Forefoot Injuries in Athletes

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Disclosure

• No relevant disclosures to report.

Forefoot Injuries in Athletes

• Sprains
  – 1st MTP
  – Lesser MTP
• Fractures
  – Mid to Distal MT fractures
  – Toe fractures
• Nail Bed Injuries

1st MTPJ

An important component of the healthy lower extremity

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Biomechanics

1st MTPJ joint is designed for the transmission of tremendous power to the great toe and multiples of body weight through the foot.

Turf Toe

- Sprain of the plantar capsuloligamentous complex
- The profound athletic disability poignantly illustrates the great toe's relevance to the lower extremity

Mechanism of Injury

- Hyper-dorsiflexion
- Also:
  - Varus
  - Valgus
  - Plantarflexion

Bowers and Martin, 1976

- Forced dorsiflexion mechanism of injury in football players
- Related to the use of flexible soccer style shoes on hard artificial turf (1st Gen)
- Established “shoe-surface relationship”

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**History**

- Axial load
- Dorsiflexion 1st MTP

**Physical Exam**

- Circumferential swelling
- Bruising
- Tenderness centered on the first MTPJ
- Passive extension is painful and guarded
- Resisted plantar flexion may be weak
- Instability may be present

**Imaging- Radiographs**

- STS at the 1st MTPJ
- Subtle avulsion fx
  - Base of the P1
  - MT head
- Compression fx dorsal aspect of the MT head
- Overt fx sesamoid(s)
- Sesamoid proximal migration

**Imaging- MR**

- Dedicated extremity coil
- 3 Tesla magnet if available
- Plantar plate edema with partial or complete rupture
- Sesamoid edema or fracture
- Dorsal impaction fracture at the MT head

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Clanton Classification

<table>
<thead>
<tr>
<th>Grade</th>
<th>Injury</th>
<th>Treatment</th>
<th>Return to Sport</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Capsular stretch without discrete tear</td>
<td>Symptomatic</td>
<td>Immediate</td>
</tr>
<tr>
<td>2</td>
<td>Partial capsular tear</td>
<td>Brief restricted weight bearing</td>
<td>1-14 days</td>
</tr>
<tr>
<td>3</td>
<td>Complete capsular tear with possible dorsal impaction fracture of the first MTPJ</td>
<td>Long-term restricted weight bearing</td>
<td>3-12 weeks</td>
</tr>
</tbody>
</table>

Initial Treatment

- RICE
- Non-weight bearing pending formal evaluation
- Subsequent treatment is dictated by the grade of injury

Grade 1

- Weight bearing as tolerated
- Post-op shoe or stiff shoe supplemented by a carbon fiber plate

Grade 1- Patient education

- Stiff-sole shoe
- Carbon fiber plate
- Taping program to resist DF at 1st MTPJ
Grade 1 - Patient education

- Stiff sole shoe
- Carbon fiber plate
- Taping program to resist DF at 1s MTPJ

Grade 2 - Patient education

- Stiff-sole shoe
- Carbon fiber plate
- Taping program to resist DF at 1s MTPJ

Grade 1

- Non-weight bearing (3-7 days)
- Splint
- Cold therapy
- Cast boot
  - Weight bearing to tolerance

Grade 2

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Grade 3- Non-Surgical Treatment

- Non-weight bearing for up to 8 weeks
- Physical therapy
  - Active ROM
  - Coordinated activity
    - Towel scrunches
    - Toe pick-ups

Grade 3- Non-Surgical Treatment

- Physical therapy
  - Joint mobilization

Grade 3- Non-Surgical Treatment

- Return to sport phase
  - 3 to 12 weeks after injury
  - Plyometrics
  - Sport-specific drills
  - Appropriate shoe wear and taping

Grade 3- Surgical Treatment

- Infrequent
- Unstable joint
- Intra-articular loose bodies
- Retracted sesamoids
- Traumatic bunion
Grade 3- Surgical Treatment

• Medial approach
  – Extensile
  – Plantar to the midline
• Plantar approach
  – Extensile
  – “L”
• Remove loose bodies

