Imaging of Sports Injuries

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Outline

- Football Injuries
- Baseball Injuries
- Running Injuries
- Martial Arts Injuries
Football Injuries

- Clipping
- Turf Toe
- Sports Hernia
Clipping

• “An illegal block in which a player hits an opponent from behind, typically at leg level.”
Clipping

O’Donohue’s Triad

1. ACL tear
2. MCL tear
3. Medial Meniscus Tear
MCL Tear

Cor PD

Ax PD
ACL Tear

Sag T2 FS

Sag PD
MM Tear

Sag Men Window
Knee Dislocation
Turf Toe

- The name comes from the fact that this injury is especially common among athletes who play on artificial turf.
- The hard surface of artificial turf, combined with running and jumping in football and soccer, make turf toe a frequent consequence of artificial turf play.
Turf Toe

- When a player sustains a turf toe injury they are tearing the 1st MTP joint capsule.
- aka Plantar Plate Tear
- Extremely painful.
- Leads to instability and dislocation of the joint.
- Leads to accelerated cartilage wear and arthritis of the 1st MTP joint.
Plantar Plate Tear

Abnormal High Signal Reflecting Capsule Tear

Sag PD
Sports Hernia

- A sports hernia occurs when there is a weakening of the muscles or tendons of the lower abdominal wall.

- This part of the abdomen is the same region where an inguinal hernia occurs.

- In the case of a sports hernia, the problem is due to a weakening in the same abdominal wall muscles, but there is no palpable hernia or herniated tissue.
Sports Hernia

• Equal and opposite traction forces exerted at the anterior superior pubic bone tendon attachments during a hyperextension injury to the hip.
Sports Hernia

- Abnormal high signal at the distal rectus abdominus muscle insertion and/or the adductor longus muscle origin.
- Reflects focal partial fascia tears of these tendons.
Sports Hernia

- Physical Therapy
- Imaging guided steroid and anesthetic injections
  - US
  - CT
  - Fluoroscopy
Baseball Injuries

• SLAP tear
• Little league elbow
• Mallet Finger
• Supraspinatus tendon tear
SLAP Tear

SLAP =
- Superior
- Labrum
- Anterior
- Posterior

Sag Obl PD
Ax Labral Window
Cor Obl T2 FS
Little League Elbow

• A group of elbow problems related to the stress of repetitive throwing in young athletes.

• During the throwing motion, a great deal of stress is placed on the medial structures of the elbow.
  – medial epicondyle
  – medial epicondylar apophysis
  – UCL complex.

• Lateral structures are compressed.

• Pain with throwing.
• Little League elbow encompasses several conditions in the young thrower
  – Medial epicondyle apophysitis
  – Medial epicondyle avulsion fracture
  – Ulnar collateral ligament sprain or tear
  – OCD of the capitellum
  – OCD of the radial head
  – Olecranon apophysitis, with or without delayed closure
  – Hypertrophy of the ulna
Little League Elbow

- One form is Panner’s disease
  - rarefaction and fragmentation of the capitellum in children that occur with repetitive motion of the arm
  - show an irregular lucent area in the capitellum and occasionally loose bodies within the joint.
Mallet (Baseball) Finger

- When a ball or other object strikes the tip of the finger
- The force tears the extensor tendon at the DIP joint
- The force of the blow may even avulse the base of the distal phalanx with the tendon.
Supraspinatus Tendon Tear

- Relative avascular zone
- Tends to be associated with impingement
- Small <1 cm
- Medium 1-3 cm
- Large 3-5 cm
- Massive >5cm
Supraspinatus Tendon Tear

- Tendon Gap
- Subacromial fluid
- Bare cartilage sign
- Concave bursa sign
Tennis Injuries

- Tennis Elbow
- Jumpers Knee
Tennis Elbow

• aka “Lateral epicondylitis"
• 7-20 times more common than medial epicondylitis.
• Most common at about age 40
• Overuse injury
• Repetitive raising and lowering or rotating the hand and wrist.
  – Hammering
  – Using a screwdriver
  – Tennis players
    • One handed backhand
    • Poor technique
    • A late forehand swing.

• Repetitive "micro-trauma“ leads to small tears and inflammation
Tennis Elbow

Thickening, intrasubstance high signal and central tendon tear of the common extensor tendon origin
Jumper’s Knee

- Proximal patellar tendinosis
- Repetitive overloading of the extensor mechanism of the knee
- Microtears to the patellar tendon
- Sports that require explosive jumping movements:
  - Tennis
  - Basketball
  - Volleyball
  - Soccer
Jumpers Knee

Abnormal high signal and focal thickening of the patella tendon origin
Running Injuries

- Shin Splints
- March Fracture
- Plantar Fasciitis
- Achilles Injury
- Hamstring Tendinosis
March Fracture

- Fatigue fracture of a metatarsal
- Most commonly found in military recruits
- First described by a Prussian military physician in the 19th century
March Stress Reaction
Shin Splints

- Stress reaction
- Can lead to a fatigue fracture
- Long-distance runners
- Train on hard surfaces increases risk
Shin Splints-Stress Reaction
Shin Splints - Stress Reaction

1. Normal Blood Pool
2. Normal Angio. Phase
3. Hot Bone Phase

Sag IR  Cor IR  Ax IR
Plantar Fasciitis

- The plantar fascia is a broad structure that spans between the medial calcaneal tubercle and the proximal phalanges of the toes.

