Foot and Ankle Injuries in Baseball
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Wright Medical/Arthrex/DJO:
Consultant, Royalties, Research

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Consultant

No off-label uses of materials are presented during this lecture

Ankle Sprains are relatively common in baseball

• The Problem
  – 20-40% with chronic pain/disability
  – 10-30% with functional disability
  • Weakness, loss of proprioception, loss of motion, tendinitis
Types of Ankle Sprains

- Lateral ankle sprains
  - Inversion/plantarflexion mechanism ("classic")
- Medial ankle sprains
  - Deltoid ligament injury
- "High ankle sprain"
  - Syndesmosis injury
  - Ext rotation mechanism
  - Increasing incidence

Sprain Types

- Types/mechanism
  - Lateral ankle sprains
    - Inversion/plantarflexion mechanism
  - Medial ankle sprains
    - Deltoid ligament injury
      - Eversion injury mechanism
  - "High ankle sprain"
    - Syndesmosis injury
      - Ext rotation mechanism
      - Increasing incidence

The use of "break away" bases is reducing the overall incidence of these ankle injuries.
Case

- 24 y/o OF with “twisting” injury
  - Tender and swollen medial and lateral
  - Normal x-rays
  - Placed in a boot for 4 days
  - Training room treatments
  - RTP at 7 days

Case

Issues

- Pain persisted
- Functional limitations
  - Weak heel rise, pain with SLSSS
- Persistent swelling/effusion
  - Medial > lateral
- MRI performed
  - “Synovitis”

Case

- Continued swelling and discomfort
  - Difficulty decelerating
- Exam “vague” at 6 weeks
  - Chronic swelling; pain posteromedial
  - Tender over anterior/inferior medial malleolus and lateral
  - (+) anterior drawer with external rotation
Concern for Subtle Instability

Tested for dynamic instability = “syndesmotic taping”
• Player asked to perform single limb heel rise with and without tape wrapped around distal tib-fib
• If tape assists then consider instability and need for syndesmotic fixation

Case
• Decision to proceed with surgical intervention at 8 weeks post-injury
• Intraop exam diagnostic
  – EUA
  – Arthroscopic: medial laxity, syndesmotic instability, lateral OCL

Case
• Intraop repair
  – Chondral debridement
  – Superficial deltoid
    • Medial Brostrom
      – Advance to denuded anterior medial malleolus
    – Syndesmotic stabilization
      • Suture-button fixation
Postop

- NWB in splint x 2 weeks and then NWB in cast x 2 weeks
- PWB in boot for 2 weeks and then FWB in boot for 4 weeks
- DF/PF only
- Progressive strengthening after 10 weeks
- Alter-G, pool running
- RTP at 5 months

Ankle Sprain Summary

- Not all ligament injuries occur in isolation
  - Consider association of superficial deltoid and syndesmotic ligament
- NFL Research: computer modeling of HAS

Ankle Sprain Summary

- If player not improving or serial MRI changes think subtle instability (deltoid/syndesmotic) and need for EUA/scope/stabilization
Foul Ball Injuries

- Ankle
  - Anterior tibia
  - Malleoli
  - Talus
- Foot
  - Medial
    - Navicular
  - Dorsum
  - 1st metatarsal

Don’t get too excited – usually contusions
- Soft tissue; bone bruise
Can treat nonop unless displaced

Work up should include an MRI if player unable to weight bear
- CT if MRI notes bone edema
Foul Ball Injuries

- CT if MRI notes bone edema

Treatment – in general...
- Ice/NSAIDs
  - Indomethacin
- Boot, WBTT
- Bone stimulator
- RTP when they can hop x 30 and perform 20+ SLHR

Foul Ball Injuries

- Case example of medial midfoot impaction
  - Tender and swollen over navicular tuberosity
  - PTT intact but pain against resistance
**Foul Ball Injuries**

- MRI performed
  - Edema in navicular
  - CT negative for fracture
- Placed in boot/arch support with WBTT
- Bone stim initiated
- RTP at 4 weeks with orthosis in shoe (protect PTT)

**Case**

- 33 y/o 1st baseman with foul ball to dorsum of the foot
- Pain and swelling
  - Worse with WB
- Xrays appear normal

