

Comminuted Intertrochanteric Fractures: Open and Closed Reduction Management

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I (and/or my co-authors) have something to disclose.

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Things to consider

- Fracture pattern?
- What is an acceptable reduction?
- What is acceptable implant position?



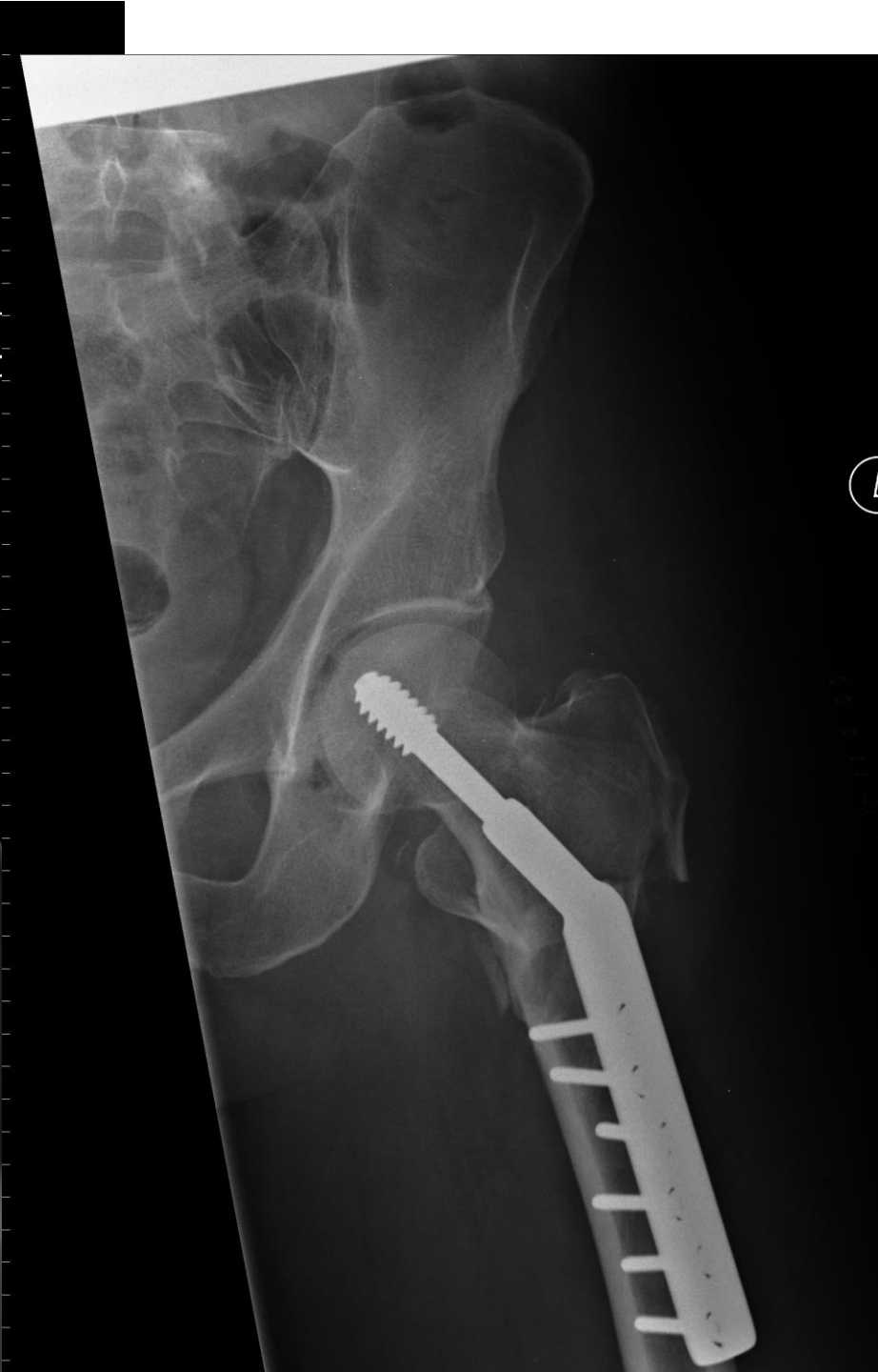
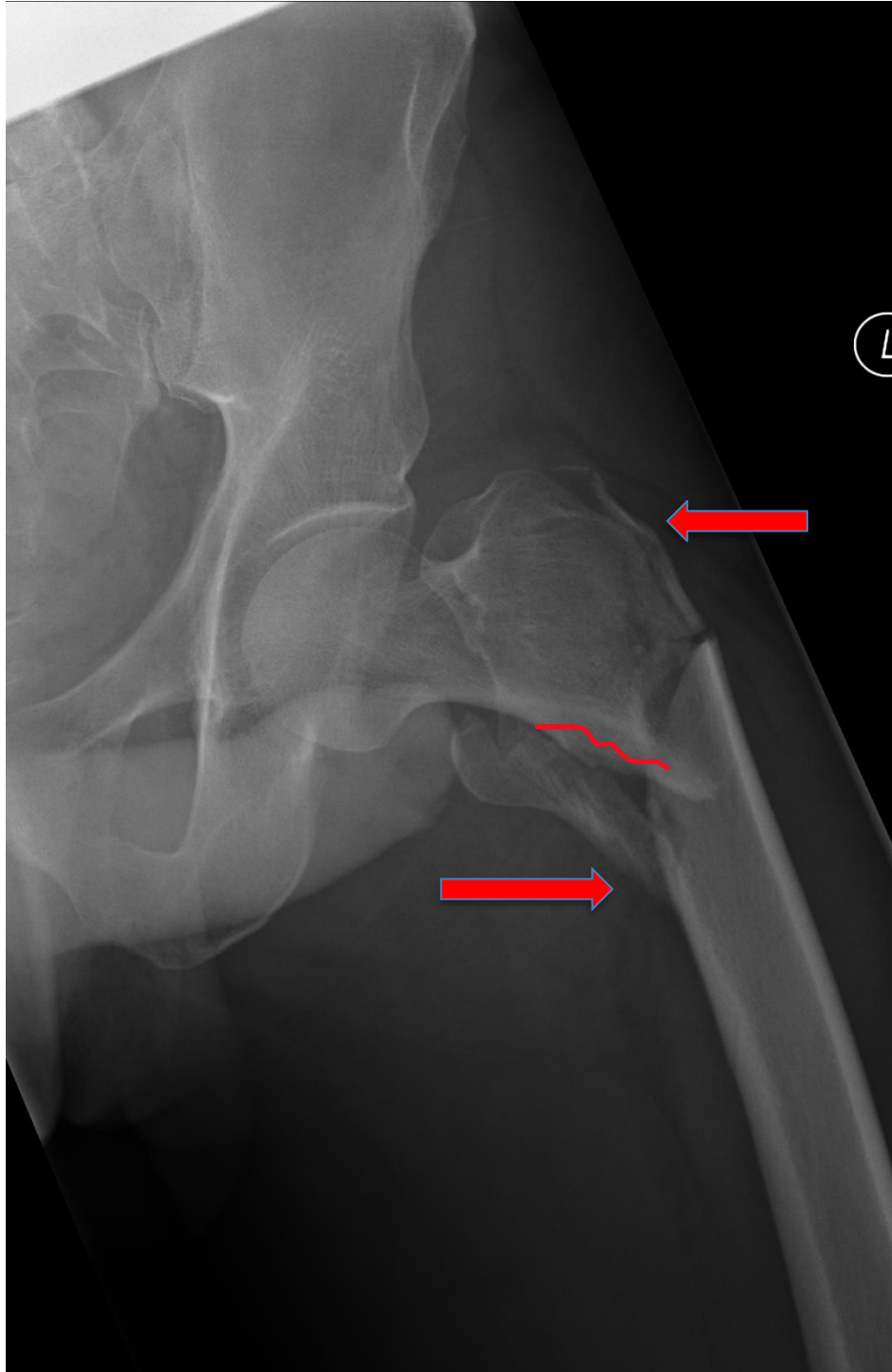
What to worry about pre-op

