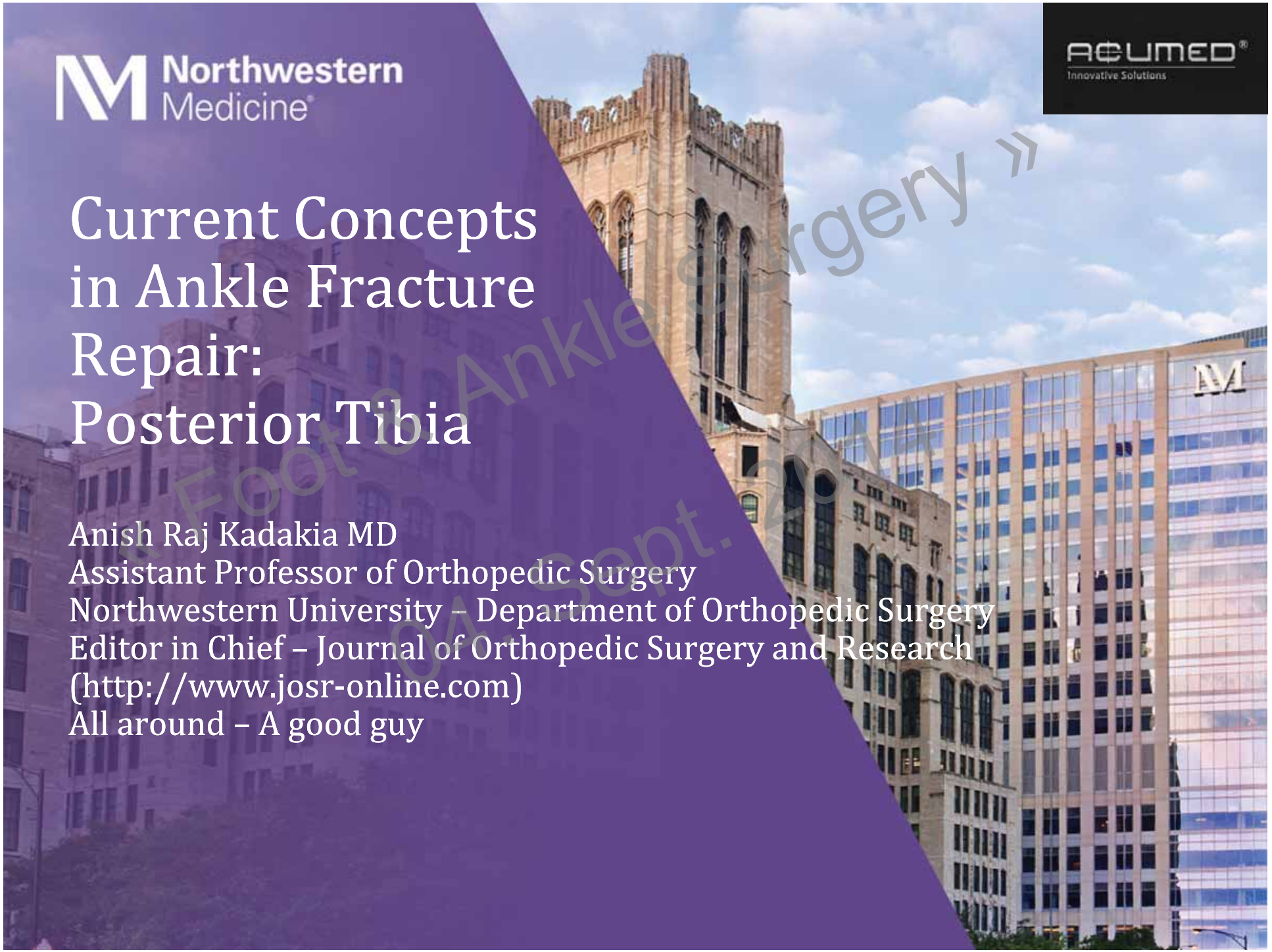
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Innovative Solutions
Current Concepts in Ankle Fracture Repair: Posterior Tibia
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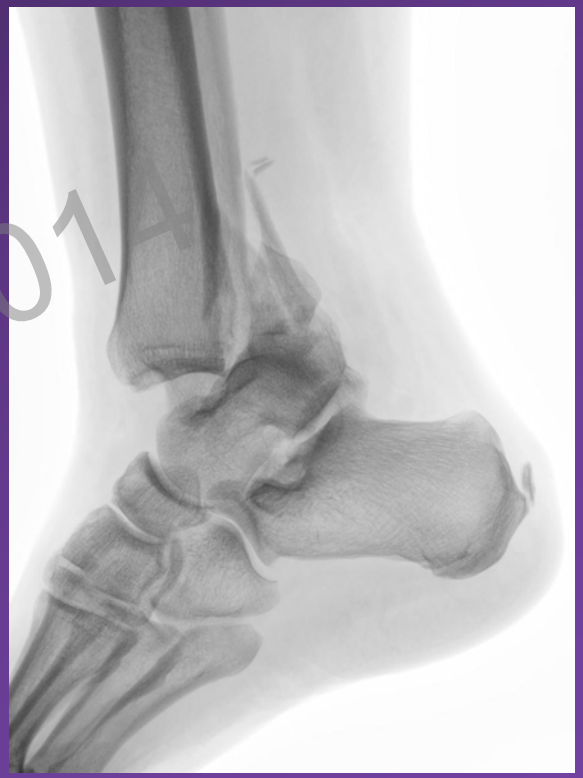
Editor in Chief – Journal of Orthopedic Surgery and Research
(http://www.josr-online.com)
All around – A good guy

