I. Introduction
   A. Definition
      1. Sprain of the 1st metatarsophalangeal joint
      2. Shoe-surface interface problem

II. Historical perspective
   A. Original article: Bowers & Martin, Med Sci Sports, 1976
      1. Coined term “turf toe”
      2. Described the problem related to shoes and surface

III. Mechanism of Injury
   A. Typical scenario - ~85%
      1. Foot fixed in equinus
      2. Axial load
      3. Forefoot progresses into dorsiflexion
   B. Other mechanisms
      1. Valgus component
         a. Leads to traumatic bunion
      2. Varus component
         a. Leads to hallux varus & instability
      3. Hyperflexion – most common in sand volleyball (“sand toe”)

IV. Pathology
   A. Soft tissue injury
      1. Spectrum of injury
      2. Disruption of FHB and plantar capsuloligamentous complex (incl plantar plate)
      3. Distal to sesamoids most commonly
      4. Extent of the tear varies
      5. Loss of plantar restraints
   B. Bone injury
      1. Sesamoid fracture or diastasis of bipartite sesamoid
      2. Ligamentous avulsions or avulsion of adductor tendon
      3. Bone contusion

V. Epidemiology
   A. Incidence in college football – 4.5-6 per season
   B. Survey of 80 NFL players – 45% with history of turf toe injury (83% on artificial turf)
   C. Increasing incidence in NFL despite study designed to define solutions
VI. Anatomy and biomechanics
   A. First MTP joint is unique – sesamoids & intrinsic muscles (abductor hallucis & adductor)
   B. Ligaments
      1. Intersesamoid ligament
      2. Metatarsosesamoid ligament
      3. Tibial and fibular phalangeosesamoid ligaments
      4. Plantar plate

VII. History and Physical Examination
   A. Mechanism of injury (film often helpful)
   B. Severity and duration of symptoms
   C. History of prior injuries
   D. Acute: tender, swollen, ecchymotic, limited motion
   E. Chronic: deformity (hallux varus or valgus, claw toe)
   F. “Lachman exam” (vertical shift test)
      1. Vertical instability = lack of plantar restraints

VIII. Radiographic Evaluation
   A. Mandatory in the evaluation of turf toe
   B. Comparison AP of opposite side recommended
   C. Assess for proximal migration of sesamoids
   D. Forced dorsiflexion lateral view
      1. Assess distance from distal sesamoid to base of phalanx
      2. Should remain the same from PF to DF

IX. Fluoroscopy
   A. AP & lateral views with ROM show whether or not the sesamoids move with the proximal phalanx
      1. A 3 mm difference in sesamoid excursion compared to uninjured side is indicative of injury to at least 3 of the 4 ligaments \(^5\)
   B. Varus/valgus stress views

X. MRI \(^6\)
   A. Very helpful if quality imaging – focused field of view, 1.5 or 3T, proton density fat suppressed
   B. Identifies osseous and articular damage
   C. Subtle injuries
   D. Helps with decision making
## Classification System for Turf Toe Injury

<table>
<thead>
<tr>
<th>Grade</th>
<th>Objective Findings</th>
<th>Activity Level</th>
<th>Pathology</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Localized plantar or medial tenderness</td>
<td>Continued athletic participation</td>
<td>Stretching of capsuloligamentous complex</td>
<td>Symptomatic</td>
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<tr>
<td></td>
<td>Minimal swelling</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>No ecchymosis</td>
<td></td>
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<tr>
<td>2</td>
<td>More diffuse and intense tenderness</td>
<td>Loss of playing time for 3-14 days</td>
<td>Partial tear of capsuloligamentous complex</td>
<td>Walking boot and crutches as needed</td>
</tr>
<tr>
<td></td>
<td>Mild to moderate swelling</td>
<td></td>
<td>No articular injury</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mild to moderate ecchymosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Painful and restricted range of motion</td>
<td></td>
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<tr>
<td>3</td>
<td>Severe and diffuse tenderness</td>
<td>Loss of playing time for 2-6 weeks</td>
<td>Tear of capsuloligamentous complex</td>
<td>Long-term immobilization in boot or cast vs. surgical repair</td>
</tr>
<tr>
<td></td>
<td>Marked swelling</td>
<td></td>
<td>No articular injury</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate to severe ecchymosis</td>
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<td></td>
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<tr>
<td></td>
<td>Range of motion very painful and limited</td>
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</tbody>
</table>