Injury characteristics

- Unstable patterns
- Reverse obliquity
- Subtroch extension
- Thin lateral wall
- Significant displacement
- Femoral bow



Dictate implant choice and approach: CR vs OR



■ TRAUMA

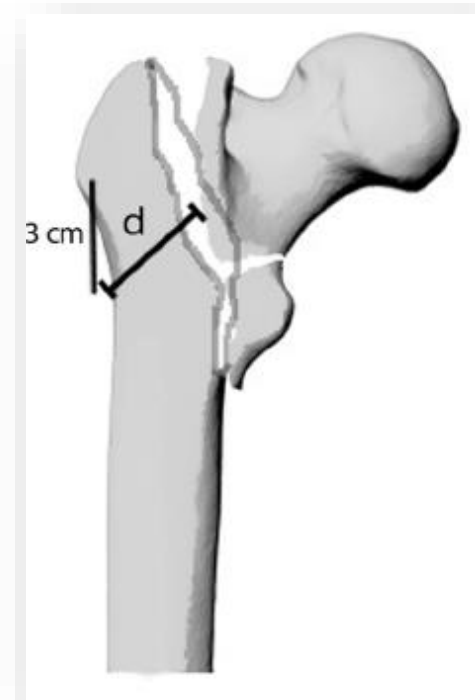
Lateral femoral wall thickness

A RELIABLE PREDICTOR OF POST-OPERATIVE LATERAL WALL FRACTURE IN INTERTROCHANTERIC FRACTURES

C-E. HSU, C-M. SHIH, C-C. WANG, K-C. HUANG

THE BONE & JOINT JOURNAL VOL. 95-B, No. 8, AUGUST 2013

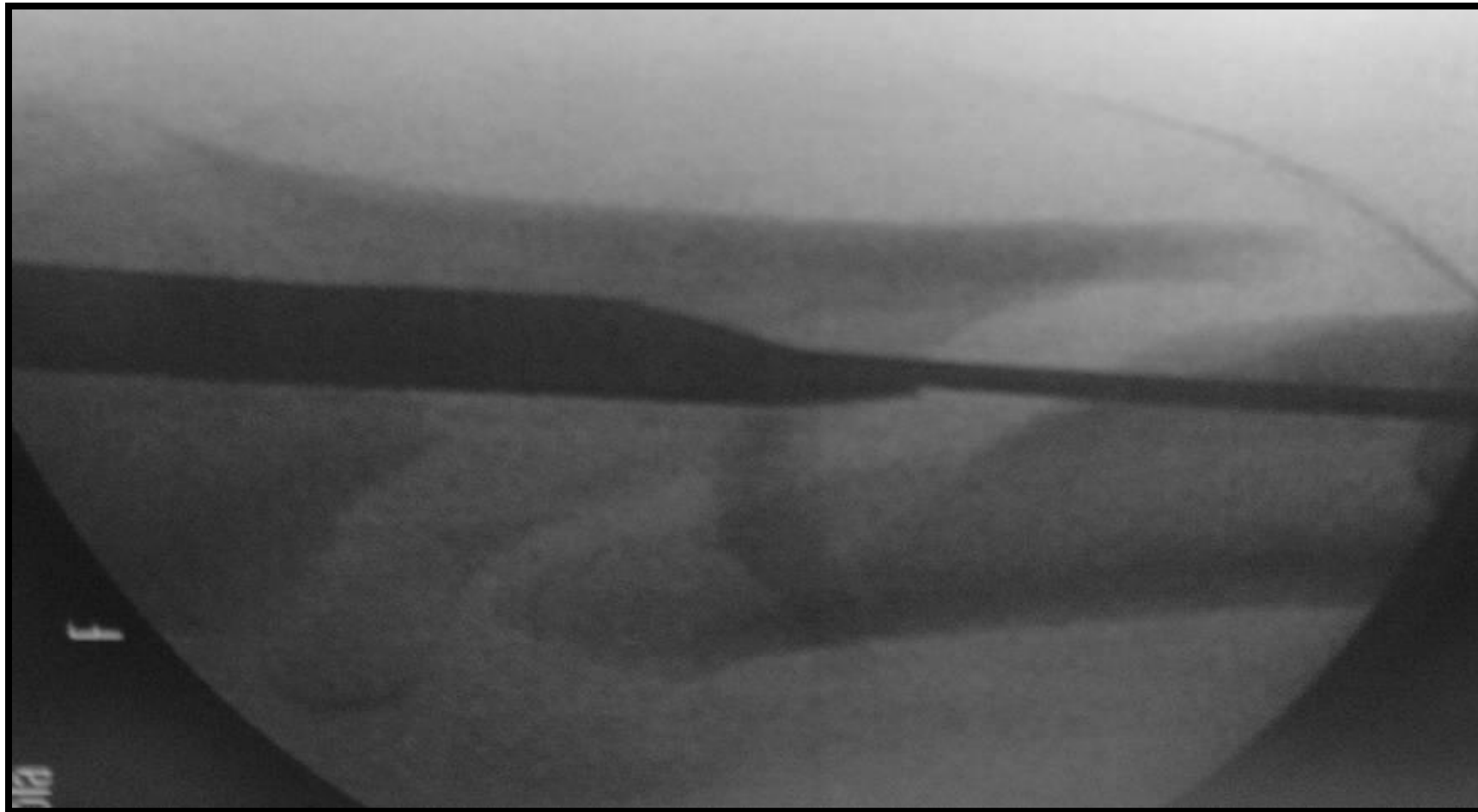
- 208 patients AO/OTA 31-A1 and -A2 intertrochanteric fractures
- Lateral wall thickness < 20.5 mm should not be treated with SHS alone