Background

- **7-44% of all ankle fractures**
  (Burwell and Charnley, JBJS Br, 1952;
  Jaskulka *et al*, J Trauma, 1989;
  Broos *et al*, Injury, 1991;
  Helmy *et al*, Tech FA Surgery, 2007;
  Tejwani *et al*, J Trauma, 2010)

- **20% of PM fractures extend to medial mall.**
  (Haraguchi *et al*, JBJS, 2006)



History of Post Mall

- **Nelson and Jensen** (Surg Gynecol Obstet, 1940)
  - only 3 of 8 patients w/ PM fragments >33% w/ good results (all fixed)
  - nearly all <33% w/ good results
- **McLaughlin** (*Trauma*, 1959)
  - PM fragment <10% = no posterior subluxation
  - 10-25% = 20% subluxation
  - >25% = 100% subluxation (if not fixed)
- **Warner *et al*** (South Med J, 1965), **100 fractures**
  - 0 poor results if PM fragment <20%
  - 8.3% poor results if 20-30% (0% when fixed)
  - 30.8% poor results if >30% (9.1% when fixed)

No Argument on This

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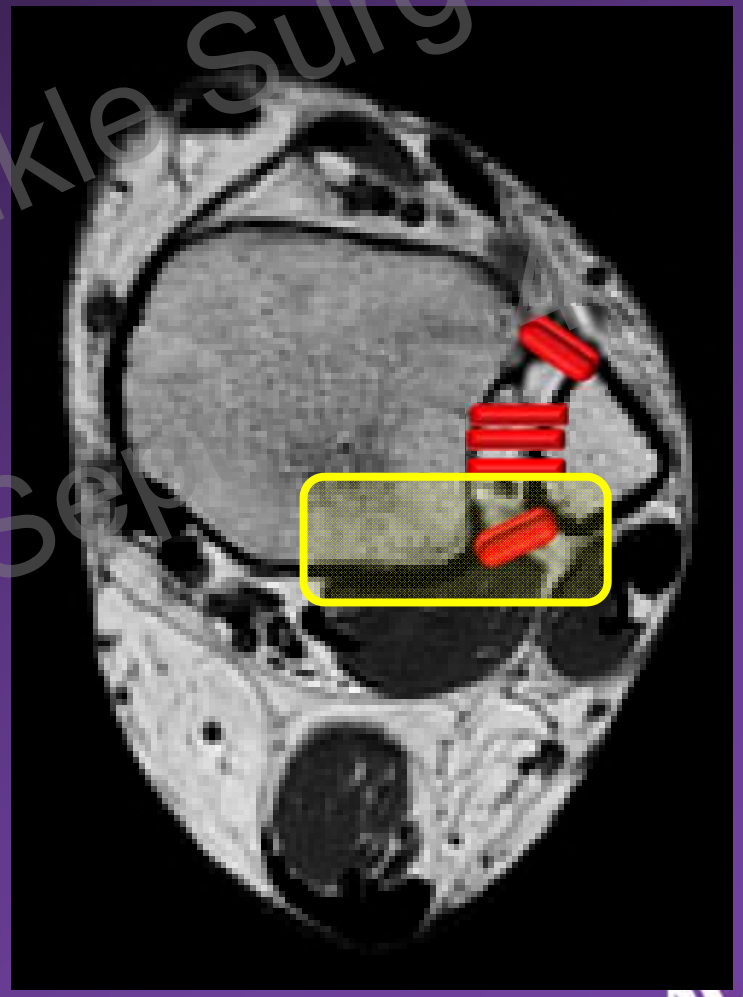
Does Size Matter?

