

## Talus fractures

Philipp Leucht, MD  
Stanford University School of Medicine

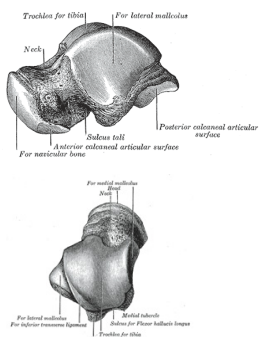
Orthopaedic Trauma course for NP/PAs  
OTA 2013

## Outline

- Anatomy
- Surgical Approaches
- Fixation strategies
- Outcomes and complications

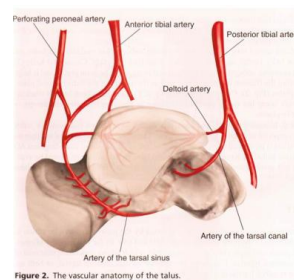
### Anatomy Bone

- 60-70% articular cartilage
- No muscular attachments
- Complex articulations



### Anatomy Vascular

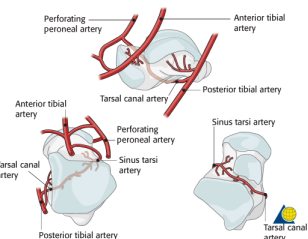
1. Posterior Tibial
  - Artery of the Tarsal Canal
  - Deltoid Artery (really off the Art of the Tarsal Canal)
2. Anterior Tibial
3. Perforating Peroneal
  - Artery of the Tarsal Sinus



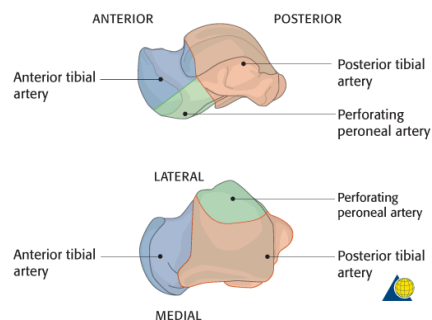
## Anatomy Vascular

### Inferior Anastomotic Sling

- Artery of the Tarsal Canal (Posterior Tibial)
- Artery of the Tarsal Sinus (Perforating Peroneal)
- Send numerous branches into the inferior talar neck
- Main supply of the talar body is from the **artery of the tarsal canal**



## Anatomy Vascular



## Injury mechanism

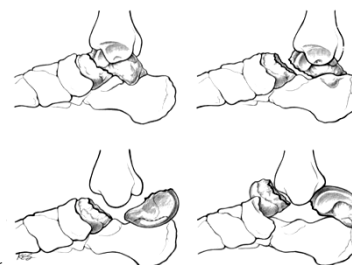
- Forced Dorsiflexion
  - Dorsiflexion causes tibiotalar impingement, leads to neck fracture
  - Dorsomedial comminution
  - not reproduced biomechanically
- Shear Force



## Classification

Hawkins\*--Prognostic Based on Blood Flow

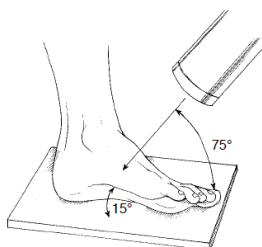
- Type I
  - Nondisplaced
- Type II
  - Subtalar subluxation or dislocation
- Type III
  - Subtalar and tibiotalar dislocation
- Type IV
  - Type III with talonavicular subluxation or dislocation



\*Hawkins LG: JBJS 1970; 52-A  
Canale ST: JBJS 1978; 60-A

## Radiographic Evaluation

- Ankle Series
- Foot Series
- Canale View
- CT Scans
  - Consider for head, body, and lateral process fractures



## Treatment

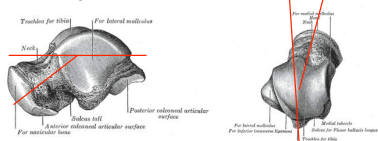
### Closed Methods

- Non-operative (rare)
  - For truly undisplaced fractures
- Closed Reduction
  - Realignment of gross displacement or dislocation
  - important for soft tissues
  - becomes increasingly more difficult with severity of fracture



## Treatment Principles

- Accurate alignment of talar neck
  - Re-establish hindfoot mechanics
- Stable fixation
  - Maximize revascularization potential
  - Allow early ROM