- Plantar fasciitis is a painful inflammatory condition caused by excessive wear to the plantar fascia.

- The pain usually is felt on the medial underside of the heel (★), and is often most intense with the first steps of the day.

- Plantar fasciitis was formerly called:
  - "a dog's heel" in the United Kingdom.
  - "flip-flop disease" among podiatrists.

- It can often result in a heel spur on the calcaneus,
  - in which case it is the underlying condition, and not the spur itself, which produces the pain.
Plantar Fasciitis

Repeated microscopic tears

Cor PD

Sag PD

Sag IR
Plantar Fasciitis

- Plantar Fasciitis = Plantar Fascia Thickening of more than 5mm
- Needle placed along the plantar fascia to introduce steroid and anesthetic
Achilles Tear

• Commonly occurs during explosive acceleration
  – pushing off
  – jumping up

• Symptom:
  – feels like being kicked or shot behind the ankle
Achilles Tear

- A gap may be felt just above the heel unless swelling has filled the gap

- + Simmonds’ test (aka Thompson test)
  - Squeeze calf muscles while the patient lies prone and feet hanging loose off bed.
  - No movement foot = Tear
  - Lack of passive movement.
Achilles Tear

- Sport Related Injury
- Tear 2-6cm proximal to enthesis (relative avascular zone)
- Average age = 30-40 yrs.
- Male-to-female ratio 20:1
- Fluoroquinolone (cipro.) have been linked with an increased risk of tendon rupture.
Achilles Injury

- **Toygar's angle**
  - the angle of the posterior skin surface overlying the distal Achilles and posterior calcaneal surfaces
  - abnormal if $> 150^\circ$

- **Arner's sign**
  - Positive if the anterior contour of the Achilles tendon at the insertion curves away from the superior-posterior aspect of the calcaneus.
Achilles Tear

- Intrasubstance Tear
  - Not retracted
  - Determine degree of tendon diameter involved

- Sag PD
- Sag IR
- Ax PD
- Calc
- Kager’s Fat Pad
Hamstring Tendinosis

- Lateral hamstring
  - Biceps femoris muscle
- Medial hamstring
  - Semitendinosus Muscle
  - Semimembranosus Muscle
- Inflammation in one or more of the hamstring tendons.
  - Pain
  - Swelling
  - Warmth
  - Redness
  - Dysfunction
- Deep buttock (in gluteus crease) or posterior thigh pain brought on during acceleration.
- Overuse injury
  - long-distance runners
Hamstring Tendinosis

Abnormal High Signal at Hamstring Origin
Hamstring Tendinosis

Ultrasound guided steroid and anesthetic injection adjacent to hamstring tendon origin
Martial Arts Injury

- Hip Labral Tear
- Iliopsoas tendonitis
- Ulnar Nerve injury
Hip Labral Tear

- **Labrum**
  - Fibrocartilaginous rim
  - Deepens the acetabulum
  - Attaches to the osseous acetabular rims and transverse acetabular ligament
- **Young Athlete**
  - Extreme hip rotation and flexion
  - Kick Boxing, gymnastics, dancing, soccer

Sag PD
Hip Labral Tear

Acetabulum

Femoral Head

Sag PD
Hip Labral Tear

**Pre Injection**
- Acetabulum
- Femoral Head
- Joint

**Post Injection**
- Steroid Mixture
- Filled Joint
- Needle

Post Injection Image
Iliopsoas Tendinosis

- Can be seen with snapping hip syndrome
  - Snapping sensation when iliopsoas tendon passes over the iliopsoas tendon.
- Common in young active athletes
  - Repetitive strenuous hip flexion and extension
- Groin pain, especially during hip flexion and extension and occasionally a mass
Iliopsoas Tendinosis

- Needle in Iliopsoas Bursa
- Contrast Effect of Steroid Mixture
- Fluid Filled Distended Iliopsoas Bursa
- Iliopectineal Eminence
Ulnar Nerve Injury

- > 0.9 cm² Abnormal Cross sectional area in ulnar sulcus
- Direct impaction
  - Ultimate Fighters
- Impingement
  - Enlarged anconeus muscle
  - Ganglion
- Dynamic imaging
  - Perching on medial epicondyle
  - Dislocating out of ulnar sulcus