Foot, Ankle and Lower Extremity Problems

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Purpose

• review some common foot and ankle injuries
• present guidelines for non-operative management of common lower extremity injuries

Background

• National Collegiate Athletic Association (NCAA) developed the Injury Surveillance System
• data released from 1988-89 to 2003-04 game time situation
• Ankle ligament sprain most common
• In comparison to other sports, football has the highest injury rate & with most time lost to injury
Initial Evaluation

- identify & locate the injured structure
- controlling cost by minimize unnecessary testing or radiographic studies
- determine the mechanism
- understanding the appropriate time to return to activities

Disorder of the Hindfoot

- Achilles Tendinitis
- Achilles Rupture
- Ankle injury
- plantar fasciitis
- painful heel pad syndrome

Achilles Tendinitis

- painful inflammation with or without swelling about the achilles tendon
- peritenon is involved in acute cases
- tendon is involved in chronic or severe cases
- may lead to nodule formation
- mucoid degeneration
Achilles Tendinitis
etiology
• traumatic (most common)
• mechanical irritation
• inflammatory
• metabolic
• infectious disease

Achilles Tendinitis
• tenderness
• swelling
• diffuse erythema about the heel
• crepitus of motion
• palpable nodules

Achilles Tendinitis
treatment
• rest
• heat - warm soaks
• anti-inflammatory medications
• proper shoe wear - open heel
• padding the heel
Achilles Rupture

- first accurate clinical description was made by Pare in 1575
- achilles tendon is one of the strongest tendons of the body
- males in the 30 - 50 age range who is physically active

Achilles Rupture

- rupture occur through direct and indirect mechanism of injury
- indirect more common is result of tension overload to the tendon, jumping or pushing off

Achilles Rupture

- describe a pop or snap - audible after jumping, landing or pushing off
- sudden pain in the calf posterior to the ankle
- common complaints of pain, weakness, ecchymosis, swelling and difficulty walking
Achilles Rupture

- palpation - defect in the tendon
- edema & ecchymosis
- weakness or absence of active plantar flexion
- Thompson test - no plantar flexion

Achilles Rupture

- immobilization - short leg cast in gravity equinus
- higher re-rupture rate
- surgical intervention
- higher complication rate

Plantar Fascitis

- inflammatory reaction at the attachment of the plantar fascia
- tearing or strain of fibers attachment of plantar fascia
Plantar Fascitis

- Increased foot pain the first few steps in the morning
- Sharp pain upon initial weightbearing

Plantar Fascitis

- Localized tenderness at the anteriomedial border of the calcaneal tuberosity
- Pain with passive dorsiflexion of the toes

Plantar Fascitis

**Conservative Treatment**

- Heel stretch
- Activity modification
- Warm foot soaks
- Anti-inflammatory medications
- Shoe modification -
  - Elevate heel of shoe - heel cup
- Medial arch support
- Localize steroid injections
Painful Heel Pad Syndrome

- inflammatory process within the elastic adipose tissue covering the plantar aspect of the calcaneus

Painful Heel Pad Syndrome

- repetitive impact loading of heel strike
- prolonged weight bearing and ambulation
- obesity
- age (atrophy of the heel pad)

Painful Heel Pad Syndrome

- centrally - pain on the plantar aspect of the heel
- tenderness localized over plantar aspect of the heel
- increase pain with axial loading plantar aspect of the heel
Painful Heel Pad Syndrome

• rest
• flexible plastic heel cup
• soft rubber sole wedge type shoes
• NSAIDS
• steroid injection for recalcitrant cases

Anke (Inversion)

• most common injury in competitive athletes
• mechanism - rolled ankle while taking an awkward step in running or landing after a jump

Ankle (inversion) finding

• acute swelling or ecchymosis
• high incidence of peroneal nerve injury with severe sprains
• difficulty walking
• possible feeling of instability
Ankle (inversion) examination

- tenderness over ATFL, PTFL, CFL
- minimal bone tenderness distal fibula, anterior process of the calcaneus, lateral taral process, base of the 5th metatarsal

Ankle (inversion) Management

- most treated nonsurgical
- RICE (rest, ice, compression & elevation)
- early mobilization and strengthening exercises
- ankle support - brace, taping
- if have not return to play within 6 - 8 weeks - consider MRI evaluation
- osteochondral lesion
- peroneal tear

Ankle (Eversion) High Ankle Sprain

- typically an injury to tibiofibular syndesmosis
- longer recovery period
- often result in residual symptoms
- direct contact to the lateral leg while the foot is fixed to the ground
Ankle (Eversion)
High Ankle Sprain

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Ankle (Eversion)
High Ankle Sprain

- tenderness directly over the syndesmosis proximal to ankle joint
- swelling & ecchymosis
- squeeze test
- external rotation test (foot planted recreate external rotation)
- single-limb calf raise - pain or stability diagnostic

Ankle (Eversion)
High Ankle Sprain

- three radiographic views of the ankle
- medial clear space - medial clear space should equal to the superior clear space on the mortise view
- biomechanical evidence indicate a stress test lateral view of the ankle - to evaluate the stability of the syndesmosis
Ankle (Eversion)

High Ankle Sprain

• absence of radiographic widening - considered a stable injury
• tall cam boot - until tenderness over injury resolve- typically 6 weeks
• functional progression test - hop on one foot 15 times - can return to sport
• widening of the medial clear space or evidence of instability - require surgical intervention

Stress Fracture

• most common overuse injuries
• primarily the lower extremity (90%)
• tibia & bones of the foot (tibia > fibula > metatarsal > calcaneous)
• seen in athletes involved repetitive load
• distance runner, college track & field, dancer
• significant changes in intense training, changes in shoe wear, & hard running surface