## Treatment

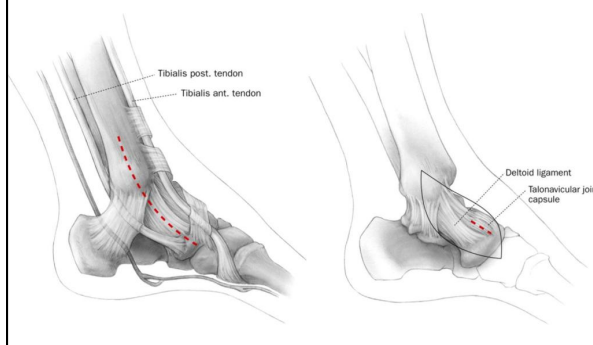
### Exposure

- Surgical Approaches
  - Combined anteromedial and anterolateral

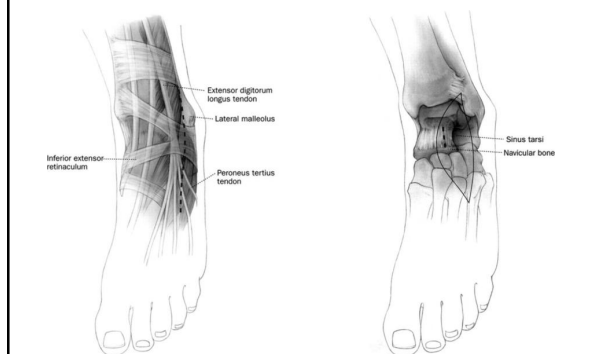


\*Mayo KA: Fractures of the talus: Principles of management and techniques of treatment. Tech Orthop 1987;2

### Anteromedial approach



### Anterolateral approach



### Operative Considerations

- Radiolucent table
- Small clamps
- Small distractor or external fixator
- Small/mini-fragment fixation
  - 1.5mm
  - 2.0mm
  - 2.4mm
  - 2.7mm & 3.5mm
  - Mini-fragment plates occasionally



## Intra-operative techniques

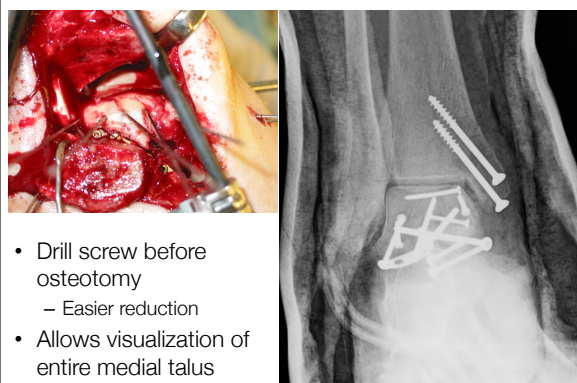
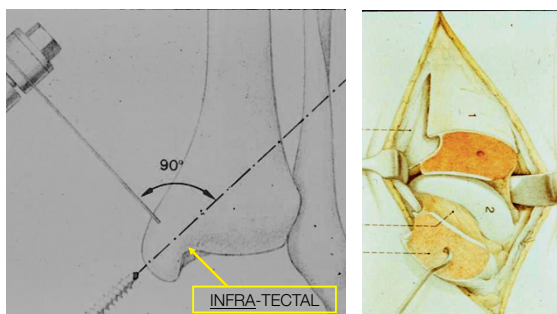
- Reduce and judge alignment through both approaches
- Lateral cortex usually provides good read (tension failure)
- Medial comminution (no lag screw fixation)
  - Cancellous bone graft/ structural bone graft
- Avoid stripping
- K-wire through talar head as reduction aid

## Reduction of a Dislocated Talar Body

- Infrequently works in the ER... but worth a try.
- GA for paralysis
- Flex the knee, traction on the the hindfoot, direct pressure on the talar body
- For open reduction: Dual exposure
- Medial and lateral distractors (ex-fix) with a transcalcaneal pin
- Malleolar osteotomy

The body is usually between the posteromedial aspect of the tibia and the Achilles tendon, immediately adjacent to the posteromedial neurovascular bundle

## Medial malleolar osteotomy



- Drill screw before osteotomy
  - Easier reduction
- Allows visualization of entire medial talus

## Post-operative rehabilitation

- Early ROM exercises once skin allows
- NWB for 12 weeks
- in cases with ligamentous instability, longer cast immobilization might be considered

## Complications

- Delayed union
- Nonunion
- Malunion
  - Particularly varus
- Subtalar and ankle arthritis
- Osteonecrosis



## Outcome

- AVN most common complication, followed by infection, mal-/non-union
- Hawkins sign is good predictor of appropriate blood supply at 6-8 weeks

**Table 1**  
Complications Following Talar Neck Fractures\*

Fracture Type	Osteonecrosis	Degenerative Joint Disease	Malunion
Type I	0%-13%	0%-30%	0%-10%
Type II	20%-50%	40%-90%	0%-25%
Type III/IV	8%-100%	70%-100%	18%-27%

## Outcome

- Sanders et al.
  - Excellent functional outcomes if pt did not require 2° reconstructive procedure
  - Development of varus and/or ST arthritis leads to poor functional outcomes
  - Most common indication for 2° surgery was ST arthritis.
  - Risk factors for 2° surgery were comminution, high Hawkins' s type, and associated L/E fractures.
    - All markers of higher-energy injuries
  - **Time between injury and surgery did not correlate with outcome**
  - 12% AVN rate (much lower than most other reports).

Sanders, DW, et al. J Orthop Trauma. 18;5, 2004

## Summary

- Delayed fixation has no effect on outcome, union or AVN
- Outcomes worse with comminution, open injuries, varus
- Post-traumatic arthritis is common
- AVN may be partial and not lead to collapse
- Set expectations