**Case**

- Persistent pain and swelling
- MRI performed
Case

- CT performed
  - No detectable fracture
- WB in boot for nondisplaced fracture of the 1st metatarsal

Case

- Began running in pool at 2 weeks
- Persistent swelling and tenderness
- Repeated CT and MRI at 4 weeks
  - Well healed
  - Heterotopic ossification
  - Indocin initiated
  
  RTP at 5 weeks

Case

- Direct impact to lateral ankle in 28 y/o 1st baseman – x-rays negative. MRI performed.
Case

• Communitied distal fibular fracture
  – Peroneal pain

Case

• Debridement of fragments, peroneal decompression, groove deepening
  – RTP at 3 months

Foul Ball Summary

• Treat most like a contusion or stress reaction
  – Relative rest
  – Bone stim
  – Vit D/Calcium
• Fix if displaced
• Consider tendon insertion
Plantar Heel Pain

- Etiologies
  - Heel pain syndrome
    - Plantar fasciitis
    - Entrapment of 1st branch of LPN
    - Inferior calcaneal bursitis
  - Calcaneal stress fracture

Plantar Heel Pain in Baseball

- Etiologies
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Plantar Fascial Rupture

- Often prior cortisone injection(s) for fasciitis
- Diagnosis
  - Plantar ecchymosis
  - Palpate medial band and compare to contralateral
PF Rupture

• Diagnosis
  – Plantar ecchymosis
  – Palpate medial band and compare to contralateral

PF Rupture

• Diagnosis
  – MRI
    • Disruption at origin
    • Soft tissue inflammation
    • Late hypertrophy

PF Rupture

• Sequelae
  – Loss of arch height → pronation deformity
  – Lateral column foot pain
    • C-C joint synovitis
    • Cuboid stress reaction
PF Rupture

• Sequalae
  – Loss of arch height → pronation deformity
  – Lateral column foot pain
    • C-C joint synovitis
    • Cuboid stress reaction

PF Rupture

• Sequalae
  – Metatarsal stress fractures

PF Rupture

• Treatment
  – Early diagnosis key!
  – Place directly into short leg cast
    • Mold arch
    • WBTT
PF Rupture

Treatment
- Serial exams
  - Weekly
  - Recast for tenderness
    - Average 2.5-3.5 weeks

PF Rupture

Treatment
- Gortex cast allows for continued rehab/conditioning/pool therapy

PF Rupture

Treatment
- Rehab
  - Night splint
  - Toe flexion (strengthening) exercises
  - Gentle windlass stretch
  - Achilles stretching
PF Rupture

• Return to play when pain allows
  – Avg. 4-6 weeks
  – Use orthotic device
  – Taping
  – Full length turf toe plate

PF Rupture

• Return to play
  – My experience in NFL is avg 4.3 weeks
  – Saxena, AMSM ’04
    • 18 athletes
    • RTP at 9 weeks (+/- 6)

Sesamoid Disorders
Anatomy

- Sesamoids of the hallux
  - fibular
  - tibial
- Joined by inter-sesamoid ligament and suspended by MT-sesamoid ligaments

Anatomy

- Delicate balance
- Cross section
  - FHL protected and centralized by the sesamoids

Biomechanics

- Like the patello-femoral joint...
  - Chondromalacia
  - DJD
  - OCL
  - Loss of strength with excision
Imaging
• Radiographs
  – Standing AP/bilateral
  – Axial
  – Oblique (for fx)
  – Use marker
• MRI
• Bone scan
  – Pinhole image
• CT

Diagnoses
• Fracture
  – Acute
  – Stress
• Sesamoiditis
• Chondromalacia
• Osteochondritis dissecans
• Osteonecrosis
  – Fibular > Tibial

Nonoperative Treatment (in general…)
• Acute
  – NSAIDs
  – Cast, boot, sandal
  – PT
• Chronic
  – Orthosis
  – Shoe with rigid sole/cushion
  – Injection?
Operative Treatment

Surgical Indications
• Failure of conservative treatment (>6 months)
• Pain/tenderness - localized to one sesamoid
• Diagnostic studies identify abnormality

Surgical Options
• Sesamoidectomy
  – Total
  – Partial
• Plantar shaving
• Bone graft fractures
• Soft tissue reconstruction (turf toe)

