme for strength, endurance and proprioception

Surgery: especially in younger athletes a meniscal repair is the way forward as excision will increase stresses on the rest of the cartilage and promote degenerative changes

Research is still looking at PRP injections



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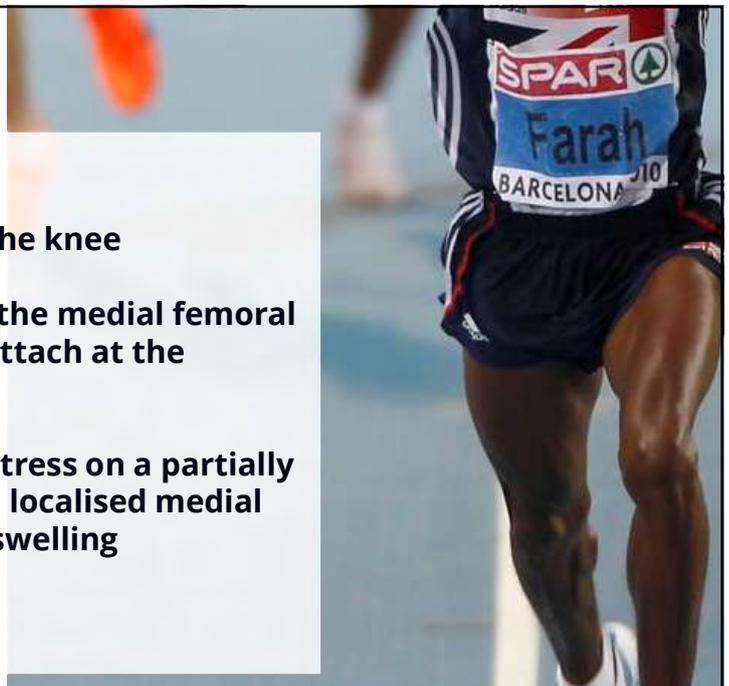
Knee Injuries

Medial Collateral Ligament (MCL)

Most commonly injured ligament in the knee

Originates from the lateral aspect of the medial femoral condyle, then passes downwards to attach at the antero-medial aspect of the Tibia

Injury primarily due to acute valgus stress on a partially flexed knee. Giving an acute onset on localised medial joint pain, sometimes with localised swelling



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Knee Injuries

Medial Collateral Ligament (MCL)

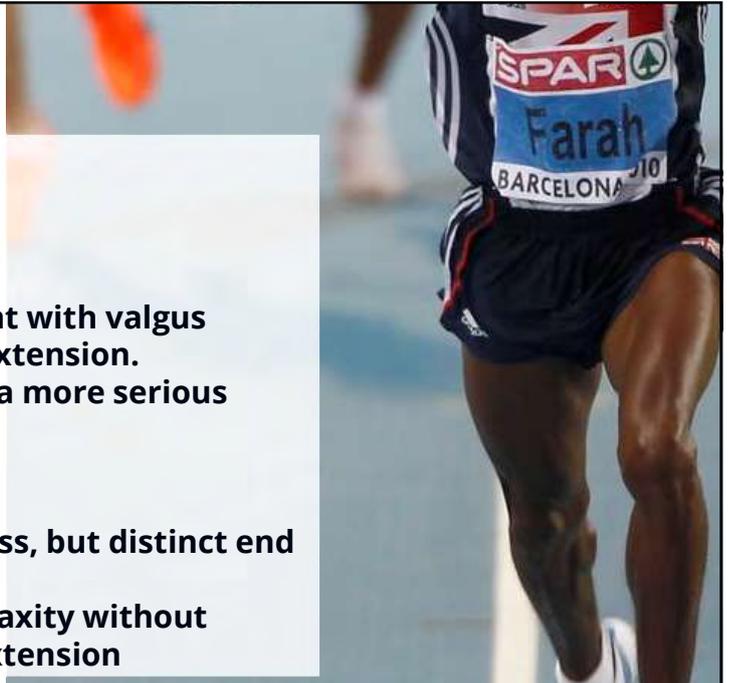
Examination:

Graded on the degree of laxity present with valgus stress. Assess in 30° flexion and full extension. If laxity on full extension it indicates a more serious injury

Gr I: mild localised tenderness

Gr II: Moderate – laxity on valgus stress, but distinct end point and no laxity in full extension

Gr III: More variable tenderness and laxity without endpoint. Laxity in 30 ° flexion and extension



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Knee Injuries

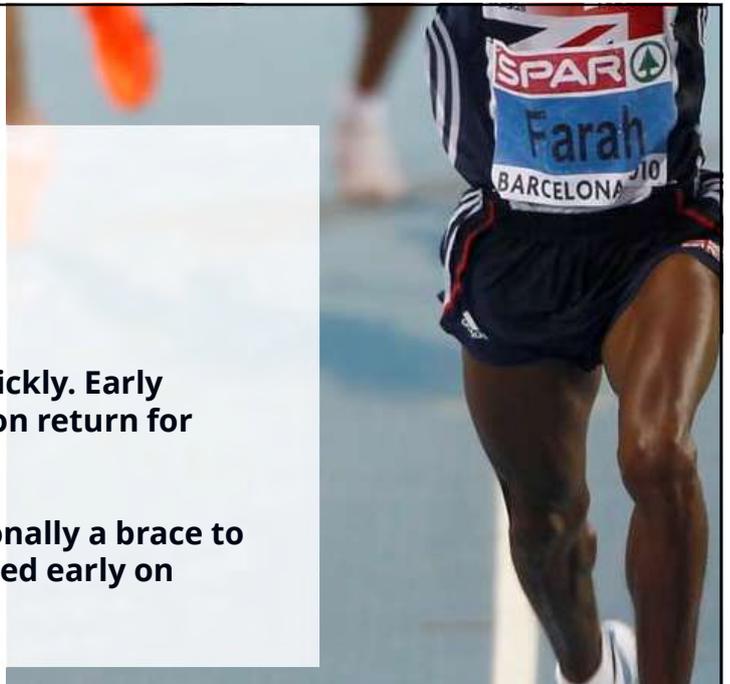
Medial Collateral Ligament (MCL)

