



## Episode 29 - Calcaneus Fxs w/Dr. Dowd- Show Notes



### History/Physical

- Assess the soft tissue envelope for swelling
  - a. skin blisters
  - b. compartment syndrome
  - c. skin necrosis
  - d. open fractures

### Associated injuries

L spine fractures  
Tibial plateau fxs,  
Tibial pilon  
Talar neck



## Imaging

### *AP/ Lateral Radiograph*

- Can assess **Angle of Bohler** on lateral view
  - a line drawn from the highest point of the anterior process of the calcaneus to the highest point of the posterior facet and a line drawn tangential to the superior edge of the tuberosity
  - Normal is 20-40 degrees
  - Decrease indicates weight bearing posterior facet of the calc has collapsed
- **Critical angle of Gissane**
  - Formed by two strong cortical struts extending laterally
    - One along lateral margin of posterior facet and other from anterior to beak of calc
    - Can see it directly below the lateral process of the talus
    - A decrease bohlers and increase in gissane is only seen if the entire facet is separated from the sustentaculum and depressed





### *Harris heel view*

- *Allows visualization of the joint*
- *Loss of height*
- *Increase in width*
- *Angulation of the tuberosity fragment*

### *Broden's view*

- Foot in neutral flexion, and leg internally rotated 30-40 degrees. Beam centered over lateral malleolus
- Xrays at 10-40 degrees towards head of patient. 10 degree view shows posterior portion of facet, 40 degrees shows anterior portion of facet
- A mortise ankle view will reproduce

### Ankle series

Consider CT imaging if intra-articular component to fracture

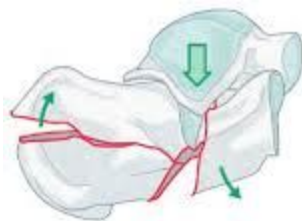
### **Anatomy/Mechanism**

- Typically high energy trauma, such as a fall from a height or a MVA
- Essex-Lopresti
  - a. Primarily fracture line produced by lateral talus impacting the crucial angle of Gissane, dividing the lateral wall and body of the calc. Fracture line exit at anterior process or calcaneocuboid joint
  - b. Secondary fracture line -
    - If force directed posterior = fracture continues posterior into posterior facet = **joint depression type**
    - If force was directed axially, a **tongue type fracture** is produced

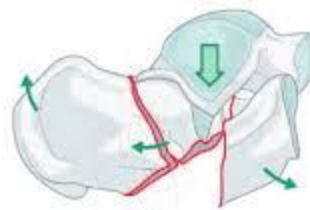


## **Classification**

- Via xray (Essex Lopresti)
  - Tongue Type
  - Joint depression type
  -



Tongue-type fracture



Depression-type fracture

Via CT (Sanders)-

- Based on coronal images
- Posterior facet divided into 3 fragments- Lateral, Central, Medial (A,B,C)
  - Type 1-4 (Non displaced > 4 part articular fragments)
- Tongue type typically IIC, IIB if extends intra-articular

## **Fragment Terminology**

- Anterolateral fragment- encompasses lateral wall of anterior process
- Anterior main fragment- large fragment anterior to primary fx line
- Superomedial fragment (sustentacular or constant fragment)-almost always remains attached to talus through deltoid ligament complex- and is stable
- Superolateral fragment (semilunar fragment)- lateral portion of posterior facet - sheared from remaining posterior facet in joint-depression fx
- Tongue fragment- the super-lateral fragment that remains attached to portion of posterior tuberosity including the achilles tendon insertion
- Posterior main fragment- posterior tuberosity



- Fracture dislocations

## **Treatment**

### Nonoperative

#### A. *Indications*

- Nondisplaced extra-articular/ intra-articular fractures
- Anterior process w/ less than 25% involvement of the Calcaneocuboid joint
- Severe PVD or diabetes
- Minimally ambulatory elderly patients

Splinting, bulky jones

Conversion to fracture boot after swelling improves

Early ROM and NWB 10-12 weeks





### Operative

#### A. *Indications*

- Displaced intra-articular fractures involving the posterior facet
- Anterior process calc fx w/ >25% involvement
- Displaced calcaneus fxs of the calcaneal tuberosity
- Fracture/Dislocations
- Open fractures
- 

#### **Medial Ex Fix**

- *Can be useful w/ soft tissue injury*

#### **Percutaneous + minimally invasive**

- Pre-op planning
- Sanders 2C tongue type where entire posterior facet is attached to tongue fragment; Displaced calc tuberosity or beak fx
- Patterns w/ relative contraindications to open surgery (heavy smokers, pmts on chronic anticoagulants).
  - Definitive fixation w/ large 6.5-8.0mm cannulated lag screws.
  - Medial/Lateral pins through superior calc



### **Lateral Extensile**

- Pre-op planning
- No touch technique (wire in fibula, talar neck, cuboid, talar body)
- Technique:
  - Fragment mobilization (posterior tuberosity disimpacted from sustentaculum- restores height and calc length)
  - articular reduction (type 3- assemble medial>lateral)
    - Anterior process- assess anterolateral fragment- reduce to A1 portion of articular fragment- restores crucial angle of gissane
  - definitive fixation (lag screws, plate, +/- grafting)
- Locking plates
- Repair SPR? Peroneals assessment?

### **Complications:**

- Wound dehiscence
- Peroneal tenosynovitis/impingement
- Peroneal tendon dislocation
- Subtalar arthritis
- CC arthritis
- Cutaneous nerve injury (can do gabapentin, amitriptyline, PT, or shoe inserts)

Nailed It Ortho podcast episode

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References:

Rammelt, Stefan MD, PhD An Update on the Treatment of Calcaneal Fractures, Journal of Orthopaedic Trauma: October 2014 - Volume 28 - Issue 10 - p 549-550 doi: 10.1097/BOT.0000000000000227