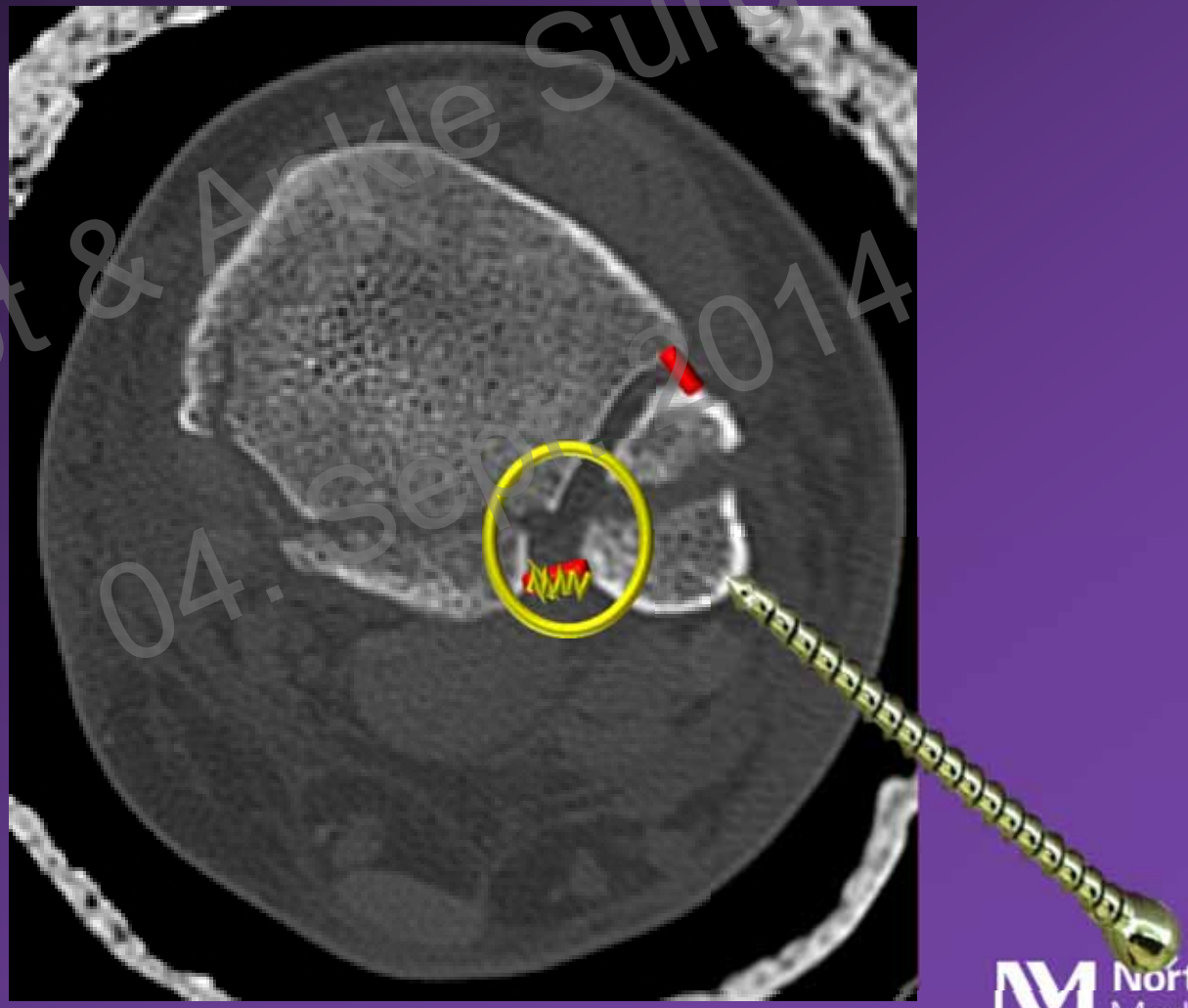
- Measurement of the posterior fragment is misleading
  (Weber, M. Foot Ankle Int. 2004)
- Deep posterior tibiotalar ligament (posterior aspect of the deltoid)
  (Weber, M. Foot Ankle Int. 2004)
  - Malreduction => incompetence of the ligament
    - Size does NOT matter
- Fixation of the posterolateral fragment
  (Naeder H. et. al. Techniques in Foot and Ankle Surgery 2007)
  - Directly repairs the PITFL
    - Size does NOT matter
- Articular congruity associated with superior outcomes at 1 year
  (Berkes M. et. al. J Bone Joint Surg 2013)
  - Incongruity
    - Worse Pain
    - Difficulties with ADLs
    - FAOS (Foot Ankle Outcome Scores)
  - Size does NOT matter

