Pilon Fractures

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History of Treatment

Immediate ORIF
External Fixators
Staged Reconstruction

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Poor Timing

Wagner, Unfallchir, 1986
Mast, CORR 1988
Trumble, JOT 1992
Wyrsch, JBJS 1996
Helfet, CORR 1994

Soft tissue must be ready for surgical insult

Poor Outcome

Staged Protocols

Sirkin, 1999
• 56 Pilons
• Immediate fibular ORIF with ankle spanning external fixation
• Average 12.7 - 14 days to ORIF
  • 1.8% wound dehiscence
  • 3.6% infection

Patterson, 1999
• 22 C3 Pilons
• Average 24 days to ORIF
• 73% Anatomical reductions
• No Infections

Staged Protocol

Early
• Trans-articular external fixation
• Fix fibula?
• Allow soft tissue stabilization

Late
• Definitive Articular reconstruction
• Remove fixator
External Fixation

- A WELL PLACED EXTERNAL FIXATOR LEAVES YOU OPTIONS

- DO NOT FIX THE FIBULA UNLESS YOU ARE THE TREATING SURGEON

TREATED ELSEWHERE AND TRANSFERRED DRAINING WOUND: COULD NOT ADJUST INCISIONS
Stage 1

- Allows you time to evaluate the PATIENT
- Allows you time to evaluate the FRACTURE
- Allows the SOFT TISSUES healing time
- GOAL IS TO NOT BURN BRIDGES

Options for Definitive Treatment

- ORIF
- External Fixation/Ring Fixator
- Primary Fusion
- Percutaneous

Stage 2 Goals -Strategy

- Multiple Incision Options
  - Based on soft tissues
  - Articular Involvement
  - Multiple small (percutaneous)

Tornetta et al. CORR 1996
Stage 2 Goals - Strategy

- Anteromedial

Stage 2 Goals - Strategy

- Anterolateral

Stage 2 Goals - Strategy

- Anterior
Stage 2 Goals - Strategy

- Anterior “workhorse incision”

Stage 2 Goals - Strategy

- Begin with Posterolateral Fragment
- Fix posteromedial to posterolateral
- Reduce central impaction
- Reduce Medial and Anterolateral fragments
- Provisional wire fixation
- Lag Screw Fixation
- Fix articular block to diaphysis

Pilon Fractures

- Staged Fixation
  Initial ex-fix +/- ORIF fibula

  What Happens?
  - Soft Tissue Improves
  - Partial Healing

  Definitive Fixation
Complex Articular Injury

Pilon Fractures

- Good Reduction
  - Good Results

- Bad Reduction
  - Bad Results

How do we improve reductions?

Complex Articular Injuries

- More staged soft tissue friendly incisions
  - Initial Ex-fix with limited ORIF

43 C

43 B
Complex Articular Injury

Technique
- Fixation of posterior fragments +/- fibula
- Application of external fixator
- Prone
- Posterolateral incision

Technique
- Posterolateral approach
  - Anatomic reduction of fibula
  - Stabilization of posterior malleolar fragment
**Technique**

- Posterior Tibial fixation
  - 3.5 mm buttress plate
  - 2.4 mm/2.0 mm plates

**Technique**

- Postoperative CT
  - Assess reduction
  - Revision:
    - Posterior fragment impaction
    - Incisions for definitive fixation

**Technique**

- PRE-OP LIMITED ORIF
- DEFINITIVE ORIF
Complex Articular Injury

Alternatives to ORIF?
- External Fixation
- Limited Use Alone
- Infection
- Poor Tissue Quality

Alternatives to ORIF?
Percutaneous
- Poor Tissues/Host
- Must be able to accept incongruity
Alternatives to ORIF?
IM Nailing + Limited ORIF
- Shaft Nonunion
- Limited Joint Comminution

Alternatives to ORIF?
Primary Fusion
- Not Good Host
  - Comorbidities
  - Noncompliance
- Soft Tissue Issues

Post-op Protocol
- Immobilization until sutures out (2-4 wks)
- Cam walker until able to keep foot at neutral
- NWB for 10-12 weeks
Outcomes

• Patients get better for up to 2.4 years (perception)
  - Ankle scores improve with time
• Increase arthritis with time
  - Radiographic

Marsh, JBJS 2003

Outcomes

• Negative long term impact on function
• Limitation in recreation
  - Running (27/31)
• Half change jobs

Marsh, JBJS 2003

Salvage?
Summary

• Difficult fractures
• No single treatment method
• Staged protocol
• Patience

Summary

• Biological exposure & fixation
• Anatomic restoration of the articular surface
• Rigid fixation to allow early motion

Thank You