Sesamoid Surgery
• Sesamoidectomy most common and not career ending
  – Identify and protect digital nerves
  – Must repair the defect
    • FHB and volar plate
Abductor Hallucis Transfer

- Transfer with tibial sesamoidectomy in athletes
  - Transfer fills plantar defect
  - Provides flexion power
- TFAS, Anderson '02

Case: 20 y/o baseball player with fragmented tibial sesamoid

Case: 20 y/o pitcher who felt “pop” running off the mound
Case: 20 y/o pitcher who felt “pop” running off the mound

- MRI confirms fracture of fibular sesamoid
- Flouro helpful
  - Increased separation of fragments with DF of hallux

Case: Required reconstruction of the plantar plate with fibular sesamoidectomy

Case: Outfielder

- 25 y/o OF with history of fibular sesamoidectomy 13 months ago
- RTP at 4 months
Case
- Felt “pop” and pain in plantar hallux mp joint
- MRI done

Case
- Tibial sesamoid fracture
- CT performed
  - Acute tibial sesamoid fracture

Case
- Boot
- Bone stimulator
- Orthosis
- Pain persists
- Have to avoid excision due to loss of push-off strength
Case

• Tibial sesamoid bone grafting
  – Calcaneal BG
• Plantar sesamoid shaving

Case

• CT at 3.5 months
• RTP at 5 months
  – Orthosis to protect hallux mp joint

Postop Sesamoidectomy – Go Slow!

• Non-WB x 2 weeks
• Maintain hallux alignment/protect in boot for 6-8 weeks
• No running for 3 months – orthosis for 6 months
• RTP around 4-5 months
Stress Fractures
• Occur in all sports
• Navicular most concerning

Navicular Stress Fractures
• Difficult to diagnose
• Have a high suspicion
  – Always a possibility in the running athlete
  – Vague anterior ankle pain without the pathology
  – Xrays often negative
  – *Don’t want to miss these!!!*

Unexplained Anterior Ankle Pain
• Image early
  – MRI or bone scan
  – CT mandatory if abnormal
  • Differentiates stress reaction vs. fracture vs. nonunion
Navicular Stress Fractures

- Nonop Treatment
  - Torg et al
  - SLC x 4 weeks; NWB
  - SLWC x 4 weeks
  - Repeat CT

Torg: 89% naviculatrs healed in 4 months (no CT)

“Incomplete” Stress Fractures

- Beware!
  - I find that these tend to progress to complete fractures or nonunion
    - McCormick et al: AJSM ’12
      - Complete fx with worse prognosis
  - Follow with CT every 6 weeks
  - I am quick to operate!

Case

34 y/o 1st baseman with ankle pain
- No injury
- Started in August and gradually getting worse
- Xrays note impingement lesions
Case
34 y/o player with ankle pain
• Played thru the playoffs
• MRI performed

Case
34 y/o pro player with ankle pain
• CT noted complete navicular fracture

Case
Surgery
• Open debridement of ankle
• Bone graft and ORIF of navicular
Case
Postop
- NWB in splint/boot for 6 weeks
- WB in boot for 6 weeks
- CT at 12 weeks
- Running at 5 months
- Made Opening Day

Case
24 y/o pro player with ankle injury
- Excessive DF hitting the wall
- Lateral and anterior pain
- Diffuse ecchymosis/swelling

Case
24 y/o pro player with ankle injury
- Negative xrays
- MRI performed same day
Case

Rehabbed
- Peroneal strengthening
- Ankle brace
- Persistent lateral discomfort with activity
  - “something slipping”

Case

Seen 2 months after the injury
- Tender along posterior fibula
- Peroneals intact
  - No obvious dislocation
- Anterior impingement sign

Case

Decision made to proceed with surgery
- EUA/Scope
  - Loose body
  - Lesion off anterior distal tibia
- Peroneal exploration
Peroneal Tendon Dislocation

My preferred technique

• Fibular groove deepening
  – Indirect
  • Maintains soft tissue on peroneal floor
  • No osteotomy to heal

Dislocation

Debridement
Groove Deepening: Indirect
Shawen and Anderson Tech. Foot Ankle Surg. 2004

Repair

Peroneal Repair with Cavovarus

• Consider realignment osteotomy
  – 1st metatarsal osteotomy
  – Protects reconstruction
Thank You!