Anatomy Posterior Malleolus

- Axial Anatomy



Mal-reduced PL fragment = Malreduced syndesmosis



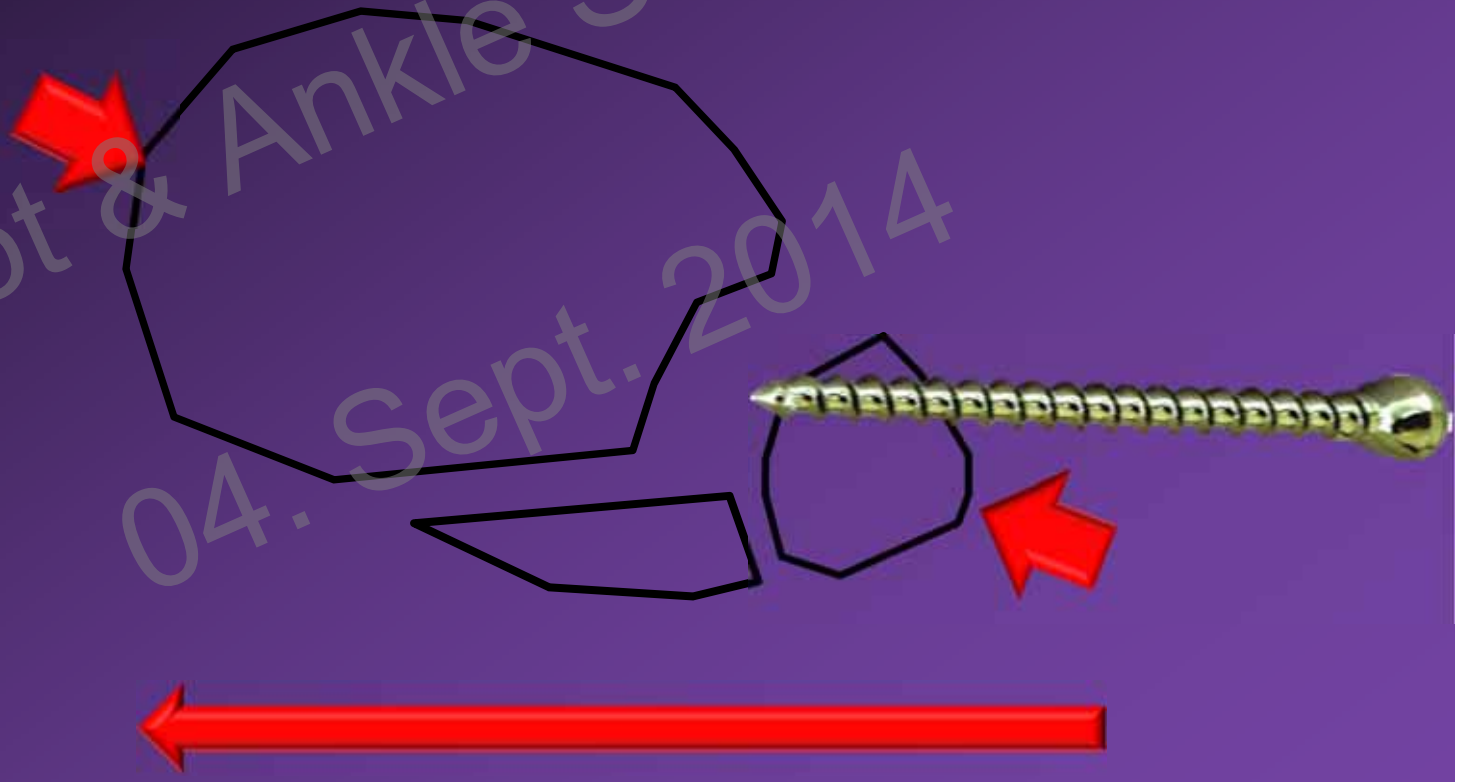
Sagittal Plane Relevance

- Fibula will follow the posterior malleolus and leads to mal-reduction when considering this as a uni-planar injury.
  - May appear closed on the AP
  - However, can be posterior subluxated.