Stress Fracture

• activity related pain associated with swelling
• point tenderness at the site of the stress fracture
• one-legged hop test - elicit pain
• evaluate for possible eating deficiencies
Stress Fracture

- plain radiograph are typically negative
- may increase cortex thickening
- MRI has sensitivity & specificity
- CT - determine whether the fracture is incomplete or complete

Stress Fracture

- nonsurgical mgmt - immobilization in boot or cast along with protective weight-bearing until symptoms resolve (6 - 8 wks)
- avoid impact activities
- low-impact cross-training
  - swimming, biking, and elliptical machines
- in elite athlete - surgical mgmt - quicker return to sport

Disorders of the Forefoot

- metatarsalgia
- interdigital neuroma
- tarsometatarsal joint injury
- turf toe
- hallux valgus
Metatarsalgia

- Pain beneath the metatarsal heads

Metatarsalgia etiology

- High heeled shoes
- Atrophy or attenuation of the metatarsal fat pads (elder population)

Metatarsalgia

- Cramping or aching pain underneath sole of the foot
- Tender callouses
Metatarsalgia treatment

- soft felt metatarsal pad
- soft rubber wedgie sole shoes
- metatarsal bar
- shaving of callouses

Interdigital Neuroma

- morton neuroma compression of the interdigital nerve at the level of metatarsal head, deep to transverse metatarsal ligament
- excessive hyperextension of the metatarsophalangeal joint
- from direct trauma or extrinsic pressure against the nerve

Interdigital Neuroma

- most common in women
- neuromas commonly located in the third metatarsal interspace
- neuromas less commonly located in the second metatarsal interspace
**Interdigital Neuroma**

- Pain localized to plantar aspect of the foot between the metatarsal heads
- Aggravated by activity in a shoe and by high-heeled shoes
- Pain is relieved with rest and removal of shoes
- Numbness, cramping and extensive distal and proximal radiation of pain

**Interdigital Neuroma**

- Fullness in metatarsal interspace
- Atrophy of the plantar pad & synovitis of the joint should be ruled out
- Pain with palpation of the metatarsal interspace
- Pain with radiation to the toes with palpation of the metatarsal interspace is highly suggestive

**Interdigital Neuroma**

- Soft metatarsal bar or pad behind the metatarsal heads - reduce traction on the nerve
- Wide and soft shoe is recommended
- Avoid heels
- If initial treatment fails, consider injection with corticosteroid.
Tarsometatarsal (Lisfranc) Joint Injury

- mechanism - axial loading force to back of heel with forefoot fixed to the ground, resulting in a ligamentous injury
- need high suspicion in initial evaluation

Tarsometatarsal (Lisfranc) Joint Injury

- feeling of "pop" in the foot at the time of injury
- midfoot pain is common with weight bearing

Tarsometatarsal (Lisfranc) Joint Injury

- tenderness when compressing midfoot
- increase pain with swiveling into pronating or supinating the first ray while stabilizing the second metatarsal stress
Tarsometatarsal (Lisfranc) Joint Injury

- weight-bearing radiographs of both feet, include 30-degree internal oblique view
- greater than 2 mm of displacement between first & second metatarsal bases
- fleck sign - small avulsion fx may be seen from the lateral edge of medial cuneiform or medial aspect of 2nd metatarsal base
- stress radiograph with foot held in pronated and

Tarsometatarsal (Lisfranc) Joint Injury (Treatment)

- indicated with non-displaced, stable midfoot (stress radiograph)
- nonweight-bearing for 6 weeks
- immobilization cam boot or cast
- surgery - unstable ligamentous injuries

Turf Toe

- hallux metatarsophalangeal (MTP) joint.
- mechanism - axial loading to he heel with ankle plantar flexed and MTP dorsiflexed
- football injury with increasing frequency
- injury occurs more with artificial turf
Turf Toe

history

- MTP pain and swelling following a recent incident
- weakness with push off
- inability to participate in cutting activities

Turf Toe

physical examination

- exam shoulder focus on MTP stability and hallux flexion strength

Turf Toe

radiograph

- In AP view - check for position of sesamoids (if proximal implies capsular injury), sesamoid fracture, diastasis bipartite sesamoid
- MRI - evaluate integrity of plantar capsular structures of the hallux MTP joint
Turf Toe
Classification
• grade I - attenuation of plantar structures, localized swelling & small amount of ecchymosis
• grade II - partial tear of plantar structures, moderated swelling, decrease range of motion of MTP joint due to pain
• grade III - complete rupture of plantar structures, significant swelling or ecchymosis, MTP joint

Turf Toe
Conservative Management
• grade I - taping and early rehab
• rehab focusing on range of motion exercises and gradual strengthening
• grade II - typically requires 2 weeks before return to sport; rehab & taping; turf toe plate (carbon fiber orthosis that limit hallux MTP extension)
• grade III - immobilization vs surgery

Hallux Valgus
• lateral deviation of the great toe at the metatarsophalangeal joint
• prominent medial eminence
• metatarsus primus varus
• pronation hallux
• bursa inflammation
Hallux Valgus

etiology

- improper shoewear
- high heels
- narrow pointed toe box
- familial
- traumatic
- inflammatory

Hallux Valgus

- more common in women than men
- pain over medial eminence
- pain at the first metatarsophalangeal joint
- discomfort with shoewear

Hallux Valgus

treatment

- appropriate shoewear
- stretching of shoes
- for acute bursitis -
  - rest
  - warm compresses
  - open toed shoes
  - surgery for recalcitrant
Conclusion

References


• Shereff, M.J: Overview of Common Foot Disorders 2003

