

Pilon Fractures Pearls of Treatment

Steven Steinlauf, MD
The Orthopaedic Foot and Ankle Institute of South Florida
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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
 - Kline AJ, et. Al. FAJ, 2009
 - Much higher risk of infection and NU
- Nutrition
- Vitamin D
- Soft Tissue Resuscitation
 - Majority of fractures - 2 stage treatment
 - Sirkin et al. JOT 2004
 - Blauth M, et. Al. JOT 2001
 - Patterson MJ and Cole JD, JOT 1999

First Stage

Ex fix 101-

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




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



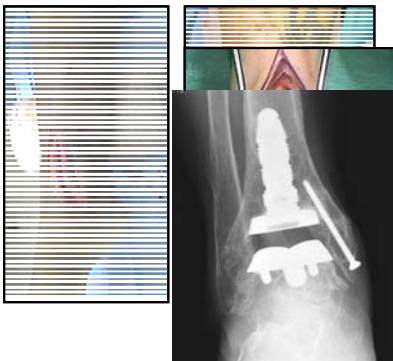
Preop planning

- Xrays and CT
 - Preferably after Ex-fix
- 3D models ?



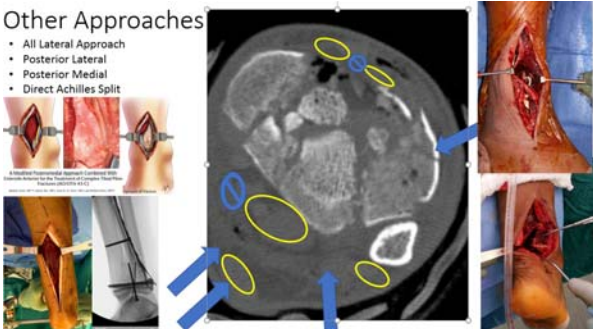
Work Horse Approaches

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

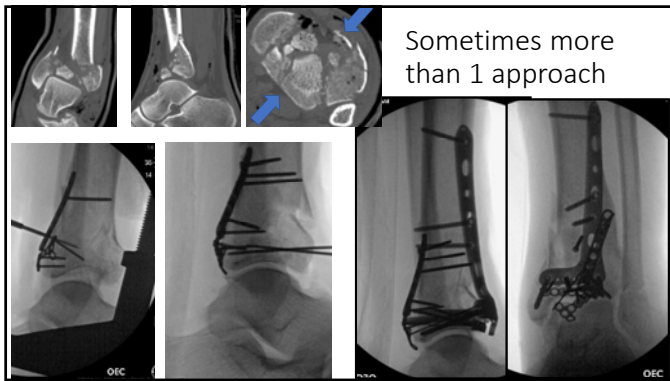


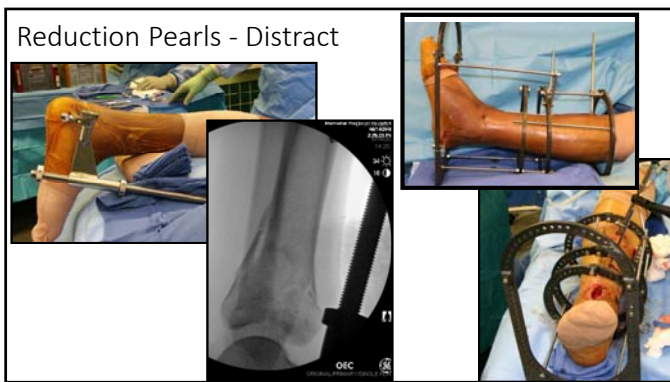
Other Approaches

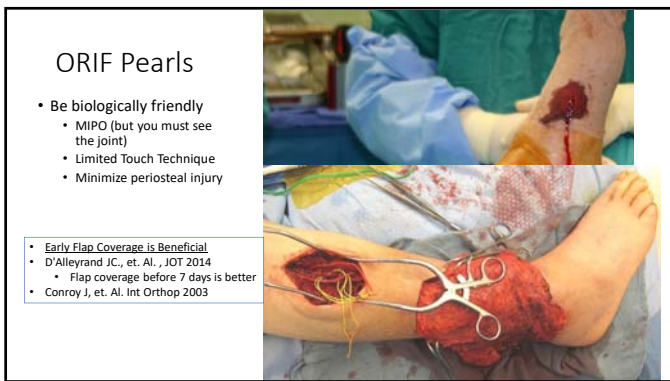
- All Lateral Approach
- Posterior Lateral
- Posterior Medial
- Direct Achilles Split



Make sure no soft tissues are entrapped







Implants

• Medial or Anterolateral plates?

- Busel GA and Watson JT JOT 2017