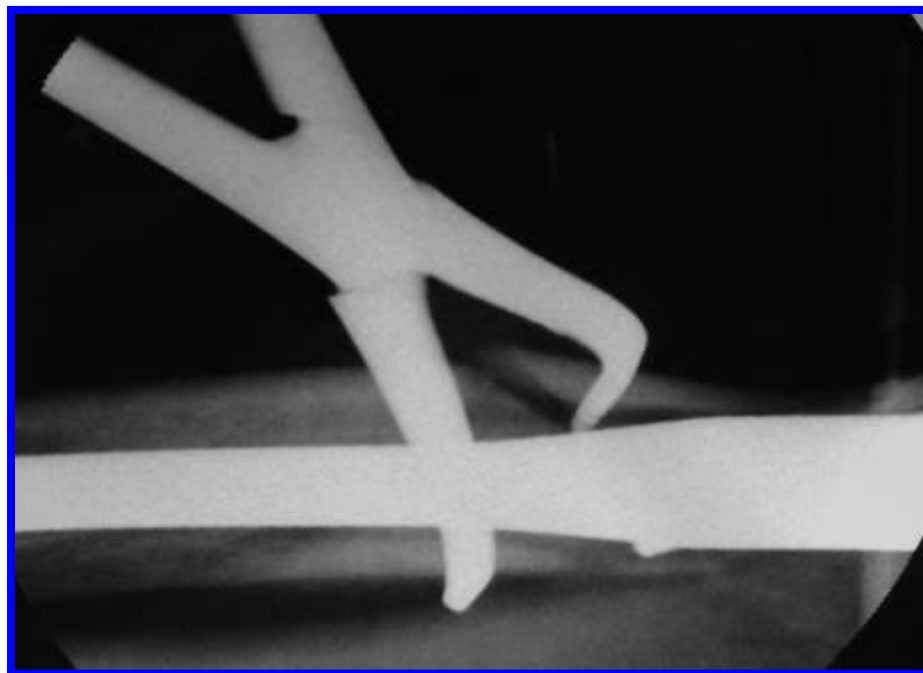
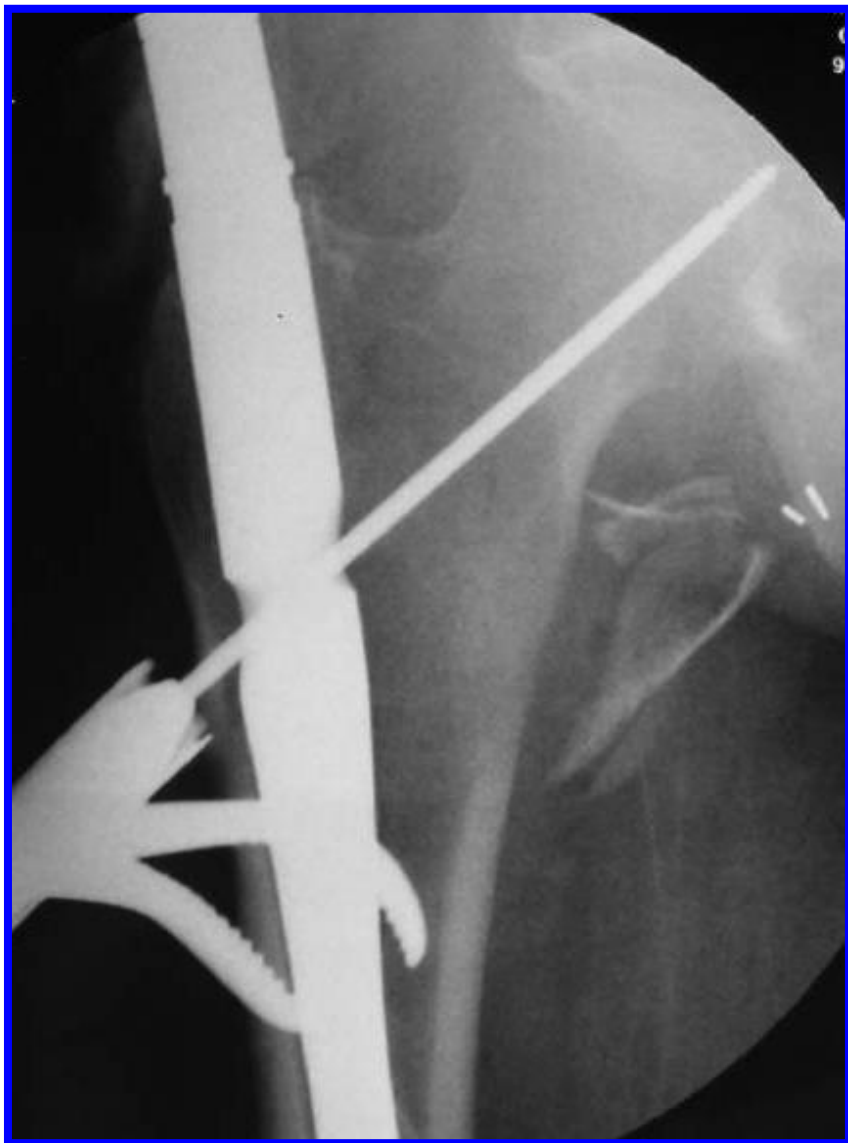
Need to reduce fracture before reaming /
implant insertion: CR vs OR?



