Foot and Ankle Injuries in the Hockey Player
A Case-Based Approach

Keep Your Edge: Hockey Sports Medicine 2015

Bradley J. Nelson, M.D.
Associate Professor
Sports Medicine and Shoulder Service
University of Minnesota Orthopaedics
TRIA Orthopaedic Center

Jeff Winslow, ATC
Head Athletic Trainer
University of Minnesota Men’s Ice Hockey
Disclosure

- Industry funded research: Depuy (J&J), Omeros, Histogenics, Zimmer

- I will not discuss off label use and/or investigational use in this presentation
Case #1

- 24 yo college hockey player injured in early December
- Mechanism of Injury
  - Turned towards boards to cycle puck back
  - Toe of skate stuck against the boards
  - Opposing player struck lateral knee
  - External rotation injury to ankle

- Physical Examination
  - Difficulty with weight bearing
    - Limp
  - Minimal anterior swelling initially
  - Tender ~10 cm up syndesmosis
  - Positive squeeze and external rotation tests
  - Unable to do heel raise
Radiographs
MR Imaging
Syndesmotic Ankle Sprains

“High Ankle Sprain”

- 10-20% of ankle sprains overall
- Is hockey different?
  - 50% of ankle sprains in NHL
  - Dallas Stars and St. Louis Blues
    - 74% of ankle sprains
    
Wright, Barile, et al AJSM, 2004

- Rigid boot
  - Higher incidence in downhill skiers
Anatomy and Biomechanics

- Synovial joint
- Fibula sits within a groove in the tibia
- Ligaments
  - Anterior inferior tibiofibular ligament
  - Posterior inferior tibiofibular ligament
  - Interosseous ligament
  - Deltoid ligament
- Small amount of movement
  - 2 mm translation
  - 2-5° rotation
Mechanism of Injury

- External rotation and dorsiflexion
  - Talus causes fibula to separate from tibia
  - Ligament disruption
  - Maisonneuve fracture

- Severe inversion injury
  - Not common in hockey
History and Physical Examination

- External rotation and dorsiflexion injury
- Anterior and posteromedial pain
- Swelling – but not much
- Tenderness
  - Between tibia and fibula
    - Days lost = 5 + cm of tenderness
  - Deltoid
  - Proximal fibula

- Squeeze test
- External rotation tests
- Stabilization test

Nussbaum, AJSM, 2001
Radiographs

- Weight bearing AP, Mortise, and Lateral
  - Diastasis
    - Clear space greater than 6 mm

- Stress films
  - Questionable reliability
  - Difficult out of the OR setting
MR Imaging

- Very sensitive and specific
  - Confirms the diagnosis
- Associated injuries
- Not predictive of the need for surgery
- NFL - May help determine time missed

Sikka, et al Foot and Ankle 2012
Arthroscopy

- Best test for dynamic instability
  - Superior to stress fluoroscopy

- Manage chondral damage and loose bodies

Williams, AJSM, 2007
Management

- Stable = non-operative treatment
- Unstable = surgical stabilization
- Determining subtle instability is the hard part!
  - Arthroscopic evaluation

- But who?
  - Serial physical examinations
  - Failure to improve over 7-10 days
    - Difficulty weight bearing
    - Inability to do a single leg heel raise
    - Inability to hop
Surgical Stabilization

- Wide diastasis
  - Open reduction
  - Fixation
  - Repair the deltoid
- Subtle instability
  - Arthroscopic and/or fluoroscopic guided reduction
  - Fixation

Bob Anderson, MD
Fixation

- Screws
  - 2 screws
  - 3 or 4 cortices?
  - Remove?
- Buttons
  - Low profile, no need to remove
  - Some motion
- Buttress plate and buttons
  - More rapid return in the athlete
    - Bob Anderson, MD
- Stay above the syndesmotic joint
  - Minimum 1.5 cm above joint line
- Ankle position does not matter but clamp position is important
- No difference:
  - Screws vs. buttons
  - 3 vs. 4 cortices
  - Remove vs. leave
Postoperative Care

**Wide diastasis**
- Go slow
  - Cast and toe touch weight bearing
  - Start range of motion at 6 weeks
  - Return at 4-5 months

**Subtle instability**
- Go faster
  - Early weight bearing and range of motion in boot
  - Advance sport specific rehab as tolerated
  - Return to sport at 6-8 weeks
Outcomes

Rate of return to play is high but:

- Persistent pain
  - Almost universal early after injury
  - Late mild discomfort common – 60%

  Taylor, AJSM 1992

- Chondral damage
  - 48% by MRI in acute injuries
  - 20% OA in chronic injuries

  Brown, AJR, 2004

  Late diastasis or malreduction is a risk

- Interosseous calcification
  - Relatively common ~50%
  - Operative and nonoperative treated patients
  - Less frequently requires resection for persistent pain

Bob Anderson, MD
Rehab Goals – Acute Phase
1-2 Weeks

- Protection – Limit ER
  - PWB in walking boot with crutches
  - Heel wedge???
- Reduce Inflammation and Pain
  - Compression – Stockinette/NormaTec/etc.
  - Soft tissue edema work
  - Protected range ankle pumps/toe curls
  - Cryotherapy
Rehab Goals – Subacute Phase
2-4 Weeks

- Protect the syndesmosis
  - Avoid exercises that force DF/ER
- Work toward full ROM
- Restore proprioceptive/neuromuscular control
  - Do exercises with extended knee
- Restore strength to a functional level
  - Avoid deep squats
  - Role of retro-walking on treadmill
Rehab Goals

Functional Strengthening/RTP

4-6 Weeks

- Increase strength/explosive strength
  - Primarily achieved in weight room
- Begin on-ice progressions
  - Progression of intensity more important than progression of on-ice maneuvers
- Important not to overlook mental readiness during RTP progression
- Player returned at 6 weeks
  - Continued “tweaks” for ~4 weeks
Return to Hockey

- Longer time lost than other sports
- 14 NHL players
  - 13 treated nonoperatively
  - One with syndesmosis screw fixation
  - 45 days missed
  - Compared to less than 2 days for a lateral ankle sprain

Wright, Barile, et al AJSM, 2004
Case #2

- 22 yo hockey player struck with puck on the left instep
- Played two shifts and felt something move
- Swelling and tenderness along 1st metatarsal
- Crepitation
Radiographs
Surgical Stabilization

- ORIF 3 days after injury
- 2 screws placed in lag fashion
Post-operative care

- Weight bear as tolerated in a boot
- Bone stimulator
- CT scan and radiographs at 3 weeks showed excellent healing
- Return to practice at 3 weeks
- First game at 5 weeks
Foot Fractures in Hockey

- Foot injuries make up 6% of all hockey injuries in the NHL
- Secondary to trauma from the puck
- Most are minimally displaced and stable
  - Crush injuries

“Peripheral bones”
- 1st and 5th metatarsals and phalanges
- Cuboid and navicular
Treatment

- **Nonoperative - stable fractures**
  - Weight-bearing as tolerated in boot
  - Allow skating as tolerated
  - Return to play as tolerated with protection
- **How long?**
  - 4-6 weeks for bone healing
  - Individualized

- **ORIF considered for some:**
  - Displaced, unstable fractures
  - Intra-articular fractures

www.aofoundation.org
ATC Perspective

- Shot blockers
  - Helpful
  - Mandated for practice
  - Encouraged for games
    - Especially defensemen
- Art of return to play
  - Each player and fracture is different
  - Managing player and coach expectations
Thank You!