 - Lateral plate better for valgus force pilons (comminuted fibula)
 - Medial plate better for varus type fractures (transverse fibula)
- Oken, OF., et. Al. Acta Orthop Traumatol Turc. 2017
 - In AO 43 C1 - similar biomechanical stiffness in the two plates.

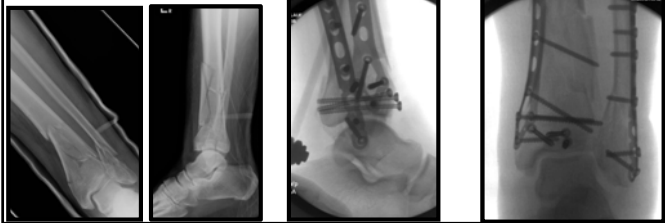
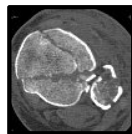
• Remember:

- Rim plates and additional plates



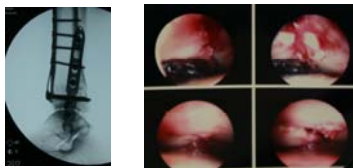
Locked or "Low-Tech"?

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



• Try to Obtain an Anatomic Reduction!!!

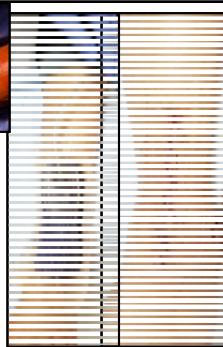
- Korkmaz, A, et. Al Injury 2013
- Do not depend on fluro alone-
 - lateral is not accurate. Graves ML, et. Al. JOT 2011)
- "Dry" Scope assistance
 - 2.7 mm 30 degree
 - Kim HS, et al. COOR 1997
- Intra-op CT
 - Vetter, SV., et. Al. FAI 2016
 - 30% intraop revision



Intraoperative 3D-imaging in foot and ankle trauma - clinical examples and study results
 Intraoperative 3D-Bildgebung beim Fuß- und Sprunggelenktrauma. Klinische Beispiele und Studienergebnisse
 Axel von Kromann

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](#)
 - [Stannard JP, et. Al. J Trauma 2006](#)
- Pie Crusting