Surgical Treatment

• Plantar plate repair
  – 2-0 braided, non-absorbable sutures
  – Suture anchors base of the P1
  – Repair or partial excision sesamoid fractures
  – Repair of MCL

Turf Toe Complications

• Intrinsic minus toe- cock-up
• Loss of push-off power
• Stiffness
• Pain
• Hallux valgus
• Hallux rigidus
• Osteoarthritis
• Transfer lesions

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Hallux Rigidus

Lesser MTP Sprains
- Uncommon
- Barefoot and sandals

Lesser MTP Sprains
- Classification
  - Low grade
  - Hi grade
    - No dislocation
    - Dislocated
      - Reducible
      - Irreducible

Treatment for Stable Joints
- RICE
- Cast boot or stiff shoe
- Return to sport
  - protective shoe
  - inserts
  - taping

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Treatment for Dislocated Toes

- Reduce dislocated joints as soon as possible
  - Local or general
  - Closed reduction
  - Open reduction and repair
  - Once reduced and stable
    - Cast boot or stiff shoe
  - Return to sport
    - Protective shoe
    - Inserts
    - Taping

Lesser Toe Sprain Complications

- Chronic dislocation
  - Painful
  - Hard to fit in shoe
  - Progressive arthritis
- Deformity
- Stiffness
- Osteoarthritis

Mid to Distal MT Fractures

- 1
  - Relatively stable
  - Significant weight transfer
- 2 and 3
  - Longer
  - Most stable
  - Least forgiving

Mid to Distal MT Fractures

- 4 and 5
  - Vulnerable to twisting
  - Least stable
  - Most forgiving
Mid to Distal MT Fractures

• Intra-articular fractures
  – Need near perfect articular alignment
  – May lead to pain, deformity, stiffness, and OA

Treatment

• Non-surgical treatment
  – Adequate alignment
  – Perfect joint alignment
• Surgical treatment
  – Mal-alignment
  – Articular incongruity

Non-Surgical Treatment

• Cast
• Cast boot
• Non-weight bearing or WBTT
• Functional foot and ankle rehab

Surgical Treatment

• ORIF
  – Adequate bone
  – Minimal comminution
  – Aim for perfect alignment and congruity

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Surgical Treatment

- Open reduction and k-wire fixation
  - Inadequate bone stock
  - Severe comminution

Distal MT Fracture Complications

- Delayed union
- Non-union
- Malunion
  - Metatarsalgia
  - Transfer lesions

Distal MT Complications

5th MT Malunion with Toe Abduction

Toe Fractures

- Great toe
  - Majority of weight transfer
  - Least forgiving
- 2, 3, 4 toes
  - Relatively protected
- 5 toe
  - Unprotected
  - Very forgiving

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Treatment

• Non-surgical treatment
  – Adequate alignment
  – Perfect joint alignment at MTP and Great Toe IP
• Surgical treatment
  – Mal-alignment
  – Articular incongruity at MTP and Great Toe IP
  – Nail Bed Lacerations (Open Fractures)

Non-Surgical Treatment

• Nail management
• Cast
• Cast boot
• Non-weight bearing or WBTT
• Functional toe and foot rehab

3rd Toe Distal Phalanx Fracture
Surgical Treatment

• ORIF
  – Adequate bone
  – Minimal comminution
  – Aim for perfect alignment and congruity

Surgical Treatment

• Open reduction and k-wire fixation
  – Inadequate bone stock
  – Severe comminution

5th Toe Fracture Dislocation

5th Toe Fracture Dislocation

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5th Toe Fracture Dislocation

Nail Bed Laceration
13 yo, soccer player, hyper-PF

Nail Bed Repair
• Remove Nail Plate
• Debride fracture
• Reduce Fracture
• Fracture Fixation
• Nail bed repair
  – Fine chromic suture

51 year old, weight fell on toe

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71 year old, car jack injury

Toe Fracture Complications

- Nail deformities
- Pain
- Stiffness
- Arthritis
- Malunion

Don’t be fooled

Subungual Malignant Melanoma

- Deadly
- No history for trauma
- Non-clearing discoloration
- Band of pigment
- Distal skin pigmented

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Thank You!

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