Pilon Fractures
Key Decisions

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Objectives

- Understand Initial management decisions
- Pre-op planning
- Common Surgical Approaches
- Reduction Strategies

Introduction

- Often complex injuries
- Severe soft tissue and bony injury is common
- High risk for complications and poor outcomes
Problems with Pilon Fractures

- Delicate soft-tissue envelope
- Fragile skin
- Little underlying muscle
- Scant extra tissue
- Complex bone injury

The Soft Tissue Component
Staged ORIF to Minimize Soft Tissue Complications

- Patterson & Cole, JOT, 1999
  - 22 C3 Pilons
  - Average 24 days to ORIF
  - 73% Anatomical reductions
  - No Infections

- Sirkin, Sanders, DiPasquale, Herscovici, JOT, 1999
  - 56 Pilons
  - Immediate fibular ORIF with ankle spanning external fixation
  - Average 12.7 - 14 days to ORIF
  - 5.3% Infections

Temporary External Fixation

- Place Pins outside anticipated implants
- Option to place foot pins
- Goal is to try to restore length and alignment

Attempt to restore length
Should I reduce and stabilize the Fibula Fracture?

Fibula Fractures
- Simple Fractures
- Postero-lateral approach (Peroneals and FHL) ok, regardless of swelling
- Anatomic reduction
- Helps restore length
- More stable Ex fix construct
- Consider temp IM

Converting C fracture to B fracture Acutely
- Postero-lateral approach
- Apply buttress to posterior fragment
Surgical Tactic

• Reduce Articular Fracture
  – Anatomic Reduction
  – Absolute Stability
• Attach reduced articular segment to rest of skeleton
  – Relative Stability for comminuted Fx
  – Absolute Stability for simple fracture patterns

Reduction Strategy
C fractures

• Reduce Articular fracture
• Attach reduced articular fracture to shaft

Planning Treatment

• Cole P, et al. The pilon map: Assessment of fracture lines and comminution zones in AO C3 type pilon fractures J Ortho Trauma, 2005
• 77 OTA 43-C3 fractures
• Consistent injury pattern
Fracture Pattern (strategy...)

- Major Fragments
  - Anterolateral Articular (Chaput)
  - Medial Articular
  - Posterolateral Articular (Volkmann's)

- Major Fracture Lines
  - Anterolateral to medial and posterolateral
  - Medial to posterolateral and anterolateral

Impaction & Comminution

- Typical Locations
  - Lateral
    between anterolateral and posterolateral
  - Central
    free segment or extension deformity of posterior fragment
  - Medial
    at the medial shoulder
General Articular Reduction Strategy

- Reduce to posterolateral fragment
- Rotation of posterolateral fragment
- Reduce Medial fragment to posterolateral fragment
- Reduce Central impaction
- Reduce Anterolateral fragment
- Lag articular fragments

Joint Reduction

Staged ORIF

- Allow soft tissue resolution – wrinkle sign
- Pre-op Planning
Approaches

Anteromedial Approach
- Lateral to tibial crest
- Medial to tibialis anterior
- Avoid violating para-tenon
- Curves acutely medially at ankle joint
- Creates large anteromedial flap
Anteromedial Approach

- Incision in line with the fourth metatarsal
- Exposure onto the talar neck distally
- Proximal exposure limited
- Preserve the superficial peroneal nerve

Anterolateral Approach

- Incision in line with the fourth metatarsal
- Exposure onto the talar neck distally
- Proximal exposure limited
- Preserve the superficial peroneal nerve
Anterolateral Approach

Posterolateral Approach

- Prone or lateral
- Combined with other approaches
- Low articular injuries
- Dissociated posterolateral fragment
- Posterior pilons

Posterolateral Approach
Surgical Approaches

• “One approach doesn’t fit all”
• Fracture Pattern/displacement and soft tissues dictates
• Fragment specific stabilization

The 7 cm “rule”

• Prospective Study
• 46 Pilon Fx
  – 37 Closed
  – 9 Open
  – 44 with Fx Fibula
• 32 had 2 incisions
• 14 had 3 incisions

7 cm “rule”

• 44 Postero-lateral
• 39 Anterolateral
• 8 Anteromedial
• 4 Posteromedial
• 16% had >7cm bridge
• 70% had 5-7 cm bridge
• 14% had <5 cm
7 cm “rule”

- Despite 84% had <7 cm bridge
- No patients had compromise of the skin bridge

Outcomes
Pollack et al., JBJS-Am, 2003

- C-types Rx’ed with staged ORIF
- SF-36 >2 SD below norms in 4/8 categories
- Lots of persistent problems
  - 35% ankle stiff
  - 29% chronic swelling
  - 33% ankle pain
  - 43% unemployed (86% due to plafond)
- Complications had worst outcomes

Post op

- Well padded splint
- Drains for 48 hours
- Early ROM ankle & subtalar joints
- NWB for 12 weeks
In Summary

- Temp Ext Fixation to allow soft tissue recovery
- Consider reducing and stabilizing a simple fibula fx and/or posterior Malleous
- Understand the fracture fragments to determine optimal surgical approaches
- 7 CM rule more of a guideline
- Surgical Tactic