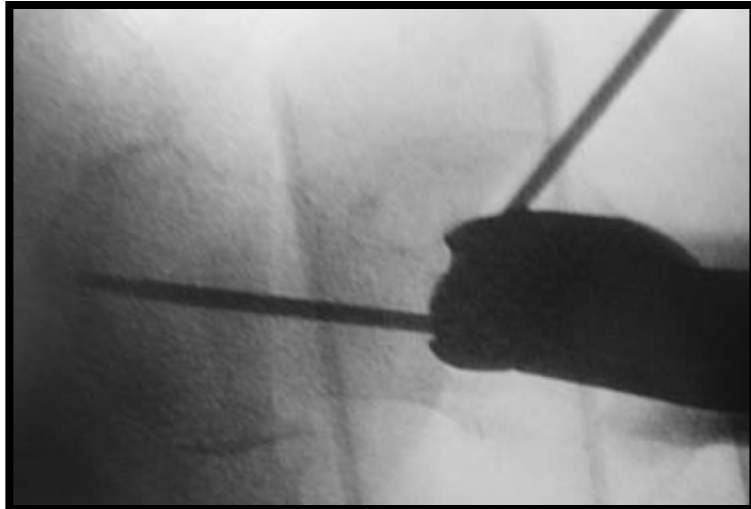
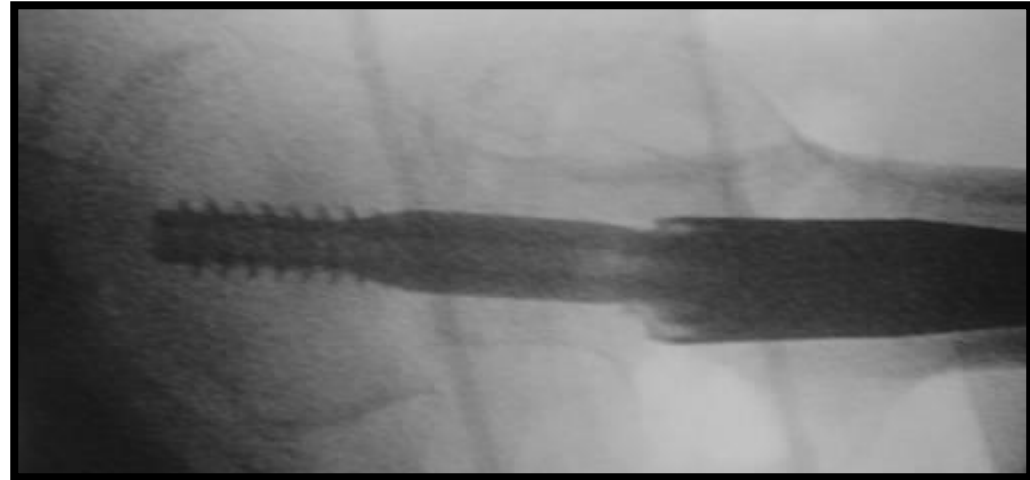
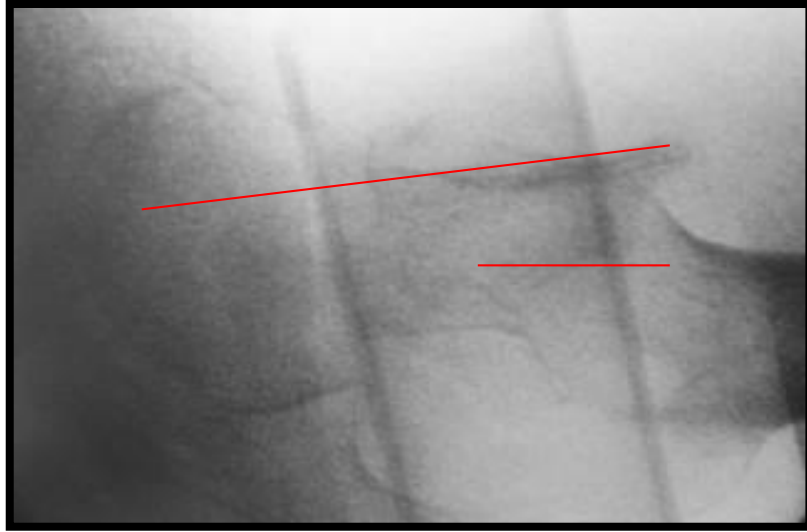
Reduction - Awl