### XI. Conservative Treatment (typically effective in 98%)

#### A. R.I.C.E

#### B. Immobilization acutely

#### C. Early mobilization and rehab as soon as symptoms allow7

1. Stiffness is a common sequela of this injury with prolonged immobilization

#### D. Restrict dorsiflexion by stiffening shoe

#### E. Carbon fiber or graphite shoe insert to reduce energy transfer during push-off

#### F. Taping techniques

#### G. Cast or walking boot may be indicated in more severe cases

#### H. Return to play dictated by symptoms (see classification table for guidelines)

1. Anesthetic or steroid injections not recommended due to possible further joint deterioration or injury

### XII. Surgical Treatment

#### A. Indications

1. Failure to respond to non-op treatment

   a. Pain

   b. Loss of push-off strength

2. Capsular avulsion w/ instability

3. Diastasis of bipartite sesamoid or fx

4. Retraction of sesamoids

5. Intra-articular loose bodies

6. Traumatic hallux valgus or varus

7. Displaced sesamoid fracture

#### B. Risks

1. Continued pain

2. Stiffness

3. Swelling

4. Nerve injury
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Saturday, March 18, 2017  
Foot and Ankle Trauma in the Athlete – Getting Them Back in the Game

5. Inability to return to the same level of performance

XIII. Surgical Goal  
A. Restoration of anatomy is necessary for restoration of function  
B. Strong repair  
C. Early protected motion

XIV. Surgical Technique  
A. Exposure through medial or J-incision  
B. Avoid injury to plantar medial cutaneous nerve  
C. Identify defect in plantar capsule  
D. Assess condition of FHL tendon  
E. Advance capsule and repair (new instrumentation or anchors)  
F. Work from lateral to medial  
G. Avoid nerve  
H. Repair with drill holes or suture anchors to base of proximal phalanx  
I. Complete repair with advancement of medial capsule  
J. Sesamoid fracture  
   1. ORIF or excise (prefer latter)  
   2. Option to reconstruct with transfer of the abductor hallucis tendon  
   3. Transfer indicated after sesamoidectomy  
   4. Transfer fills plantar gap  
   5. Sesamoidectomy results in loss of push-off strength (tibial=11%, fibular=19%)

XV. Postoperative Management  
A. Balance protection and early ROM  
B. Immobilize for 7-10 days → active plantar flexion, but block DF  
C. 4 weeks PWB, then walking boot & begin active ROM, but avoid forced DF  
D. Stiff-soled shoe with insert/plate at 6-8 wks  
E. Resume practice at ~4 months  
F. 4-5 months – return to play  
   1. Taping, shoewear modifications  
      a. Goal: Prevent dorsiflexion

XVI. Rehabilitation with nonoperative treatment and return to play  
A. Grade 1 injuries – manage symptomatically, tape, stiffened insole/shoewear, usually little if any lost playing time  
B. Grade 2 injuries – walking boot ± crutches, RICE, WBAT, ROM exercises, usually return to play in 3-14 days but can take longer  
C. Grade 3 injuries – walking boot or short period in walking cast, crutches as needed, start motion into PF at 10-14 days, start ROM with DF at 2-3 wks, protect from hyperdorsiflexion, usually return to play in 2-6 wks, but longer when surgery required
Summary

A. Be aware of injury & potential serious consequences
B. Examine and listen to patient carefully
C. Repair when instability present or other specific indications
D. Avoid nerve injury
E. Protect post-op from dorsiflexion but start plantar flexion early
F. Use protective shoewear & insoles, tape for support

References