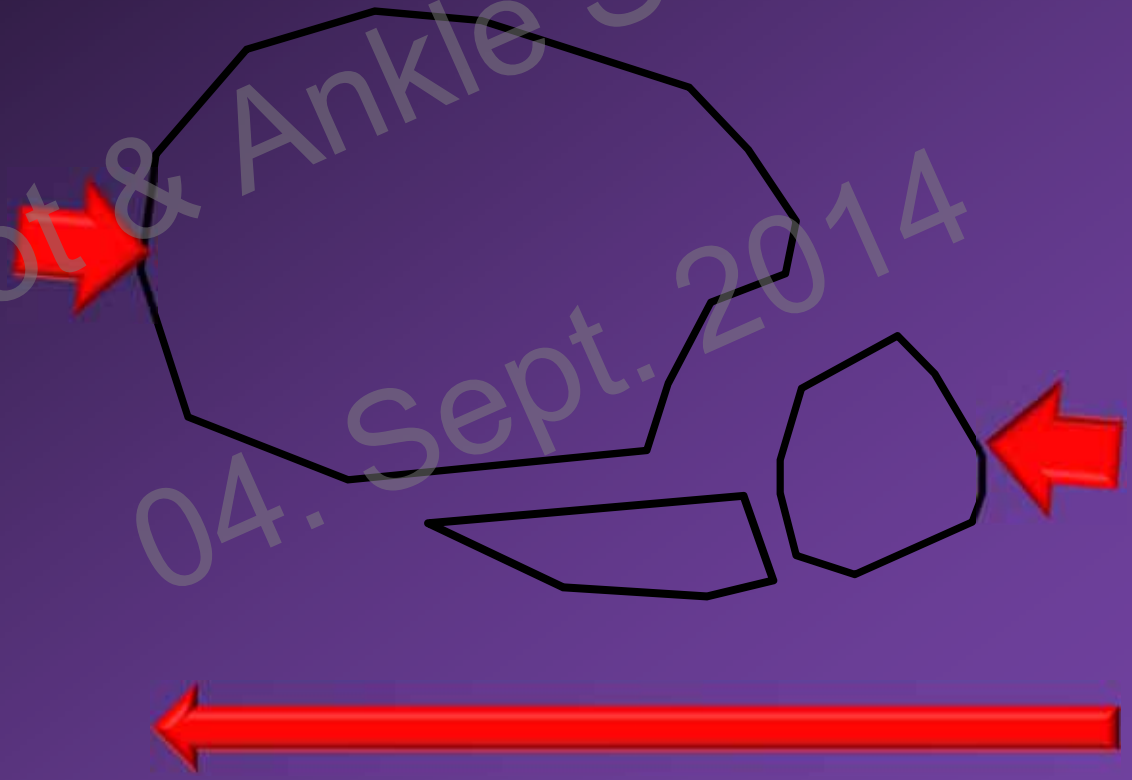
Why this can lead to malreduction

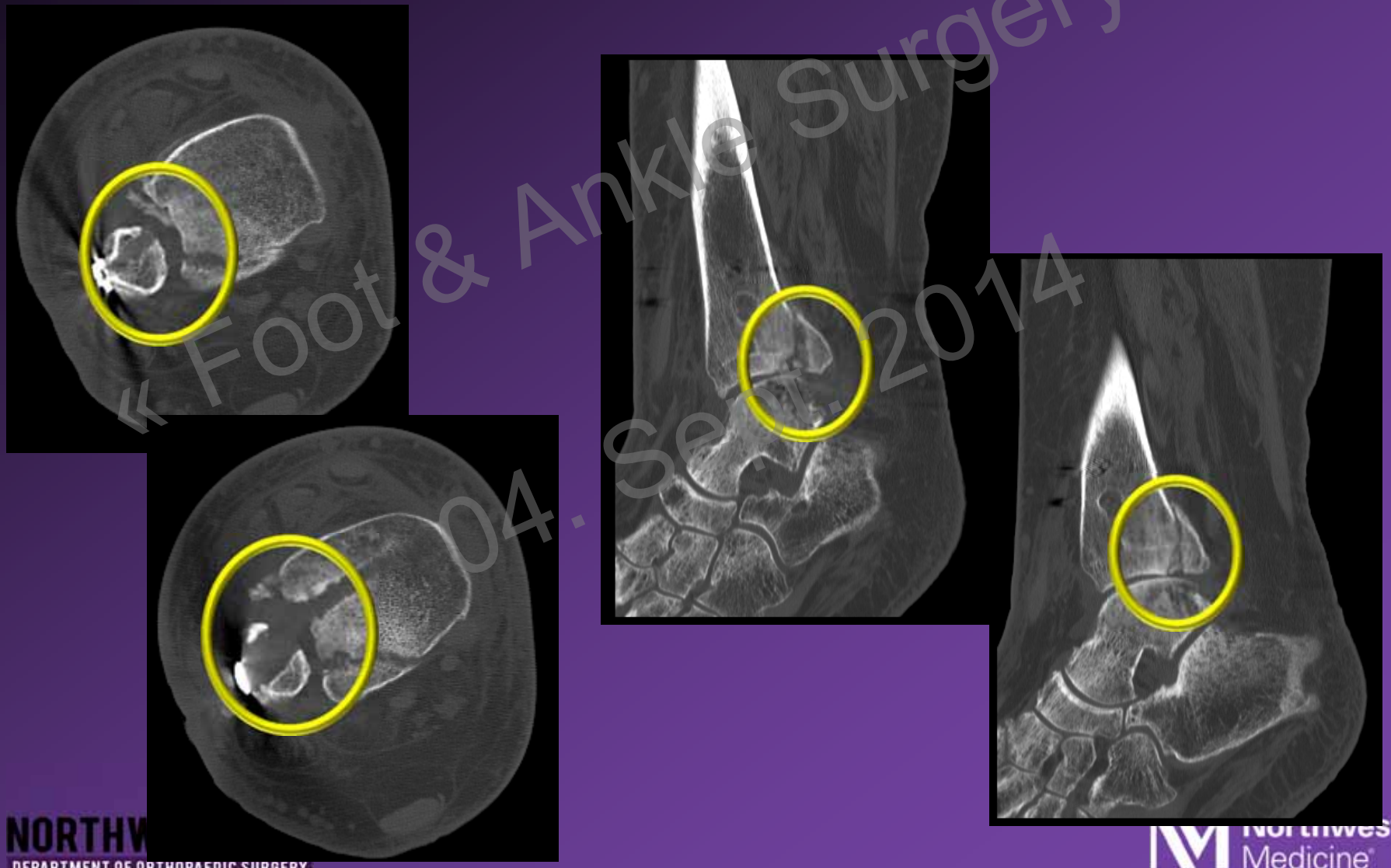
Posterior Lip Intact

Poster Mall Fx + Sagittal Instability = Bad News



