Imaging of the Foot and Ankle

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Foot and Ankle
- Plantar Fasciitis
- Hallux Valgus Deformity
- Achilles Tendinosis
- Posterior Tibialis Tendon tendinopathy
- Stress Fracture
- Ligamentous tearing
- Turf Toe
- Osteochondral Defect of the Talar Dome

Plantar Fascia (Aponeurosis)
- Thin Ligament directly beneath the skin
- Absorbs the shock placed on the foot when walking
- Divides into 5 sections extending to each toe
- Functions to prevent eversion during heel rise
- Arises predominantly from the medial calcaneal tubercle

- Central Band: Implicated in plantar fasciitis
- Medial Band: Very thin
- Lateral Band: Attaches to the base of the 5th metatarsal - Absent in 12% of the population
**Plantar Fasciitis**
- Mechanical overload...altered load
- Micro tears
- Degeneration of collagen
- Uncommon to see traumatic rupture

**Imaging features**
- Edema in the tissues deep to the fascia
- Edema within the fascia
- Bone marrow edema at the insertion
- Thickened fascia
- Hyperemia (ultrasound)
- Calcaneal Enthesopathy/spur – 25% in asymptomatic patients

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**Calcaneal Enthesopathy**
- Remember inflammatory arthritis
  - Reactive

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**Advanced Imaging**
- **Computed Tomography**
  - Best for bony anatomy - fractures
- **Magnetic Resonance Imaging**
  - Physiologic imaging - most sensitive
    - T1: Good at evaluating bony anatomy
      - Fat is white
    - T2: Good at evaluating fluid/pathology
      - WATER is white
      - WW2 (Water is white on T2)
- **Diagnostic Ultrasound**
  - Good soft tissue resolution and can evaluate blood flow
  - Allows for movement/orthopedic tests during the exam
  - Limited at evaluating articular/internal joint structures
  - Very limited in the spine
Edema in the Adjacent Soft tissues

Edema and Thickening of the Fascia
Hallux Valgus Deformity

- Angle: Normal 5-10
- Tibial Sesamoid Position
  - Should be medial to the line
  - Lateral deviation of the sesamoid
- Crista
  - Seen with position 4 and up
  - Central prominence on the 1st MT head

- Other terms
  - Hallux Limitus: reduced 1st MTP dorsiflexion
  - Hallux Rigidus: results from structural or functional restriction of motion (end stage of limitus)
Achilles Tendinosis

- Thickened tendon
- Fluid within the fibers
- May have some partial thickness tearing
Stress Fracture
• Repetitive Injury
• Stress response
• X-Ray: Periosteal Reaction
  • Callus formation
  • Sign of attempt at healing
• MRI: Bone marrow edema
  • Present even BEFORE it fractures
• Location: Metatarsal
  • 2nd Metatarsal: March fracture
  • 3rd
  • 5th: Near peroneus brevis insertion

Case Courtesy of Jamie Bedle DC, DACBR
Ligamentous Grading

**Grade 1 Sprain**
- Ligament injured without disorganization of fibers

**Grade 2 Sprain**
- Partial thickness tear
- Disorganization of fibers

**Grade 3 Sprain**
- Full thickness tearing
- May have instability

Ligaments

**Anterior Talofibular Ligament (ATFL)**
- Primary restraint to ankle inversion
- Injury as patient moves into plantar flexion and inversion
- Most common ligament to tear

**Calcaneofibular Ligament (CFL)**
- Stabilizes both the ankle joint and the subtalar joint
- Injury as ankle is inverted and dorsiflexed
- 2nd most common ligament to tear in inversion ankle injuries
- Both are torn in approx. 20%

**Anterior Inferior Syndesmotic Ligament**
- Injured in a HIGH ANKLE sprain
- Can be very unstable and require surgery
Posterior Tibialis Tendon

- Common site of pain in patients who pronate excessively

Posterior Tibialis Tendon

- Interstitial Tear
- Tenosynovitis

http://www.ajronline.org/doi/pdf/10.2214/ajr.175.3.1750627
Turf Toe

- Plantar plate injury
  - Sesamoids embedded in a plate of connective tissue
  - Hyperextension
Osteochondral Defect
• History of trauma in 85%
Location
• Posteromedial
  • Inversion, plantar flexion, external rotation
  • Deeper lesion
  • Slightly more common than lateral
• Anterolateral
  • Inversion, dorsiflexion
  • Shallower

Osteochondral Defect - Talar Dome

Osteochondral Defect - Talar Dome
Talar Avascular Necrosis

- Sclerosis
- Collapse

Case courtesy of Dr. Ahmed Abd Rabou, Radiopaedia.org, rID: 22964

Thank You!
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