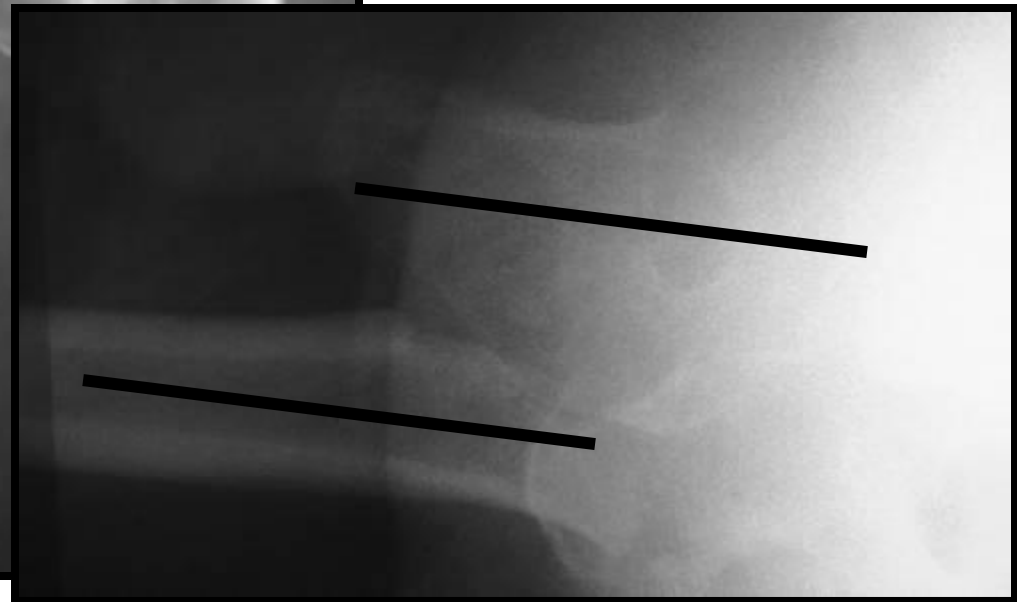
Reduction - Clamp



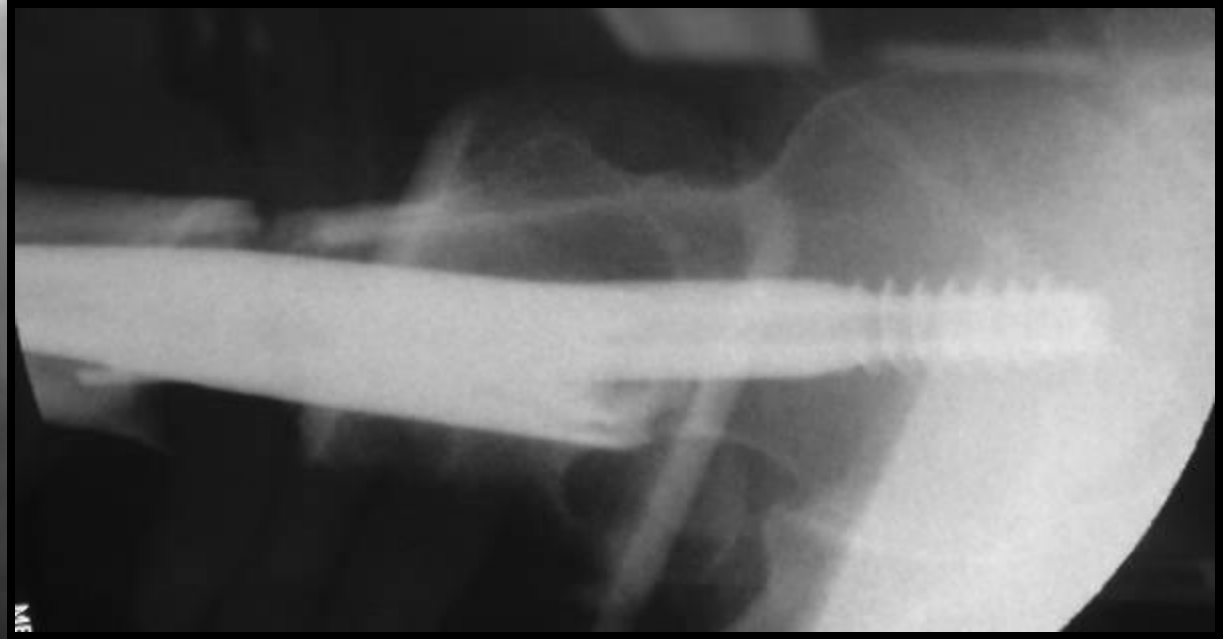
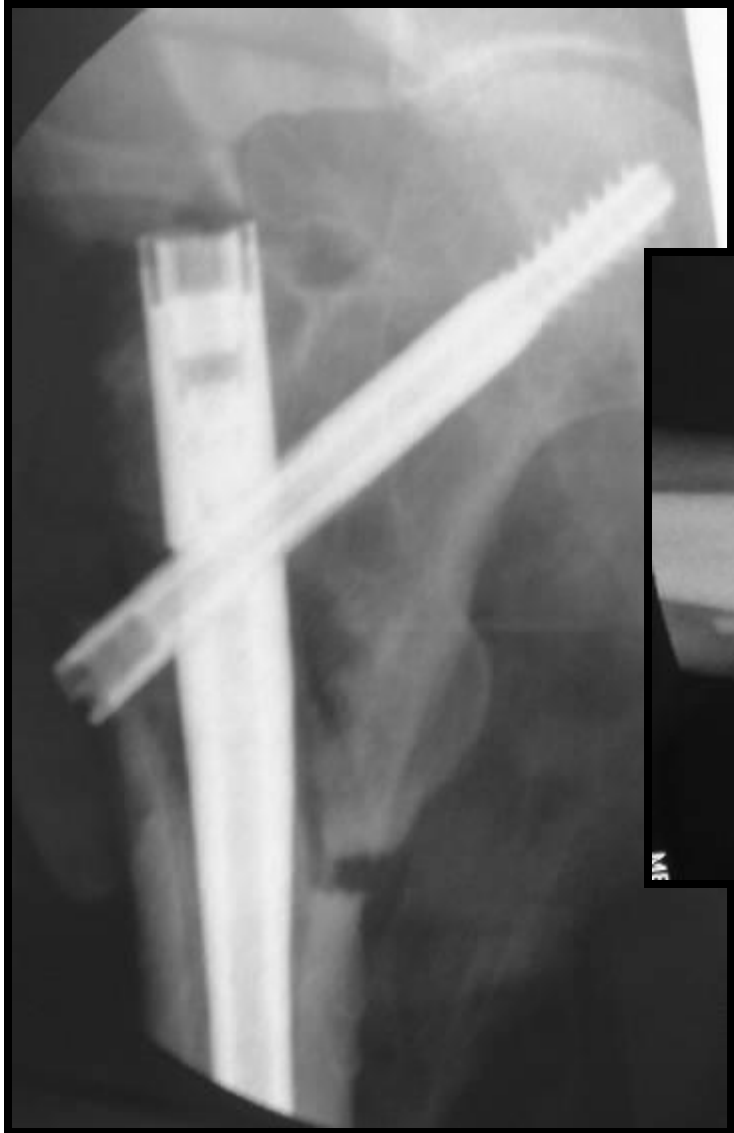
Reduction – Joy sticks / pushers



