Pilon Fractures
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Initial Radiographic Evaluation
• 3 views ankle
• Full length tibia

*** Joint above and joint below***

Initial Treatment GOAL
• Soft tissue management
• Restore Mechanical axis
  – Length
  – Alignment
• ± Fibula Plating
• Relax soft tissues → AT LENGTH
• Address open injuries
Temporizing Ex-fix

- Ex-fix placement
  - Out of zone of injury
  - “Safe Zone”
    - Proximal
      - Distal to tibial tubercle
    - Distal
      - ± Talar neck
      - Calcaneus
        - Posterior tibiotarsal
        - Anti-equinus

Versatility To Accommodate Soft Tissue Injury

To Plate The Fibula or Not?

- Fix the fibula acutely?
  - Helps with alignment
  - Maintenance soft tissue
- Fix the fibula ever?
  - Definitive ORIF
  - Definitive Ex-fix
- Why fix the fibula?
  - Lateral column stability
Acute Fibula Fixation

• What is the ultimate "work horse incision"?
• Draw that approach on the leg first
• Ensure > 5 cm between incisions
• Reported 30% Wound Complication rate

CT Scans – After initial reduction

• Tornetta and Gorup, CORR, 1993

22 patients
Increased fragments in 12
Increased impaction in 6
Operative plan changed in 14 (64%)
Additional info gained in 18 (82%)

Stage One Management

Span It!
Plan It!
Scan It!
Surgical Timing

Old School Low Energy Fractures
Rüedi and Allgöwer

- 60/84 low energy twisting
- 74% good functional results
- 90% return to work
- Low complications
  - 5% infection
  - 12% wound problem

New School High Energy Fractures
Staged Protocol Popularized

- 4 – 43C1
- 10 – 43C2
- 42 – 43C3

- 34 closed fx's
  - Avg 12.7 day delay
    - 5 minor wound issues tx'd non-op
    - 1 osteomyelitis
- 22 open fx's
  - Avg 14 day delay
    - 2 minor wound issues tx'd non-op
    - 1 ROH & IV Abx
    - 1 amputation

Sirkin MS, et al: JOT 1999
Practical Approach To definitive surgery?

• Blisters epithelialized

• “Wrinkle test”
  – Without manipulation wrinkling of skin around ankle

Exceptions

Open Fractures Early Limited Internal Fixation

• Night 1
• Meta-diaphyseal spikes
  – May simplify definitive reconstruction
  – May protect soft tissues

Night 1: I&D open wounds, limited fixation

Post-op CT

Day 5: Repeat I&D w/ fibula plate
Day 12: Definitive Surgery

Day 12: The Real Deal

It's the right time...

What to do?
Principles

I. Restore length, fibula
II. Reconstruct joint
III. Bone graft defect
IV. Buttress

• Absolute stability – Articular Surface
• Absolute or Relative stability – Metaphysis / Diaphysis

ORIF - Overview

• Where to attack the injury from
  – CT Scan

• What is the fixation
  – LAG the JOINT when possible !!!
  – Neutralize / Bridge / Compress metaphysis & diaphysis
  – RESPECT soft tissues along the way

• Wound management

Choosing the surgical approach

• Choices
  – Anteromedial
  – Direct Anterior
  – Anterolateral
  – Posterolateral
  – Posteromedial
Reduction Aid
Temporizing Ex-fix vs Femoral Distractor when going from the front

- Can be useful
- Pin position determines “pull” & “visualization”
- Both give distraction

Neutral Axis

Fixation Strategy

- Go through the front
- Work from back to front
- Joint distraction
  - Ex-fix
  - Femoral Distractor

Surgical Approaches...
**Anteromedial Approach**

- Incision starts ~5cm proximal to tibio-talar joint line just lateral to tibial crest
- Extends distal-medial crossing crest (following medial border of TA tendon)
- *Watch for saphenous vein

**Anteromedial Approach**

- Do NOT violate TA tendon sheath
- Elevate anterior compartment from medial to lateral
- Incise anterior ankle capsule
- Preserve periosteum

**Anteromedial Approach**
Anteromedial Approach

- Center of Mortise
- Access to AM & AL joint
- Watch for superficial peroneal nerve branches
- Incise extensor retinaculum
Anterior Approach

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- Access to AM & AL joint
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Anterior Approach

- Intervals
  - EHL/TA
  - EHL/EDL
  - EDL/peroneous tertius
- Proximal to tibio-talar joint NV bundle between TA and EHL
- Distal to tibio-talar joint NV bundle between EHL and EDL
- Excise anterior ankle capsule and intra-articular fat

Anterior Approach
Anterior Approach

- Absolute stability – Articular Surface
- Absolute or Relative stability – Metaphysis / Diaphysis

Posteromedial Approach

- Prone or “figure 4” positioning
- Btw Achilles and posteromedial tibia
- Identify the NV bundle
- Free structures from fx site
- Extra-articular reduction
- Visualization of joint through the fracture only

Anterior with Posteromedial
Anterior with Posteromedial

• Absolute stability – Articular Surface
• Absolute or Relative stability – Metaphysis / Diaphysis

Anterolateral (Bohler’s) Approach

• Incision in line with 4th MT
• Centered at the ankle joint
• Protect the superficial peroneal nerve which crosses the incision
• Incise the extensor retinaculum
• Elevate anterior compartment from lateral to medial
• Joint arthrotomy
Anterior Lateral Locked Tibia Plate

- Heavy Plate
- Improved Fixation
- Better Soft Tissue Coverage
- No Fibular Plating

Post Op Ant Lateral Plate

Closure

- Retinaculum – prevent “bowstring”
- Limited subcutaneous sutures
- Consider Modified Allgower-Donati sutures for skin
  — Sagi HC et al: JOT 2008
- Consider Wound VAC
- Splint to Rest Tissues
Post Op Plan

- Splint 2 weeks
- Removable Boot or Splint
- Active Motion
- NWB or TDWB for 10 Weeks
- Outcome – Hard to Predict

Pitfalls

Mal-Union

Poor Reduction?
Poor Fixation?
Poor Plate Placement?

Preventable Outcome
Percutaneous Plates

Percutaneous Medial Based Broad Plates Prone to Wound Breakdown & Infection To Much Hardware
Take Home points

Soft tissue stabilization
• Span It
  – External Fixation
• Scan It
  – CT scan
• Plan It! Or Punt It!
• LAG It!
• Neutralize It!

Thank You