Management of Calcaneal Malunions

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Disclosures

- NONE

Calcaneal Malunions

- Key to treatment is understanding the complex pathoanatomy
- Not just subtalar arthrosis
Calcaneal Malunions

- CT scan best demonstrates this pathoanatomy

Pathoanatomy

- Lateral Impingement
  - Subfibular
  - Peroneal tendons
- Subtalar Arthrosis
- Hindfoot Angulation

Pathoanatomy

- Weight-bearing lateral
  - Anterior Impingement secondary to loss of talar height and inclination
Calcaneal Malunions

- Stephens and Sanders, 1996
  - Developed classification system based on CT findings
  - 3 Types of malunions identified

Type I Malunion

- Lateral exostosis
- Lateral Impingement
- +/- Far lateral arthrosis

Type II Malunion

- Lateral exostosis
- Extensive subtalar arthrosis
Type III Malunion

- Lateral Exostosis
- Subtalar arthrosis
- Varus or valgus angulation

Surgical Treatment

- All 3 types have exostosis
  - Lateral decubitus position
  - Extensile lateral incision
- Lateral wall exostectomy

Type I

- May also need to remove the far lateral joint
- ROM started as early as possible
- Check ROM
Type II

- In situ subtalar fusion also performed
- Cannulated screws placed thru heel

Type II

- Supplemental bone graft
  - Local (exostosis)
  - ICBG
  - Allograft

Type II

- Screws are placed in talar neck and body
Type II
- Post-op
  - 10-12 weeks in cast
  - NWB 6 weeks

Type III
- Subtalar Fusion
- Osteotomy to correct angulation

Type III
- Varus deformity
  - Lateral closing wedge (Dwyer) osteotomy
- Valgus deformity
  - Medial slide
Osteotomy

Sanders Classification

- Does not address
  - loss of talar height
  - loss of talar inclination
  - indications for a bone block arthrodesis

Distraction Bone Block Arthrodesis

- Carr et al 1988
  - Subtalar bone block fusion
  - Restore height
  - Restore talar inclination
  - Relieve Anterior impingement
Distraction Arthrodesis

- Lateral decubitus position
- Posterolateral approach
  - Minimize wound problems

Ext. Lat vs PL approach

Distraction Arthrodesis

- Lateral wall exostectomy
- Medial femoral distractor (prevent varus)
- Lamina spreader
Medial ex fix

Bone Block: allograft vs autograft

Distraction

- Tricortical posterior iliac crest graft
- 2 screws
  - Fully threaded
  - Partially threaded
Bone Block Fusions

- Higher complication rate, malunion and nonunion with bone block fusions vs in situ fusions
  - Myerson & Quill, 1993
  - Flemister et al, 2000
  - Easley et al, 2000
- Bone blocks performed for more complicated malunions

Subtalar Arthrodesis

When is a bone block arthrodesis indicated versus an in situ arthrodesis?

Subtalar Fusion
Bone Block vs In-situ

Good results with in situ fusions regardless of talar height or talar inclination provided anterior impingement was not present (2 to 5 yr f/u)

- Chandler et al, 1999
- Flemister et al, 2000
Anterior Impingement

- Painful forced dorsiflexion < 10 degrees
- Anterior ankle tenderness

Subtalar Fusion

- In situ fusion if anterior impingement is not present clinically

Complications

- Nonunion
- Malunion (usually varus)
- Wound healing
- Persistent Pain
### Union Rate

- >90% in nonsmokers
- 75% in smokers
- Structural allografts also risk factor for nonunion

### Persistent Pain

- On uneven ground
- Sural and tibial neuritis
- Heel pad pain

### Timing of Surgery

- 8 – 12 months after injury
- Sooner if significant lateral wall impingement
Post OP
- All fusions
- 6 wks NWB cast
- 4wks in wb cast
- Wean out of boot

75 y/o female, 6 mos post injury

CT SCAN
Question

- Treatment for this 75y/o with this calcaneal malunion? She has no anterior ankle pain, good dorsiflexion, and sub-fibular pain.

1. Osteotomy and repair without fusion.
2. Distraction bone block fusion with allograft.
3. Distraction bone block fusion with autograft.
4. In-situ fusion with lateral wall exostectomy.

Used the extensile approach

In situ fusion with exostectomy
Case 2
- 65 y/o male, healthy, active
- 6 month old calcaneal malunion
- Pain with ankle dorsiflexion, lateral pain
Case 2

Prevention of Malunion

- Adequate ORIF in appropriate patients
- Radney et al JBJS 2009
- Better results following subtalar fusion if they had initial ORIF
Summary

• Follow the Sanders protocol for Type 1,2,3 malunions (does not address talar height)

• Bone Block arthrodesis for anterior impingement

Thank You