Poster Mall Fx + Sagittal Instability + Bad Clamp = Worse

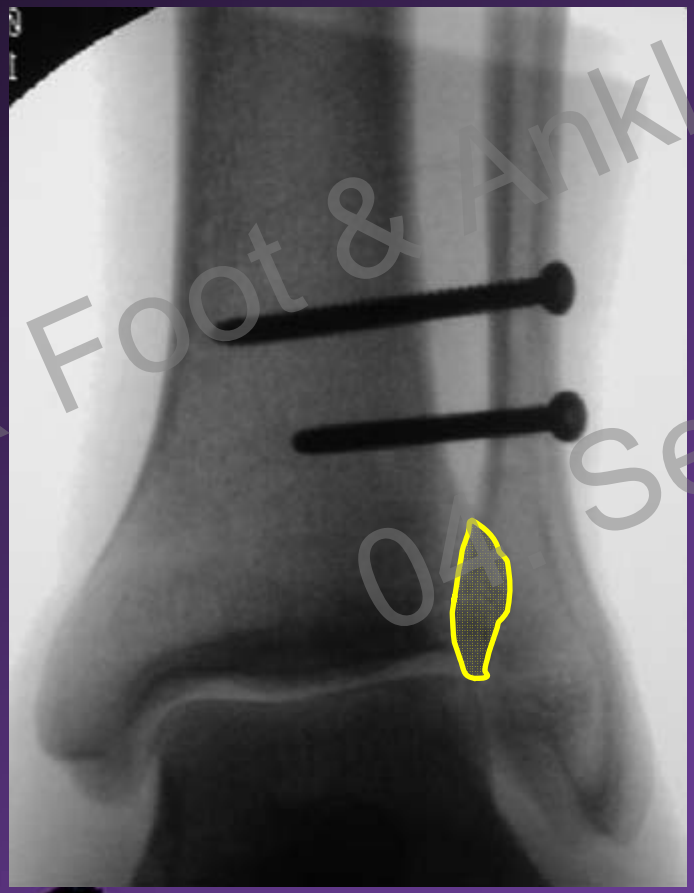




Syndesmotic Fixation w/ Mal reduced Post Mall

(Moore et al. Foot Ankle Int. 2006)