Treatment

Conservatively

Gr I: no specific treatment, settles quickly. Early movement and isometrics. Can tape on return for comfort. 2 weeks RTP

Gr II-III: may take 8-12 weeks. Occasionally a brace to prevent final 30 ° extension can be used early on



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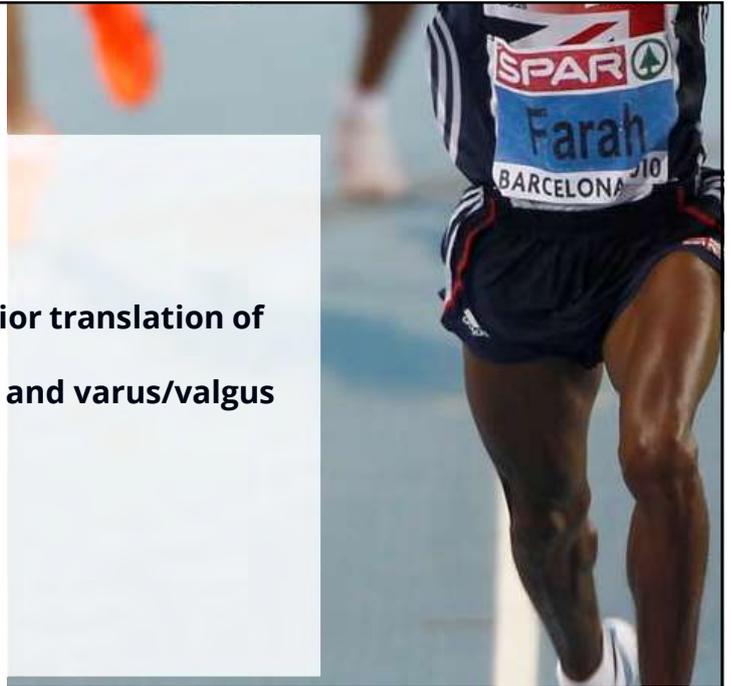
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Knee Injuries

Posterior Cruciate Ligament (PCL)

Much stiffer and wider than ACL

**Primary function is to prevent posterior translation of the Tibia in relation to the Femur.
Also restrains tibial external rotation and varus/valgus stresses**



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Knee Injuries

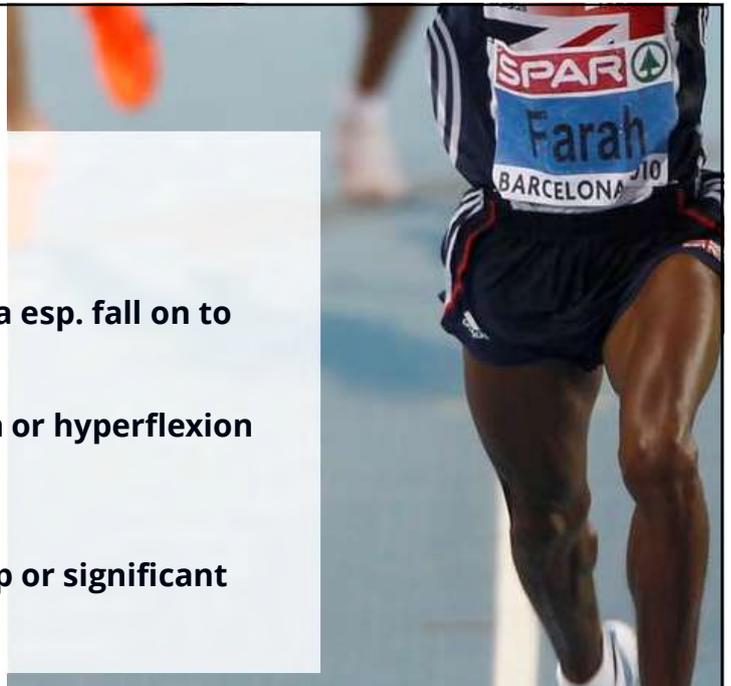
Posterior Cruciate Ligament (PCL)

History

Most commonly a high energy trauma esp. fall on to flexed knee or hit dashboard in RTA