Significant displacement

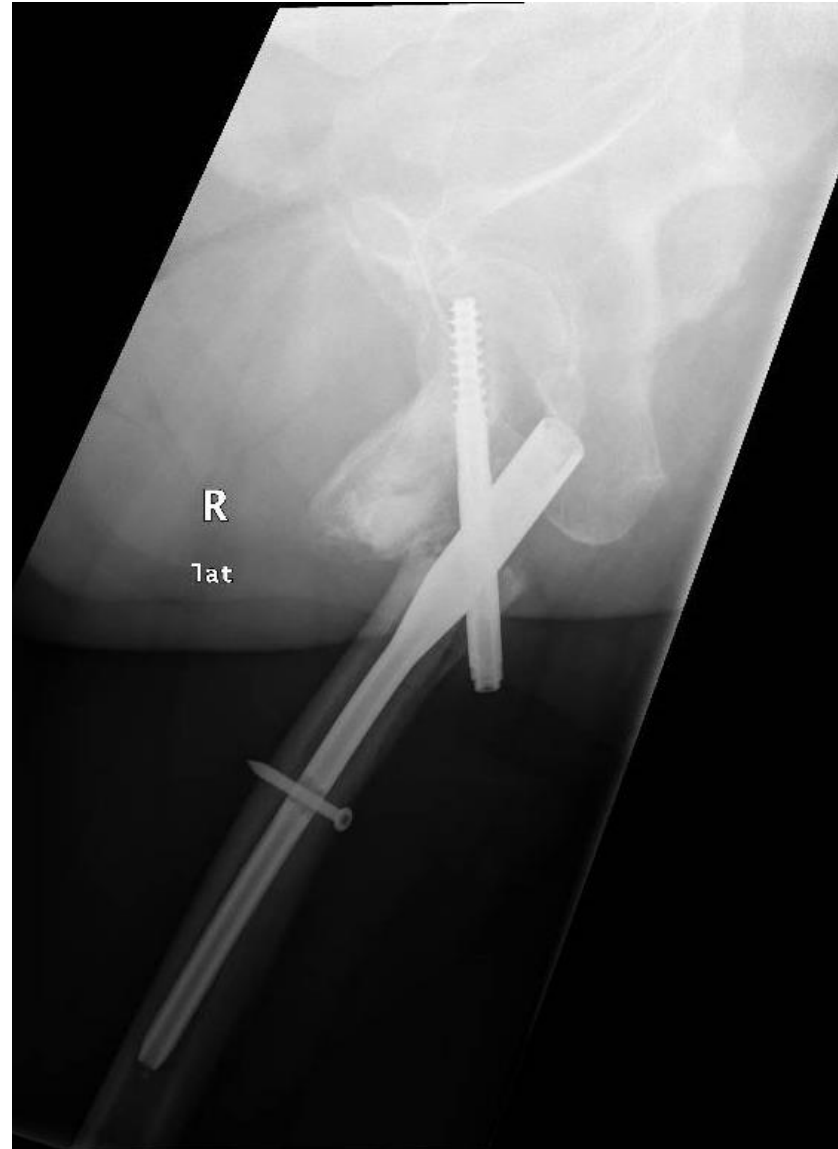


Requires open reduction





No open reduction



Femoral bow



Ensure nail ROC is appropriate for femur

Screw cut-out is still a problem! Reduction is key!



Risk Factors Associated With Cephalomedullary Nail Cutout in the Treatment of Trochanteric Hip Fractures

*David J. Ciufu, MD, Douglas A. Zaruta, MD, Jason S. Lipof, MD, Kyle T. Judd, MD,
John T. Gorczyca, MD, and John P. Ketz, MD*

Downloaded from

- Important factors
 - Lateral wall fracture
 - Neck shaft mal-reduction
 - Residual basi-cervical gapping

Acceptable reduction

- Anteromedial calcar reduced
 - Avoid translation
 - Avoid negative medial cortical support
 - Chang et al, AOTS 2015
 - Avoid anterior malreduction
 - Inui CORR 2024
- Restore neck shaft angle
 - Avoid varus
 - Fisher et al JAAOS 2024
- Avoid distraction

Calcar reduction

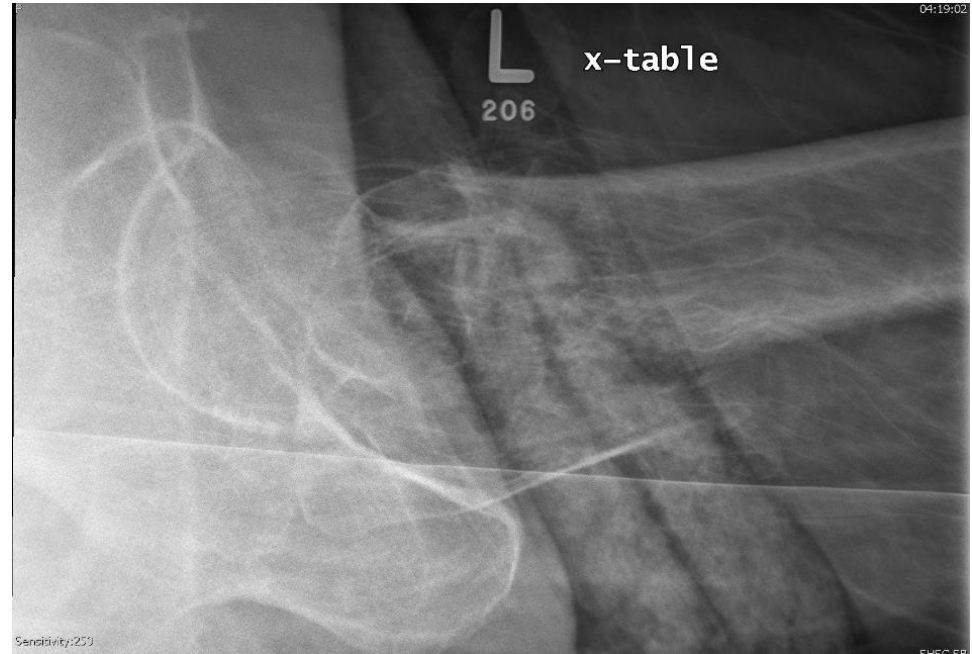
- Chang et al, AOTS 2015
 - Positive medial cortical support reduction had the least loss in neck–shaft angle and neck length