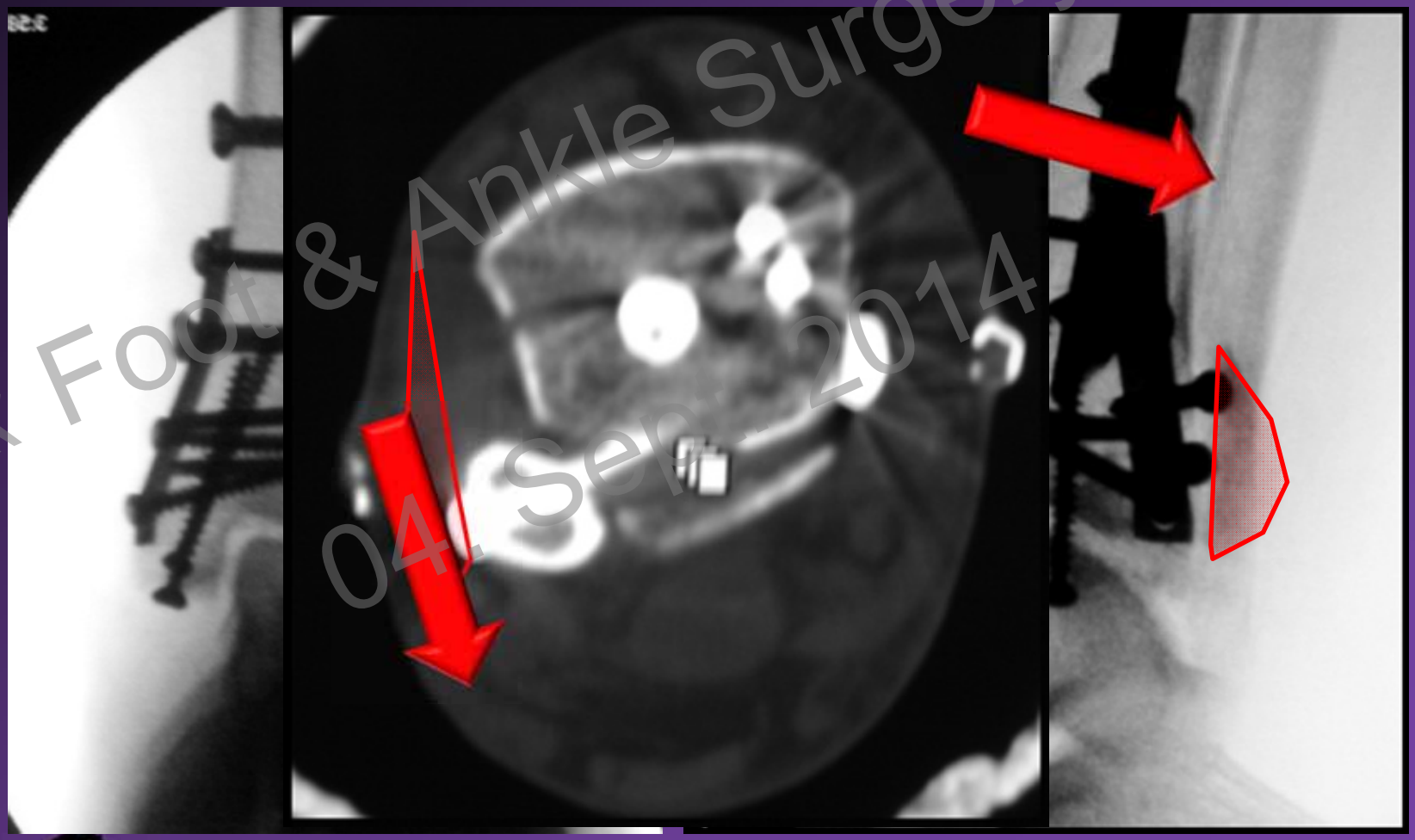
79 days PO



Increased Stability w/ ORIF Post Mal

- Cadaveric Study evaluating Syndesmotic Stability
  (Gardner MJ et. al. Clin Orthop 2006)
  - 10 cadavers
    - AITFL and IOM sectioned
    - 5mm thick Posterior Mall fragment with intact PITFL
  - Two groups
    - ORIF Syndesmosis – One tricortical screw
      - 40% stiffness restored
    - ORIF Post Malleolus
      - 70% stiffness restored

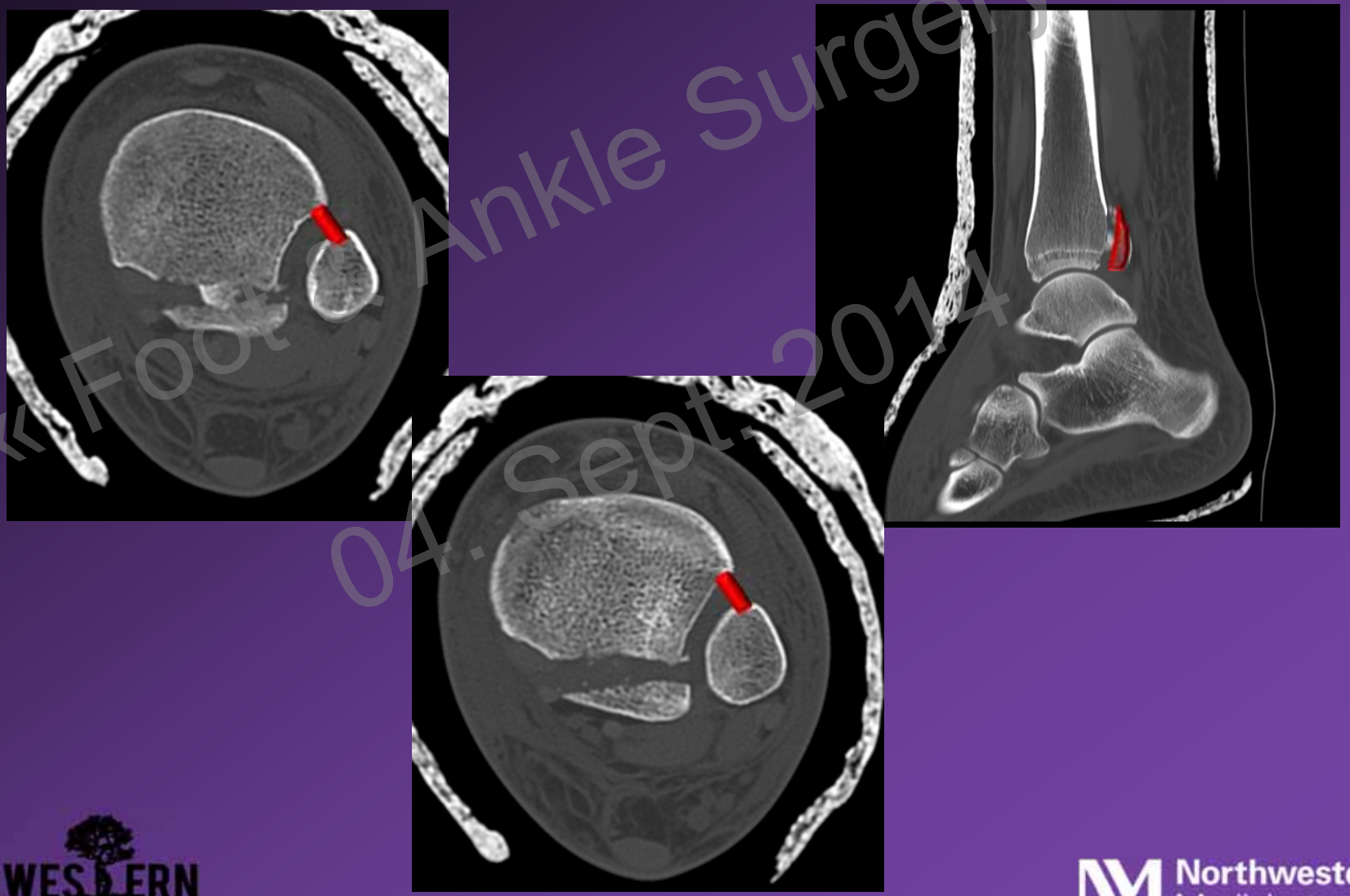
Restores Posterior Buttress (Anatomic Incisura)