Can also happen on a hyperextension or hyperflexion injury

It is not common to report a snap/pop or significant swelling



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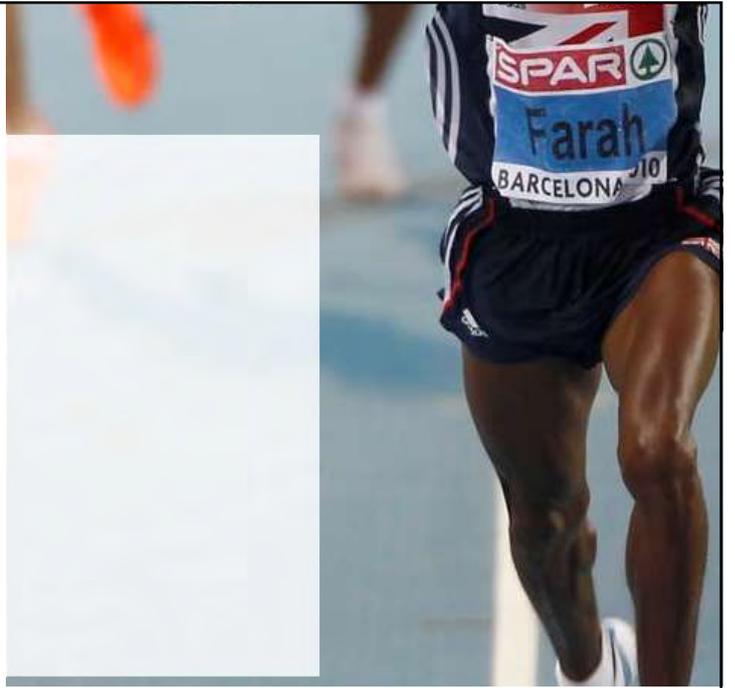
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Knee Injuries

Posterior Cruciate Ligament (PCL)

Tests:

- Posterior Drawer
- Posterior Sag



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Knee Injuries

Posterior Cruciate Ligament (PCL)



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Knee Injuries

Posterior Cruciate Ligament (PCL)



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Knee Injuries

Posterior Cruciate Ligament (PCL)

Treatment

Usually does very well, if only PCL involvement usually does not need surgery

Functional outcome does depend on amount of laxity present

Rehab to increase Quad strength is very important to restrict posterior translation

Usual RTP 6-8 weeks



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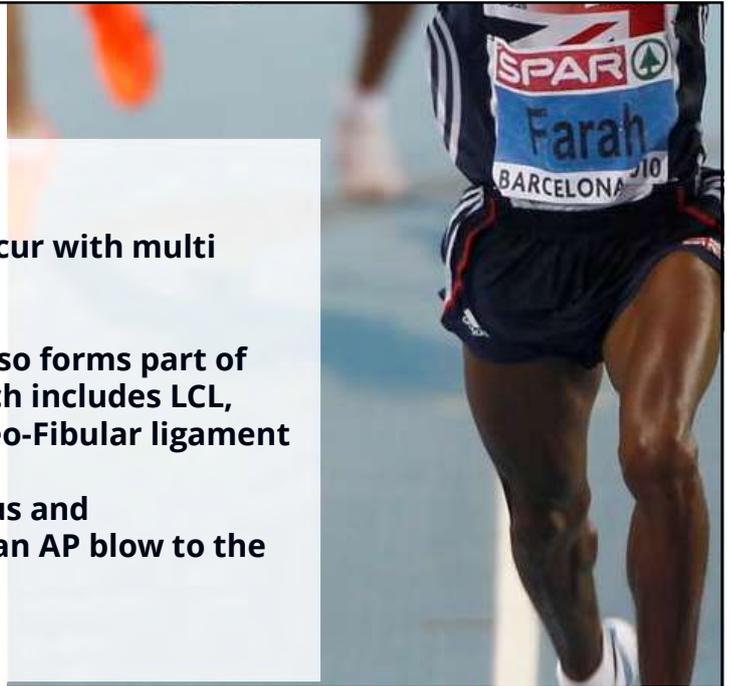
Knee Injuries

Lateral Collateral Ligament (LCL)

Rarely injured in isolation, usually occur with multi ligamentous injuries to the knee

Primarily restrains valgus stress, it also forms part of the Postero-Lateral Corner (PLC) which includes LCL, Popliteus, Biceps Femoris and Popliteo-Fibular ligament

Typical injury to LCL and PLC is a Varus and hyperextension injury, but also with an AP blow to the Tibia with the knee in extension



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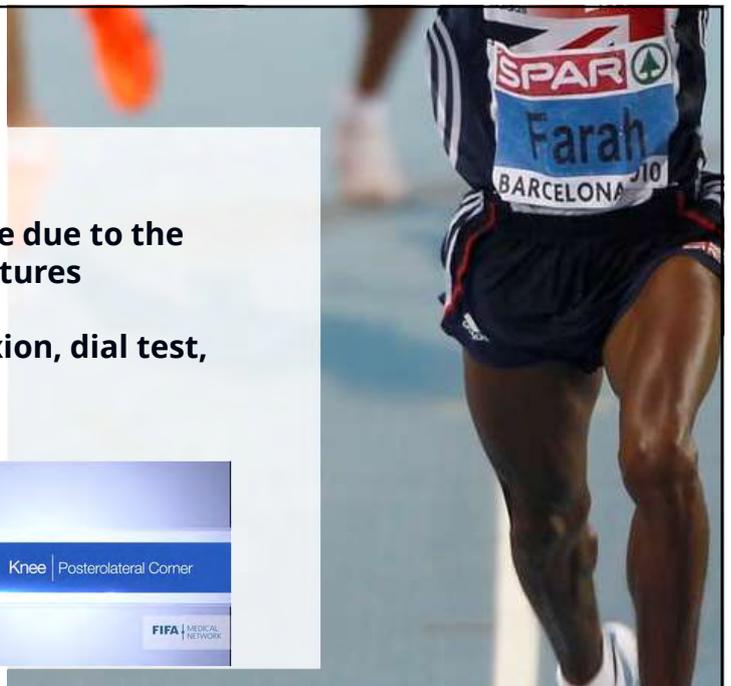
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Knee Injuries

