Sports Injuries of the Foot and Ankle

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University of Iowa College of Medicine Refresher Course for the Family Physician
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I. Objectives

A. By the end of the lecture attendees will be able to create a differential for sport-related injuries of the foot and ankle organized by anatomic location.

B. By the end of the lecture attendees will be able to identify high-risk, sport-related injuries of the foot and ankle.

C. Attendees will be introduced to resources which aid the diagnosis and treatment of sport-related injuries of the foot and ankle

II. Anatomy

A. Anatomic regions of the ankle
   1. Medial ankle is area medial to syndesmosis
   2. Lateral ankle is area lateral to syndesmosis

B. Anatomic regions of the foot
   1. Hindfoot is area between ankle joint and midtarsal (transverse tarsal) joint
   2. Midfoot is area between midtarsal joint and tarsometatarsal joint
   3. Forefoot is area distal to tarsometatarsal joint

III. Differential Diagnosis (*indicates high risk injury)

A. Medial Ankle
   1. Medial ankle sprain
      
      a) Uncommon (4-5% of ankle sprains) injury of the deltoid ligament typically result of forefoot eversion with hindfoot in valgus.
      
      b) Higher energy required to injure because of boney/ligamentous stability of medial ankle.
   2. *Tibia fracture
a) Mechanism can be similar to ankle sprain but can also be transmission of force across ankle with inversion/adduction or axial load.

b) Associated lateral ankle pain may indicate unstable fracture.

3. Talus osteochondral lesion
   a) Chronic lesions often present with mechanical symptoms or instability.
   b) Should be considered in patient with persistent “ankle sprain.”

4. Medial ankle instability
   a) May be structural or functional.
   b) Conservative management includes strengthening, proprioceptive exercises, taping, bracing, and orthotics.

5. *Tibia stress reaction
   a) Progressive pain with activity without inciting injury.
   b) Anterior tibial cortex stress fracture is high risk injury due to frequency of nonunion

6. Anterior tibial tendinopathy
   a) Overuse or irritation from tight fitting foot wear.
   b) Pain worse with walking/running downhill (eccentric contraction).

7. Anteromedial ankle impingement
   a) May be soft tissue or osseous.
   b) Gymnasts landing short is classic scenario.

B. Lateral Ankle

1. Lateral ankle sprain
   a) Most common sports injury (~40%)
   b) Early range of motion, progressive weight bearing, and bracing/taping with sport participation for 6-12 mon.

2. *Syndesmotic injury
3. *Fibula fracture*
   a) Location is key.
   b) Associated medial ankle pain may indicate an unstable fracture.

4. Lateral ankle instability
   a) May be structural or functional.
   b) Conservative management includes strengthening, proprioceptive exercises, taping, bracing, and orthotics.

5. Distal fibula stress reaction
   a) Brief period of crutch-assisted ambulation or long air splint may provide comfort.
   b) Pain and limping should guide activity progression.

6. Superficial peroneal neuropathy
   a) Pain, paresthesia, and/or numbness on dorsum of foot.
   b) Rule out spinal radiculopathy and common peroneal neuropathy

7. Anterolateral ankle impingement
   a) May be soft tissue or osseous.
   b) Common cause of chronic pain after ankle sprain.

C. Hindfoot

1. *Achilles rupture*
   a) 20-25% misdiagnosed initially.
   b) Pts often feel they had been struck in the back of the leg.

2. Achilles tendinopathy
   a) Mid-portion and insertional variants.
   b) Pain initially at beginning and shortly after exercise may progress to constant pain.
3. Fibularis tendinopathy
   a) Mechanism may be overuse or chronic subluxation.
   b) Often associated with later ankle ligamentous instability.
4. Posterior tibial tendinopathy
   a) Posteromedial ankle pain with plantar flexion/inversion in older athlete
   b) Progression may result in pes planus and valgus ankle deformity.
5. Calcaneal stress reaction
   a) Low-risk stress fracture
   b) Common in distance runners or military recruits with rapid change in activity level.
6. Plantar fasciopathy
   a) Pain often worse with first few steps or after prolonged periods of inactivity.
   b) Numbness is not typically present and can differentiate from nerve entrapment.
7. Tarsal tunnel syndrome
   a) Caused by tibial nerve entrapment within the tarsal tunnel.
   b) Symptoms include burning/shooting pain, paresthesia, and numbness of the medial ankle and heel.