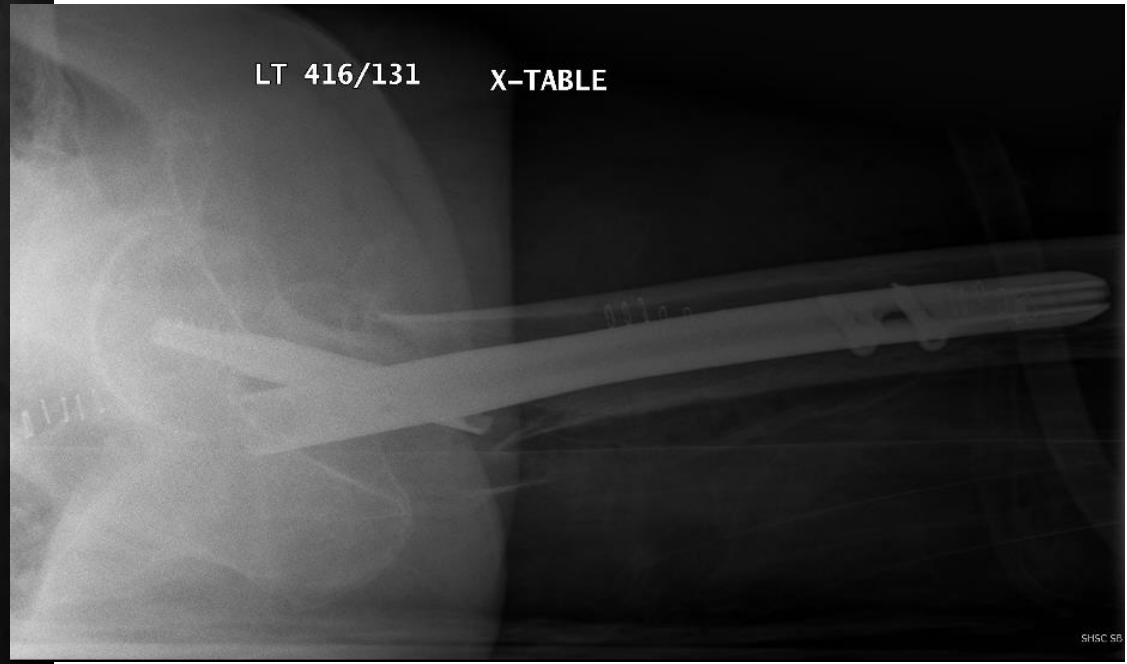
Positive

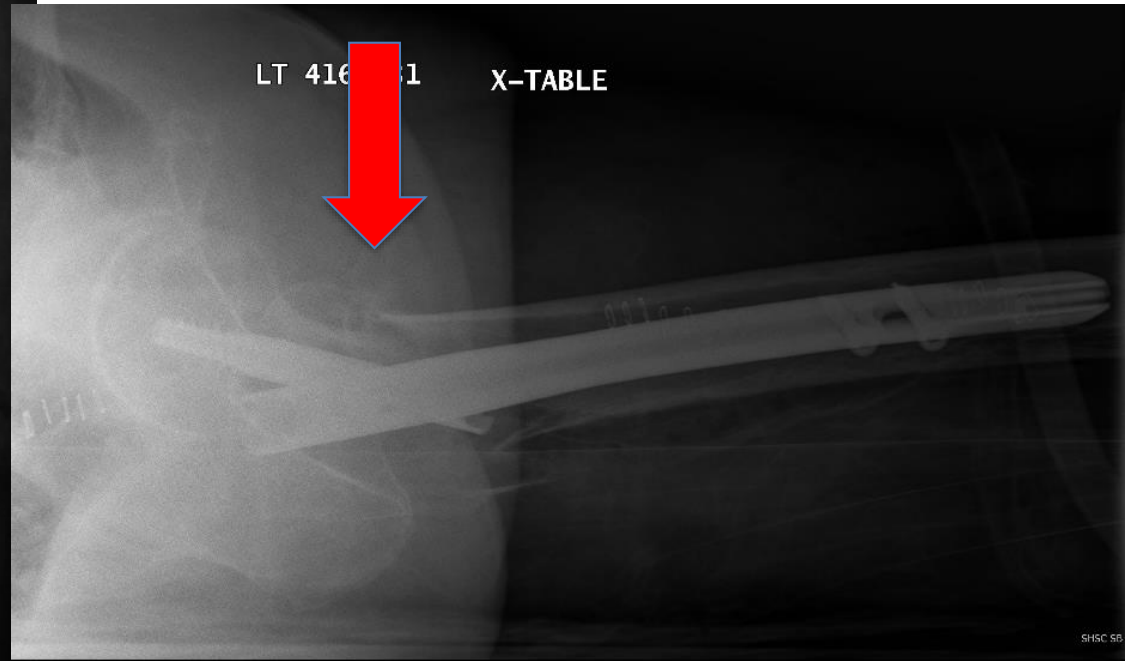
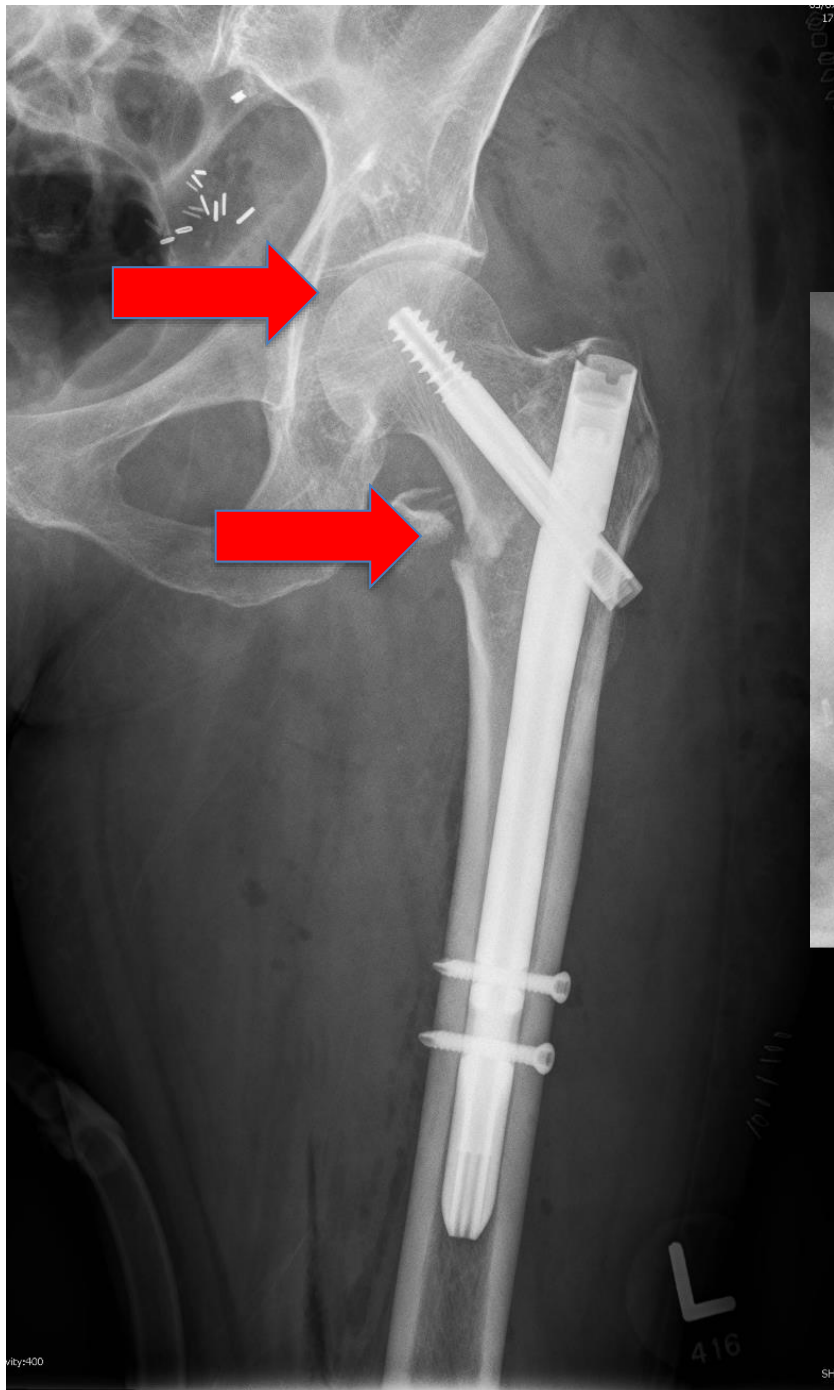