Lateral Collateral Ligament (LCL)

Examination has to be comprehensive due to the possible involvement of several structures

Hyperextension, Laxity of LCL 30° flexion, dial test, posterior drawer



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Knee Injuries

Lateral Collateral Ligament (LCL)

Treatment

No Laxity – conservative, strength, proprioception and function

Laxity – Acute repair to be considered (FIFA)



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Knee Injuries

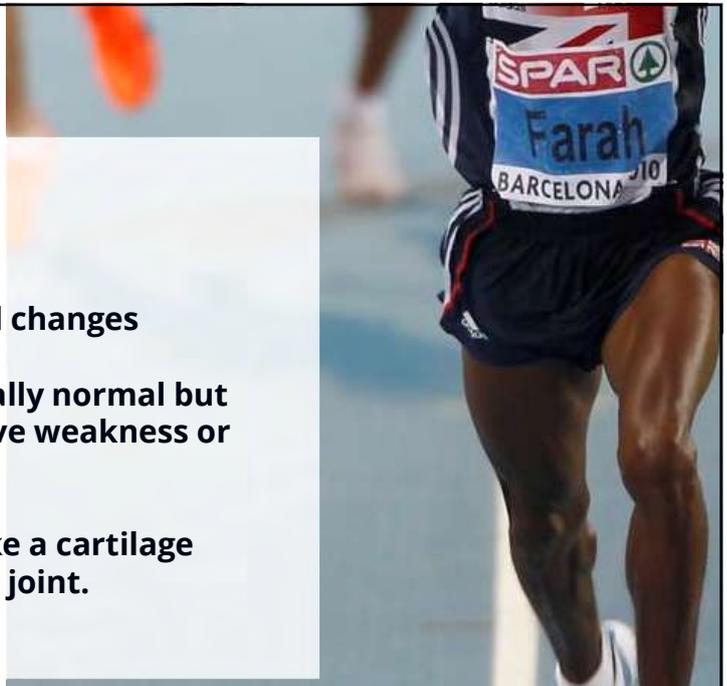
Patello-Femoral

Very common in anterior knee pain

2 groups: Normal knee and structural changes

Younger athletes tend to be structurally normal but have a 'functional' issue. Often relative weakness or increased training load.

Remaining have anatomical issues like a cartilage pathology within the Patello-Femoral joint.



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Knee Injuries

Patello-Femoral

History

Often a diffuse and poorly localised anterior knee pain felt 'deep inside the knee'

Usually of an insidious onset, but can be caused by a fall onto flexed knee

Generally pain increases with walking or running downhill/stairs

Athletes often describe a clicking or catching sensation



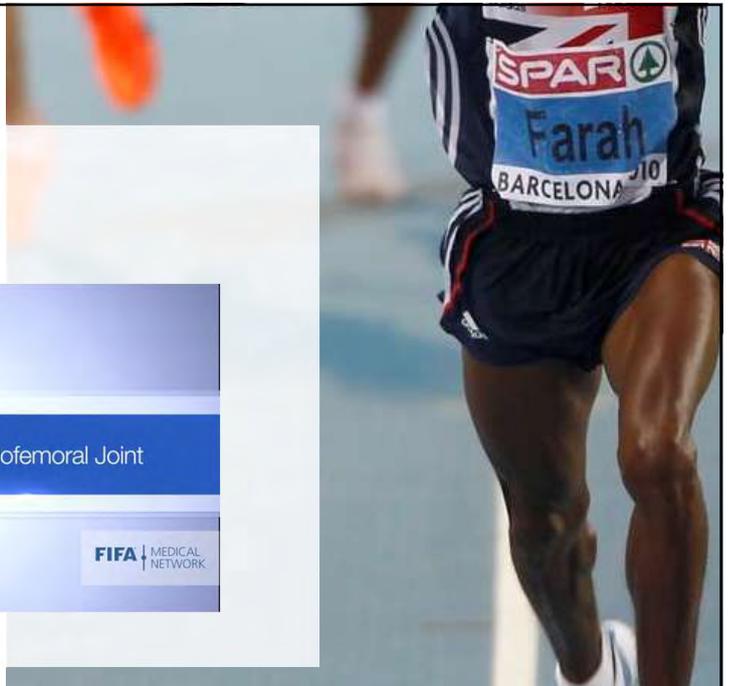
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Knee Injuries

Patello-Femoral



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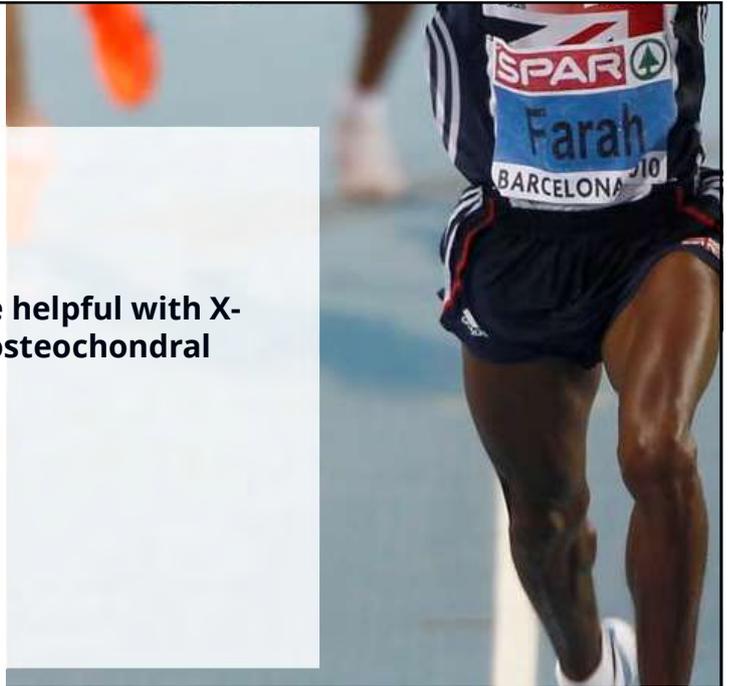
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Knee Injuries