D. Midfoot
1. *Lisfranc injury
   a) Suspect in patient with midfoot pain with weight bearding especially if pain persists > 5 days.
   b) Unrecognized unstable injuries have high risk of posttraumatic degenerative changes and poor outcomes.
2. *Navicular stress fracture
   a) Typically presents with dorsal foot pain with activity that may radiate along medial arch.
b) Initial presentation may be subtle so high index of suspicion is necessary.

3. Medial plantar neuropathy
   a) Known as jogger’s foot due to its relatively high incidence in runners.
   b) Typically presents with medial arch pain, paresthesia, or numbness with activity.

4. First branch of the lateral plantar nerve (Baxter’s) neuropathy
   a) May present similar to plantar fasciopathy with medial heel pain that may be worse in the morning and with beginning of activity.
   b) Pain location is typically more medial than plantar fasciopathy and can have associated numbness/paresthesia.

5. Pes planus
   a) Majority of patients are asymptomatic.
   b) Acquired pes planus is most often associated with posterior tibial tendon dysfunction.

6. Kohler’s disease
   a) Clinical syndrome that typically presents as midfoot pain in a young child.
   b) Some believe radiographic findings typically associated with this syndrome represent normal variant and therefore question the validity of the diagnosis.

7. Plantar fibromatosis
   a) Plantar analog to Dupuytren Disease
   b) May cause flexion contracture of the first ray.

E. Forefoot

1. *Proximal fifth metatarsal fracture
   a) Metadiaphyseal region is high-risk for nonunion and refracture.
   b) Repetitive pivoting/cutting put basketball players at higher risk.

2. *Metatarsal shaft stress reaction
a) Distal fractures are more common and lower risk.

b) 2nd and 5th metatarsal are most common.

3. Morton neuroma

a) Compression neuropathy of the interdigital nerve.

b) 10x more common in women (likely caused by tight-fitting, high-heeled shoes).

4. Metatarsalgia

a) Pain of the plantar forefoot beneath the second, third, and fourth metatarsal heads.

b) Umbrella diagnosis grouping many etiologies.

5. Hallux rigidus

a) Pain overlying first MTP with reduction in ROM.

b) Caused by degenerative change of first MTP joint.

6. Turf Toe

a) Umbrella diagnosis for pain at the plantar surface of the first MTP.

b) Typical mechanism is hyperdorsiflexion.

7. *Sesmioditis*  

a) Patients typically present with pain at the plantar surface of the metatarsal head during toe-off.

b) Medial sesamoid bears majority of weight and is most often affected.

### IV. Differential by tissue type

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<thead>
<tr>
<th>Location</th>
<th>Tissue</th>
<th>Diagnosis</th>
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<tr>
<td>Medial Ankle</td>
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<td>Tendon</td>
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V. Fracture management principles

A. Ottawa foot/ankle rules are a useful clinical tool to determine necessity of radiographs.

   1. Ankle: TTP posterior aspect of distal 6 cm of tibia or fibula or distal tip of medial or lateral malleolus, or inability to walk immediately after injury and at time of evaluation.

   2. Foot: TTP base of 5th metatarsal or navicula, or inability to walk immediately after injury and at time of evaluation.

B. Unstable fractures

   1. Ankle osseous and ligamentous structures can be thought of as a ring in the coronal plane.

   2. Injury at two points in ring indicates potential instability.

   3. Weight bearing and stress view radiographs help assess instability.

C. Stress reaction

   1. True fracture is one end of stress reaction spectrum.

   2. Stress reactions are considered high or low risk based on likelihood of true fracture, malunion/nonunion, and recurrence.

   3. High risk stress reactions of the ankle: medial malleolus, talus, navicular, proximal fifth metatarsal, and great toe sesamoids

VI. Tendinopathy principles

   1. Chronic tendinopathy is a syndrome of pain, swelling, and impaired tendon function.

   2. Pathophysiology of pain generation and tissue changes not completely understood.

   3. Treatment options include tendon loading, oral medications, topical treatments, injection, tenotomy, and surgery.
VII. Resources for diagnosis/treatment


VIII. References

