Pilon Fractures
Pearls of Treatment

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Disclosures
• No relevant disclosures
• There is more literature than we can keep up with
  • Follow core principals and you will be fine!
• The goal is to have more than 1 tool in your tool box!!

Main Objective
• An anatomically healed fracture without complications
• A patient with a good functional outcome
Optimize your patient

- **Diabetes**
  - Much higher risk of infection and NU

- **Nutrition**

- **Vitamin D**

- **Soft Tissue Resuscitation**
  - Majority of fractures - 2 stage treatment
    - Sekeri et al. *JOT* 2004
    - Blauth M, et. al. *JOT* 2001
    - Patterson MJ and Cole Jr. *JOT* 1999

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First Stage

- **Ex fix 101**
  - Know your anatomy
  - Broad Tibial Base
  - Transcalcaneal pin
  - Medial and lateral support
  - First MT pin (mid diaphyseal)
  - Shortest Working length possible (Think about definitive fixation)
    - Shah CA, et. al. *JOT* 2014. To avoid infection, avoid plate overlap of ex-fix pin sites.
    - Do not plate the fibula

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Advanced First Stage Concepts

- **Dunbar RP, et. al. *JOT* 2008**
  - Small fragment antiglide plate applied to the diaphyseal component of the fracture proximal to the area of greatest injury.

- **Chan DS, et al. *JOT* 2017** – Likely higher risk of NU with a staged approach with posterior fix. Followed by delayed anterior approach
Preop planning

- X-rays and CT
  - Preferably after Ex-fix
- 3D models?

Work Horse Approaches

- Traditional pilon approach
- Anterior Approach
- Maintain adequate skin bridge with Fibular incision (5cm)
- Anterior medial and anterior lateral variants

Other Approaches

- All Lateral Approach
- Posterior Lateral
- Posterior Medial
- Direct Achilles Split

Make sure no soft tissues are entrapped
Sometimes more than 1 approach

Reduction Pearls - Distract

ORIF Pearls

- Be biologically friendly
  - MIPO (but you must see the joint)
  - Limited Touch Technique
  - Minimize periosteal injury

- Early flap coverage is beneficial
- D’Alleyrand JC., et. Al. JOT 2014
- Flap coverage before 7 days is better
Implants

• Medial or Anterolateral plates?
  • Busel GA and Watson JT JOT 2017
    • Lateral plate better for valgus force pilons (commminuted fibula)
    • Medial plate better for varus type fractures (transverse fibula)
    • In AO 43 C2 - similar biomechanical stiffness in the two plates.
  • Remember:
    • Rim plates and additional plates

Locked or “Low-Tech”?

• d’Heurle A, et. Al. JOT 2015 – Locking Vs. Nonlocking = no difference

• Try to Obtain an Anatomic Reduction!!!
  • Korkmaz, A, et. Al Injury 2013
• Do not depend on fluro alone:
  • Lateral is not accurate. Graves ML, et. Al. JOT 2011
• “Dry” Scope assistance
  • 2.7 mm 30 degree
  • Kim HS, et al. COOR 1997
• Intra-op CT
  • Vetter, St., et. Al. FAI 2016
    • 33% intraop revision
After the ORIF

- Vancomycin Powder
  - Decreased infection in diabetic ankle surgery and spine surgery
- Incisional wound VAC
  - Benefit
  - Stannard JP, et al. JOT 2012, randomized, prospective

- Pie Crusting

Postop Protocol

- Compression wrap under splint
- No movement until the wound is healed
- Motion begins at about 2 weeks
- TTWB immediately
- PT starts at 2 weeks for motion
- 25% WB at 8 weeks
- 50% WB at 10 weeks
- 100% WB at 12 weeks

Do Not Forget
External Fixation
**Indications – Soft Tissue Injury**

- Open
  - Especially if wound is where plate will go
- Closed (Tscherne 3)

**Indication – Soft Tissue Loss**

- Taylor Spatial Frame to avoid a flap

**Indication – Complex Fractures**

- Segmental / Multiple levels
- Bone loss
Circular Ex-fix Basics

- Do not plate the fibula
- Keep wires 1cm away from joint
- Wires cannot touch screws
- To increase stiffness
  - More rings
  - "Drop wires"
  - "Cross wires"
  - Maximal spread of wire blocks
  - More wires
  - Opposed Olive wires
  - Bone on bone contact

How Do You Know When to Remove Frame?

- Radiographic signs of healing
  - Xray (cortical bridging)
  - CT – Better to see bone bridging
- Dynamize frame and allow patient to walk
  - If no pain then can likely remove

What Technique is best?

Some Benefits to ORIF
- Ex-fix group - higher rate of superficial infection, malunion, nonunion

Some Benefits to Circular Ex-Fix
- Endres T, et al., Unfallchir. 2004

Similar Outcomes
- Rotter R, Gierer P, Unfallchir. 2017 – Similar outcomes if follow core principals
- Imren Y, et. Al., JAPA, 2017
- Davidovich R, et. Al. FAI 2011 –

Some Benefits to Circular Ex-Fix
- Pugh KJ, et al. JOT 1999
- Podolsky A and Chao EY COOR 1993
- Calhoun JH, et al. COOR 1992
Summary

- Optimize your patient
- Staged Surgery
- ORIF and Circular Ex-fix both work
- Core principles
  - Treat the soft tissues well
  - Stable Fixation
  - Anatomic joint reduction
  - Appropriate postop wound care
  - Early functional return

Oh Yah – Almost Forgot

Primary Fusion can have successful outcomes

- Ho B, Kett J. JAClinics 2017
- Zell, BA, et. Al. JBJS 2014 – 20 pts
- Beamam DN, Gellman B. CoRR 2014 – 12 ankles
- Bozic V, et. Al. FAI 2008
Work Horse Approaches
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Other Approaches
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- Posterior Lateral
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- Direct Achilles Split
- Combinations
- MIPO techniques