(Miller AN, et. Al. Foot Ankle Int. 2009)

Does Posterior Mall ORIF = Syndesmosis ORIF?

- Retrospective Review – 31 fractures
  (Miller AN. et. al. Clin Orthop Relat Res. 2010)
  - PM – Posterior Malleolus Fracture – 9
    - MRI confirmed intact PITFL in all patients
  - S – Syndesmotic Injury w/o PM fracture – 14
  - C – Combined (Ankle dislocated w/ PM fracture) – 8
- All PM fractures fixed regardless of size
- Results
  - No significant difference in outcome measures
    - Pain, ADL, Sports
    - Radiographic parameters – clear space, overlap, medial clear space.



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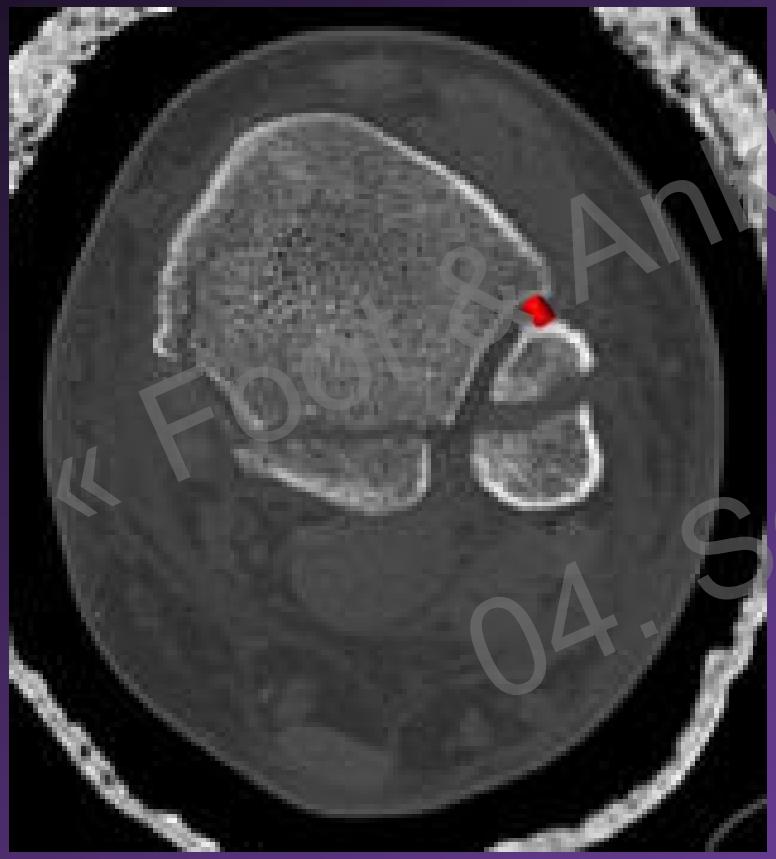
ORIF Post Mall is enough



Final PO

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Posterior Pilon Fractures : A Retrospective Case Series and Proposed Classification System

Georg Klammer, Anish R. Kadakia, David A. Joos, Jeffrey D. Seybold and Norman Espinosa

Foot Ankle Int 2013 34: 189 originally published online 22 January 2013

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- 11patients total over 4 years
- I now recognize more and have done 20 over the last 12 months
  - All fracture dislocation and post mall
    - CT to define fracture pattern

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Proposed Classification

- Type 1 – Single Posterior Fragment
- Type 2 – Split Posterior Fragment
  - May require PM incision
- Type 3 – Anteromedial Fragment
  - Demands Medial Incision

- Type S – Additionally Fix Syndesmosis

Articular Impaction + Joint Incongruity

- Will not reduce indirectly
  - Lack of ligamentous attachment prevents reduction
  - Will prevent reduction of the larger posterior tibial fragment

- The underlying reason for the term
  - “Posterior Pilon”

Initial Radiograph

Fracture / Dislocation

Subtle after Reduction

Lateral Radiograph

Small Posterior Fragment

>25% Fragment Size