Patello-Femoral

Investigation

In chronic cases, 6-12 weeks, it can be helpful with X-rays or MRI to check for chondral or osteochondral injuries



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Knee Injuries

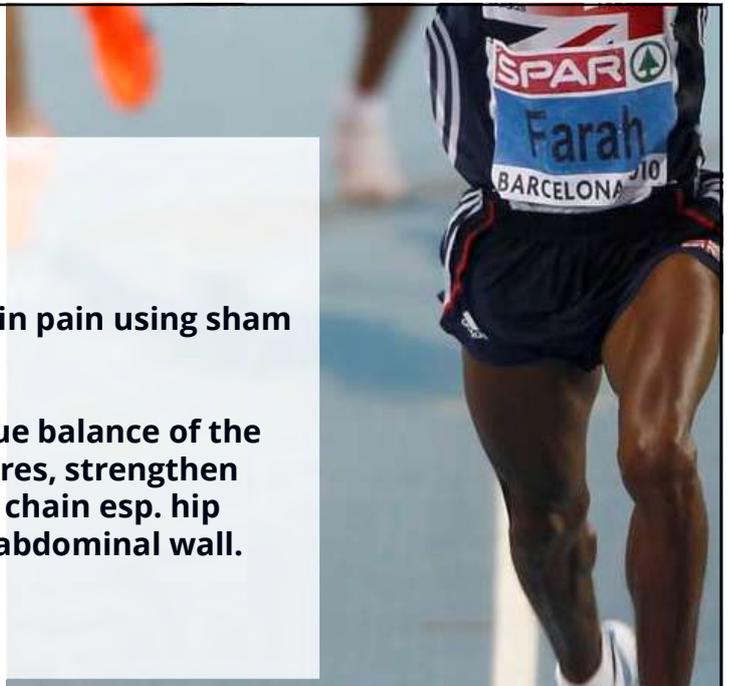
Patello-Femoral

Treatment

FIFA say there is a 60% improvement in pain using sham soft tissue manipulation

The aim is to restore normal soft tissue balance of the patella; mobilising the lateral structures, strengthen VMO and strengthening the proximal chain esp. hip extensors, external rotation and the abdominal wall.

Taping can be a help in earlier stages



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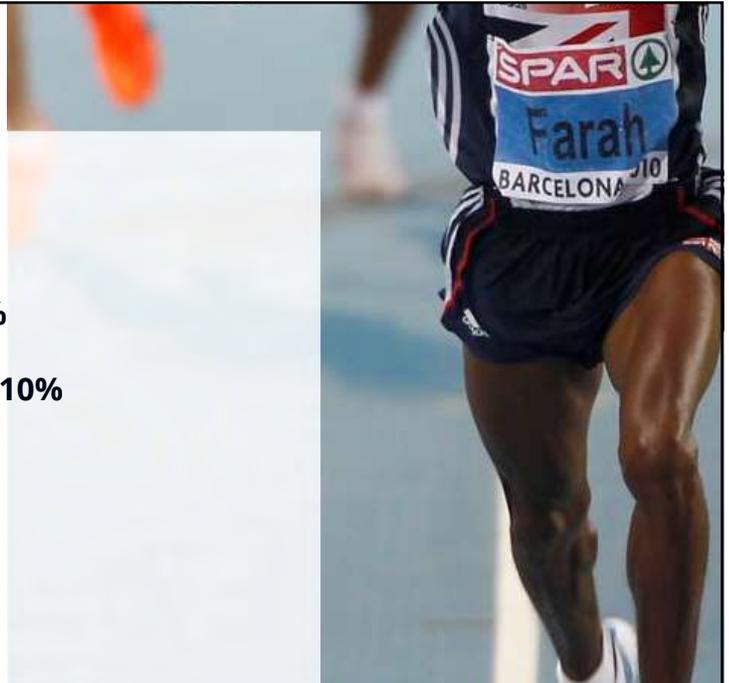
Knee Injuries

Patellar tendinopathies

Infra-patellar tendinopathy 65-75%

Supra-Patellar tendinopathy 20-25%

Patellar tendon insertion to Tibia 5-10%



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Knee Injuries

Patellar tendinopathies

History:

Generally a well localised anterior knee pain

Usually increased by jumping, bounding and hopping

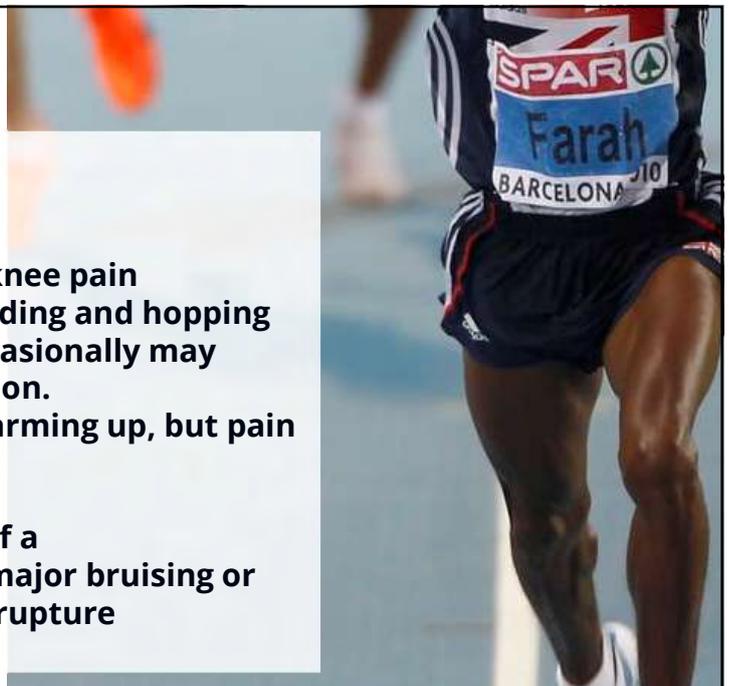
Usually gradual insidious onset, occasionally may experience an acute tearing sensation.

Usually some improvement with warming up, but pain increase after activity or next day

Often morning pain/stiffness

Beware of an acute, sudden onset of a

popping/snapping, especially with major bruising or disability as this could be a tendon rupture



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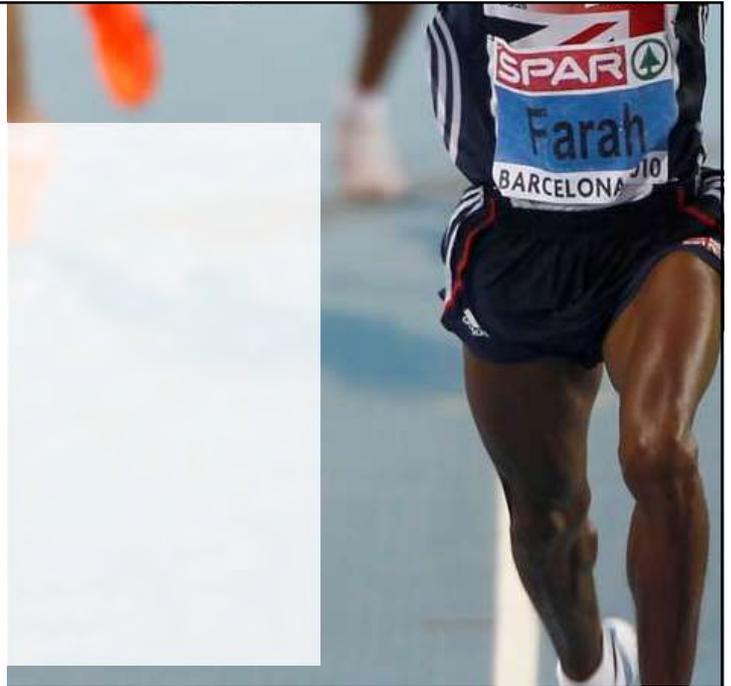
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Knee Injuries

Patellar tendinopathies

Investigation

Ultrasound is best modality



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Knee Injuries

Patellar tendinopathies

Treatment:

Usually eccentric exercises advised (eccentric exercises are often painful to do, generally best suitable for more chronic cases)

Knee strapping or taping has shown variable effect

60-80% of athletes return to previous level of sport



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Knee Injuries

Patellar tendinopathies

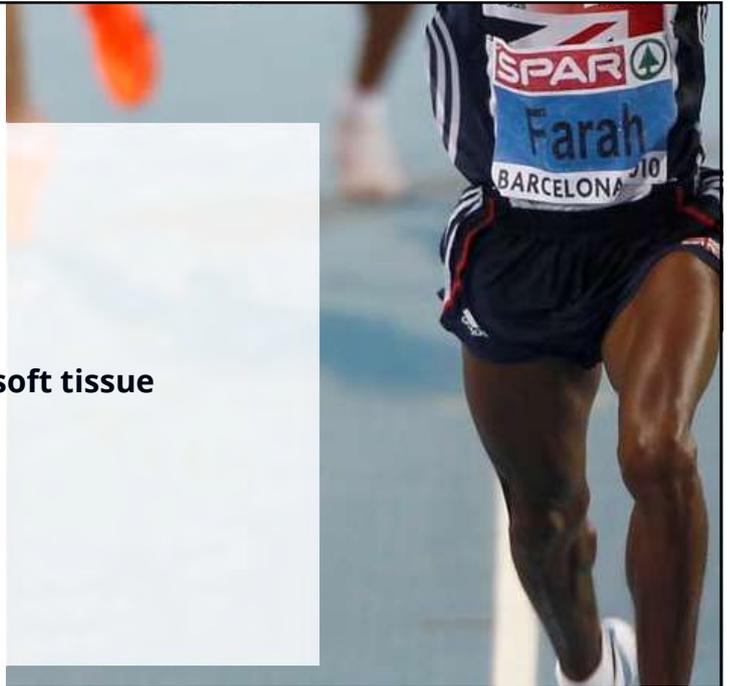
Rehabilitation

Cryotherapy can provide analgesia

Manual therapy: Cross friction and soft tissue mobilisations

Shockwave treatment

Hydrotherapy or 0G treadmill



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Knee Injuries

Patellar tendinopathies

Prevention

Careful management of training - if symptoms are reported - modify training load to reduce overall loading

