Talar Fractures: Anatomy, Imaging, Classification

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Talar Fractures

• Talar Neck
• Talar Process
  – Lateral Process
  – Posterior Process
• Talar Dome
• Talar Head

  Neck > Body > Lateral/Medial Process

• Usually high energy – fall, MVA
• Associated Fractures

The following relationships exist:
Partial Owner: Midtowne Surgical Center
Grants: OTA, NIH/FAITH, DOD/METRC
Boards non reimbursed: OTA, MAOA, MOS
Evaluation

Integument/Skin

Tendon/Function

Vascular

Neural

Osseous Anatomy

60% Articular Surface
Multiple 3D Articulations
Determine Motion
No Muscle Attachments
Minimal Ligament Attachments

Ligament Anatomy
Vascularity

Many disrupted at time of injury
Careful to maintain dorsal capsule and inferior ligaments

Radiographic Imaging

- Lateral Ankle
  - Neck & Posterior Process

- Mortise Ankle
  - Talar Dome & Lateral Process

- Broden
  - Lateral Process

- Canale
  - Talar Body & Neck
CT Imaging

- Reconstruction
  - Axial
  - Coronal
  - Sagittal
- 3D with & without other osseous structures
  - True anatomical relationships
  - Determine other associated injuries

OTA/AO Classification

[Diagram of OTA/AO Classification]
Hawkins Classification
Hawkins, LR, JBJS, 52A: 991, 1970

I) Nondisplaced
<10%, OTA 81-B1

II) Subtalar
Displacement
<40%, OTA 81-B2

III) Subtalar & TC
~90%, OTA 81-B3

IV) *Pantalar
100%

*Canale, ST, JBJS, 60A: 143, 1978

Example – Hawkins 1 or 2

Hawkins 2
Hawkins 2 with lateral process fx

Hawkins 3

Hawkins III with Talar Dome
Lateral Process Fractures

Frequently missed (40%)

Suspect in all ankle injuries

Snowboarders

Dorsiflexion Inversion

External rotation

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Posterior Process Talus

Skate boarder
Talar Body Fracture

Conclusion

• Injury
  – High Energy – Fall, MVA

• Anatomy
  – Complex 3D Articulations
  – No Muscular Attachments

• Vascularity
  – Sinus Tarsi a.
  – Tarsal Canal a.

• Classification
  – OTA/AO
  – Hawkins

Thank You
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- SLACK Incorporated
  - Royalties
- Full Disclosure Online at AAOS.org

**Second most common fracture among all tarsal bones**

- **Epidemiology**
  - 0.34% of all fractures
  - 30-50% of all talar fractures are necks
  - 3.4% of all foot fractures
  - 13% Neck fx's present as open injuries
- **Mechanism of injury:**
  - Dorsiflexion/Axial load
FRACTURES OF THE TALAR BODY

- Occur infrequently at a rate of 1% of all talar fractures
- Not much in literature, most are discussed as part of talar neck injuries

**Mechanism of injury**
- Axial compression of talus between calcaneus and tibial plafond

Studies have demonstrated

- During weight bearing > 90% of the load applied to the central part of the talar dome.


Studies have also demonstrated

- Decrease in 42 percent of contact of the fibio-talar joint with 2mm of displacement

Studies have also demonstrated

- 2 mm neck displacement alters mechanics of the ant and middle facets of the subtalar joint

Sangeorzan et al, J Orthop Res, 1992

Non-operative Treatment

- **Indications: Non-Displaced Fractures of the Talus**
  - Need to be certain that this is truly a nondisplaced fracture. Any displacement indicates some degree of subtalar subluxation
  - CT scan

Operative Treatment

- **Indications:**
  - Any Displaced Body or Types II-IV Neck Fractures
  - ALL NEED SURGICAL TREATMENT!!!
The Key is to recognize the injury.

60 y/o F, fell through attic.

Day 39

Open fracture?
- No: Elective treatment
- Yes: Emergent Treatment
Is there a dislocation?
- No: Elective treatment
- Yes: Emergent reduction

Physical Examination
- Foot is often swollen
- Ecchymosis, Blisters +/-
- Check for wounds
- Neurovascular exam
  - Pulses
  - Temperature
  - Refill
  - Sensation

Significant edema
Delay In Treatment

- Until good wrinkling of the skin is noted
  - Make take 2-3 weeks
  - Don’t fit them conveniently into surgery schedule
  - Splint all patients
  - See them at weekly intervals
Conclusions
- All displaced fractures body and neck need surgery
- Emergent Care
  - Dislocated fractures
  - Open fractures
- Wait for skin wrinkling

Thank You
Current Concepts in Talus Surgery

April 14, 2015

Objectives

Demonstrate familiarity with…

• Dual approach
• Posteromedial approach to talus

Introduce typical fixation constructs

42 M asleep at wheel. Displaced talar neck
Surgical Approaches

Fractures of the talar neck should be approached with DUAL incisions

Let's begin laterally...
Now for the medial side.
Medial
Assess dorsomedial comminution

Lateral
Extra-articular neck
Subtalar debris
Lateral process fx

Combined
Rotational reduction
Axial alignment

Medial Approach
Anterior tibial tendon
Posterior tibial tendon
Osteotomy

Inaccessible medial body fx
Precise aim toward medial shoulder
Drill prior to osteotomy
Implants?
Small / mini fragment fixation

- 3.5 mm
- 2.4 mm
- 2.0 mm
- 1.5 mm
- Kirschner wire

Plate fixation example

[Image of plate fixation example]
Summary:

Dual approaches required
- Lateral: Subtalar joint, lateral process, extra-articular neck
- Medial: Assess comminution
- Both: Rotational and axial alignment

Small caliber implants
Thank you!
Vu Medi Webinar

Lateral Process
Talar Fractures

Peter A. Cole, MD
Professor, University of Minnesota
Chief of Orthopaedic Surgery, Regions Hospital
April 14, 2015

“The Ankle Sprain that isn’t”
Steve Benirschke, MD

Lateral Process Fractures

39 Year old twisted ankle playing soccer.
6 Months Later

Radiographs
Mortise, Lateral, Canale
CT SCAN
Fracture Patterns

- Small → Substantial (↑ % of SubTalar Joint)
Treatment Decision

Fix Vs Debride

- Based upon SIZE and % of SubTalar Joint

Small Fragment & Small %

- Immobilize/Cast → 6 weeks
- If chronic pain or nonunion → Debride Later

Fixation: Implant Selection

Mini Frag  1.0mm – 2.7mm ø Screws
- Single Large Fragment → 2.7mm ø Screw Adequate
- Comminuted Fracture → 2.0mm Buttress plate
  fits hollow of hard lat talar process shelf & Talar Neck Junction
Surgical Approach

Incision

Over Sinus Tarsi

Ant Distal Lateral Mal to Base of 4th Metatarsal

Soft Tissues

- Extensor Brevi mobilize anteriorly

- Sinus Tarsi Fat
  - debrided for adequate exposure

Preserve capsular & ligamentous attachments when possible.
Deltoid Artery and Artery of the Tarsal Sinus

Wound Closure
CASE 1

29 Year old boyfriend jumping out 2nd story.

Axial CT Cuts
Perpendicular to Subtalar Joint
CASE 2
49 Year old female stepping off icy curb.

Surgery: 12 weeks post injury
Take Home Messages

- “The ankle sprain that isn’t.”
- Mortise & Lateral X-ray
- Simple vs comminuted
- % of Subtalar Joint
- Debride vs Fix
- MinFragment fixation (1.2 mm-2.7)
- Immobilize 10 days, NWB for 6-8 weeks