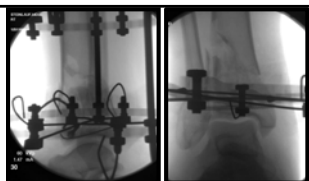


Postop Protocol

- 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



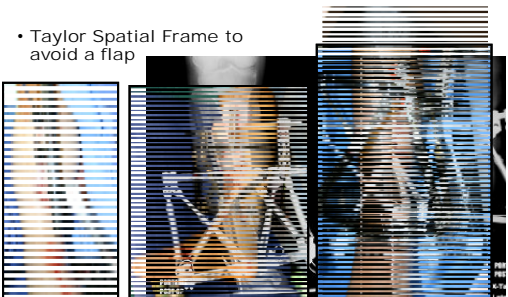
Indications - Soft Tissue Injury

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



Indication - Soft Tissue Loss

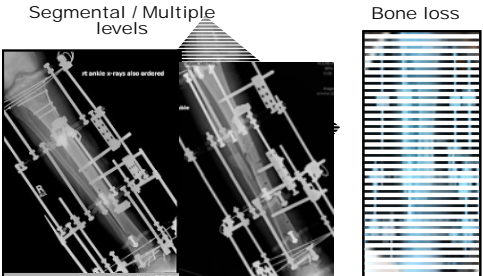
- Taylor Spatial Frame to avoid a flap



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"
 - Tension wires appropriately
 - Maximal spread of wire blocks
 - More wires
 - Opposed Olive wires
 - Bone on bone contact
- Pugh KJ, et al. JOT 1999
- Podolsky A and Chao EY COOR 1993
- Calhoun JH, et al. COOR 1992
- Orbay GL et al. Clin Orthop Relat Res. 1992

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

- [Meng YC, Zhou XH](#). Chin J Trauma 2016 - Metaanalysis
 - ExFix group - higher rate of superficial infection, malunion, nonunion
- [Bacon S., et. Al. Injury 2008](#)

Similar Outcomes

- [Bacoin S., et. Al. Injury, 2008](#) -
- [Rotter R, Gierer P., Unfallchir. 2017](#) - Similar outcomes if follow core principals
- [Imren Y, et. Al., JAPMA, 2017](#)
- [Davidovitch RI, et. Al. FAI 2011](#) -
- [Wang C., et. Al. Arch Orthop Trauma Surg, 2010](#)

Some Benefits to Circular Ex-Fix

- [Endres T, et. Al., Unfallchir. 2004](#)

Summary

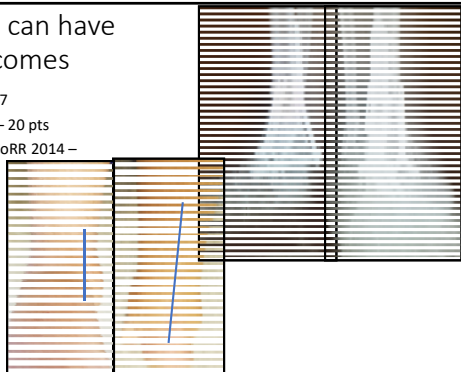
- Optimize your patient
- Staged Surgery
- ORIF and Circular Ex-fix both work
- Core principles
 - Treat the soft tissues well
 - Stable Fixation
 - Anatomic joint reduction
 - Appropriate postop wound care
 - Early functional return

Oh Yah - Almost Forgot



Primary Fusion can have successful outcomes

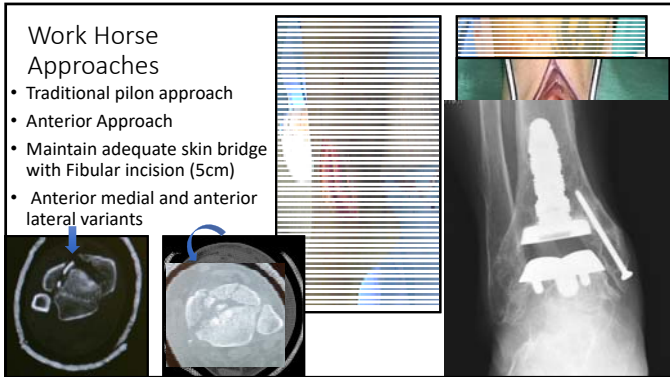
- [Ho B, Ketz J. FAClinics 2017](#)
- Zell, BA, et. Al. JBJS 2014 – 20 pts
- [Beaman DN, Gellman R, CoRR 2014 – 12 ankles](#)
- [Bozic V, et. Al. FAI 2008](#)



Thank you

Work Horse Approaches

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Other Approaches

- All Lateral Approach
- Posterior Lateral
- Posterior Medial
- Direct Achilles Split
- Combinations
- MIPO techniques