Isometric strength



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Knee Injuries

Patellar Dislocation

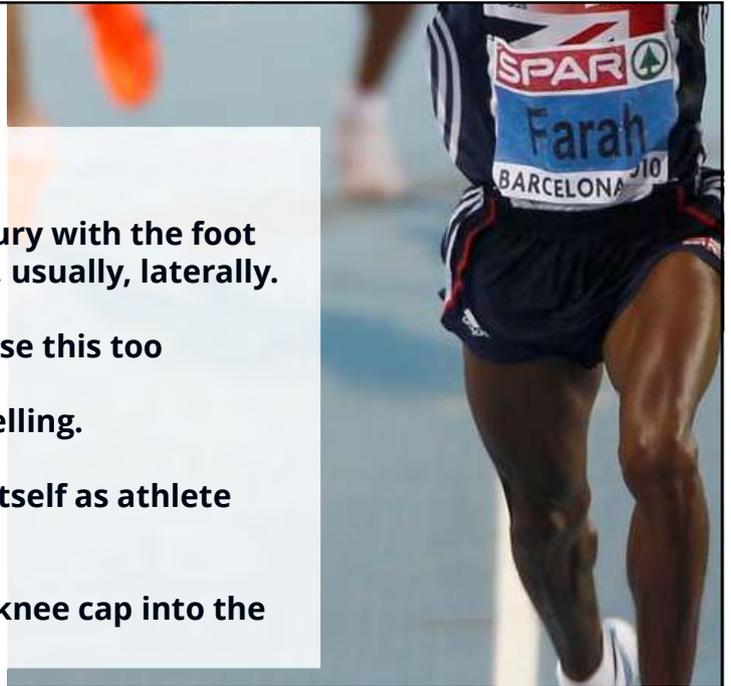
Usually occur following a twisting injury with the foot planted. This dislocates the knee cap, usually, laterally.

A direct blow to the knee cap can cause this too

Often causes significant pain and swelling.

Many times the patella will relocate itself as athlete straightens knee.

Initial step should be to relocate the knee cap into the trochlear groove



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Knee Injuries

Patellar Dislocation

Treatment

Most patients does not need surgery

Some people recommends a short immobilisation (7-10 days)

Then slow mobilisation of the knee and patella-femoral joint.

Isometric strength build up for legs and hips



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Knee Injuries

Patellar Dislocation



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Knee Injuries

Patellar Dislocation



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Knee Injuries

Osgood-Schlatter

This 'traction apophysitis' is a very common cause of knee pain in adolescent athletes.

It is more common in boys and is generally bilateral.

It is estimated that 1 in 5 children will suffer this.

It is frequently associated with sports involving running and jumping and occurs in athletes between 11 and 15 years of age.



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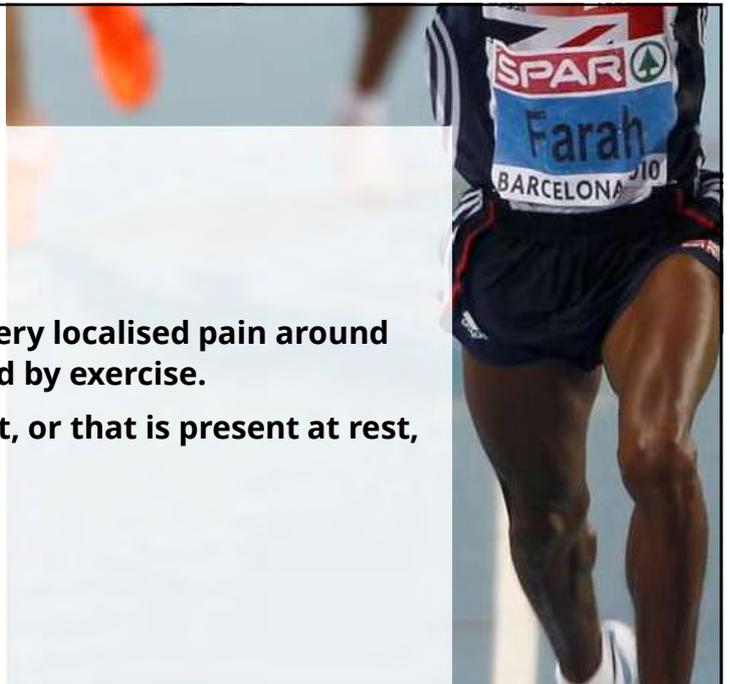
Knee Injuries

Osgood-Schlatter

History

The patient typically complains of a very localised pain around the tibial tuberosity that is aggravated by exercise.

Pain that does not get better with rest, or that is present at rest, is not consistent with this diagnosis



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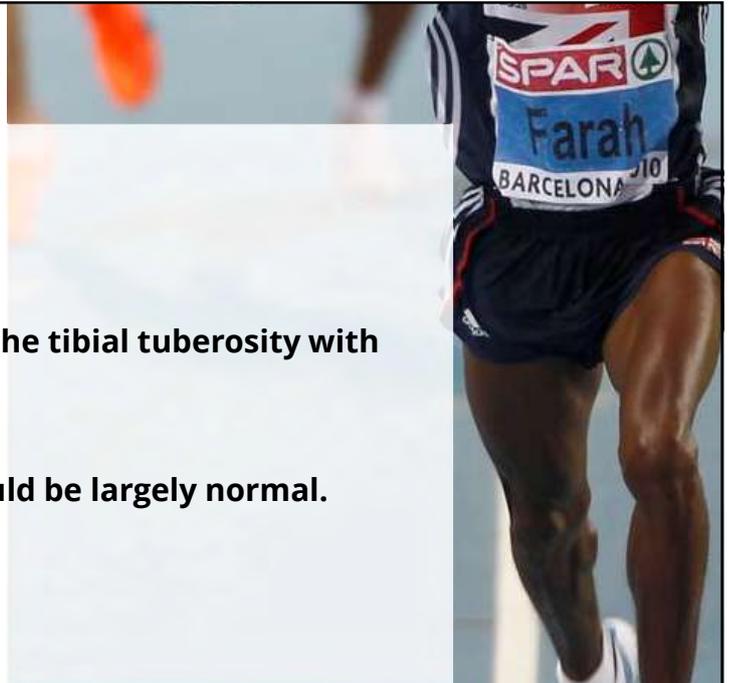
Knee Injuries

Osgood-Schlatter

Examination

Patients have point tenderness over the tibial tuberosity with localised swelling.

The remainder of the knee exam should be largely normal.



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Knee Injuries

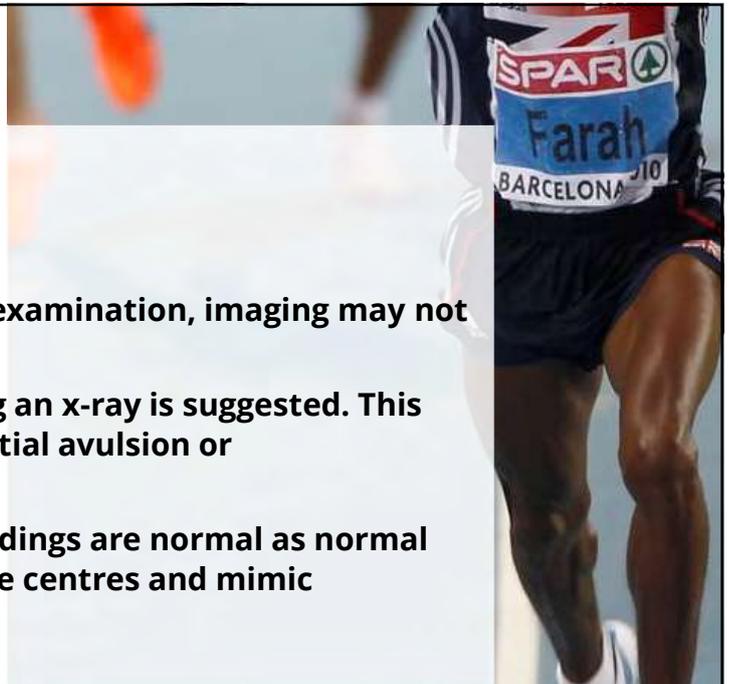
Osgood-Schlatter

Investigation

When there is a classical history and examination, imaging may not be needed.

For more significant pain and swelling an x-ray is suggested. This might show soft tissue swelling, a partial avulsion or fragmentation of the tuberosity.

In the vast majority of cases these findings are normal as normal apophyses may develop from multiple centres and mimic fragmentation.



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Knee Injuries

Osgood-Schlatter

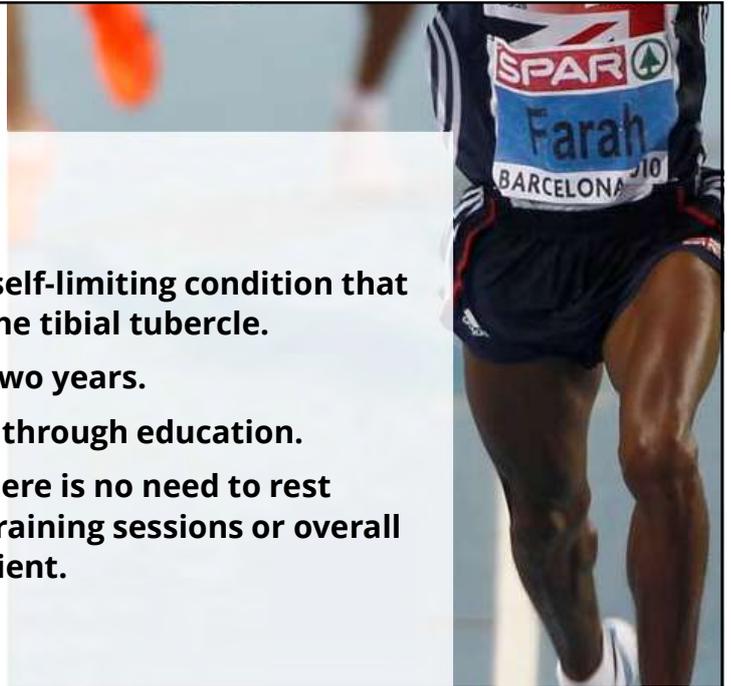
Treatment

In the vast majority of cases this is a self-limiting condition that settles at the time of bony fusion of the tibial tubercle.

The symptoms may persist for up to two years.

The key to managing this condition is through education.

Activity modification is needed but there is no need to rest completely, reducing the number of training sessions or overall sports involvement is generally sufficient.



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