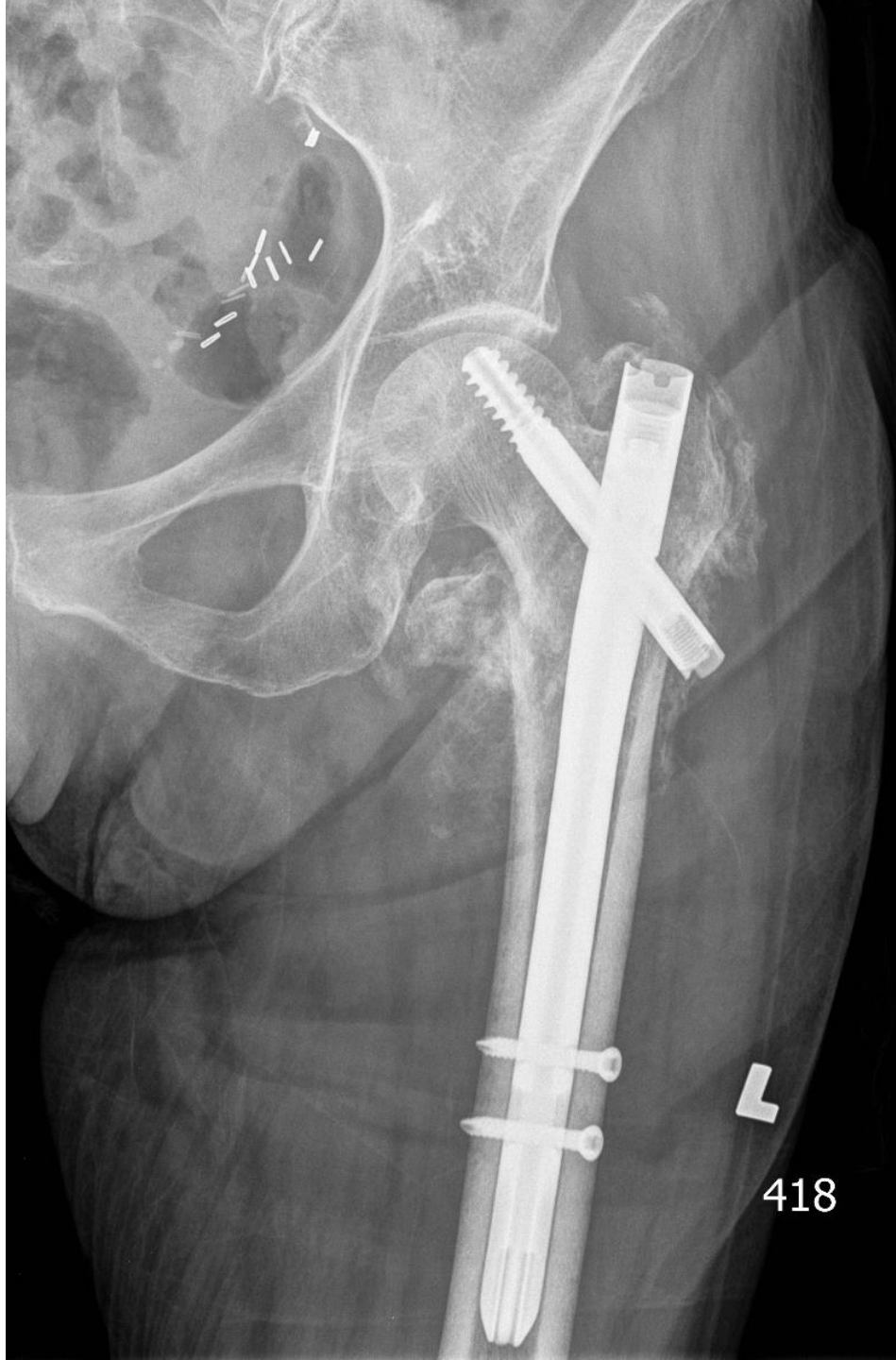
Negative











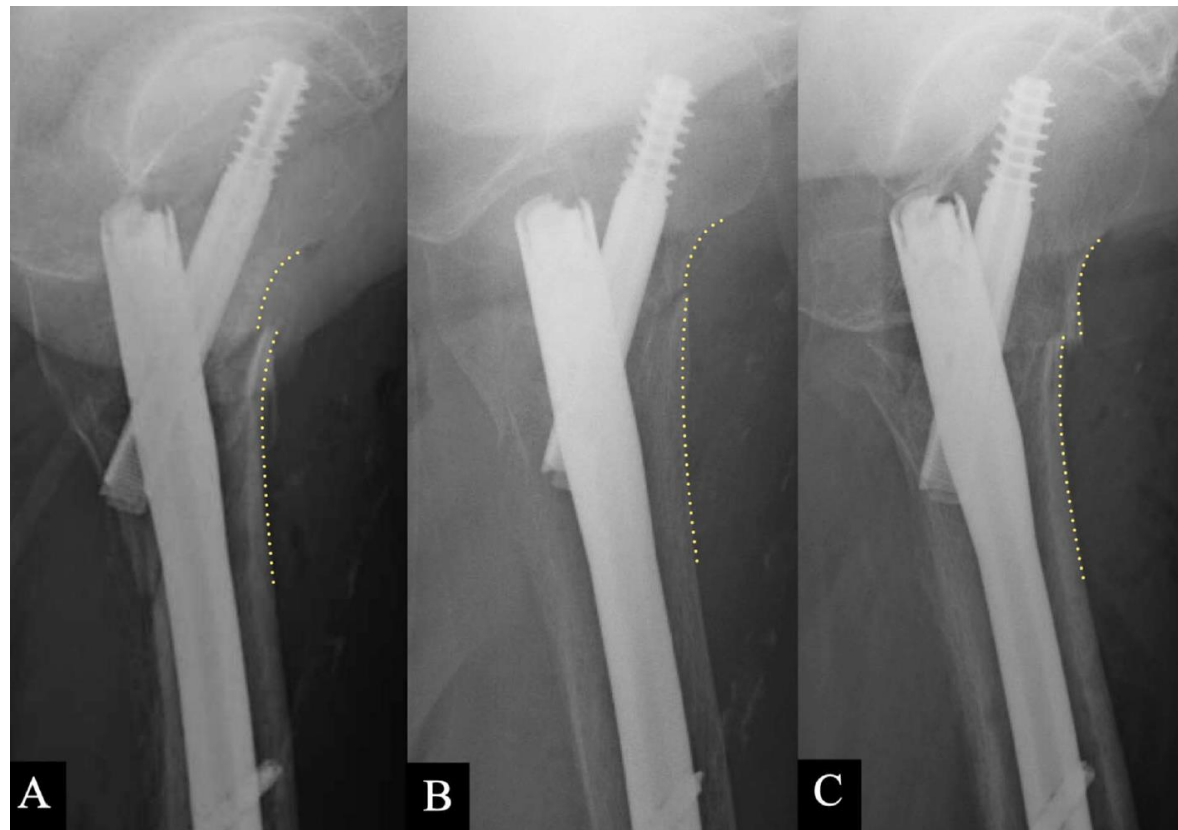
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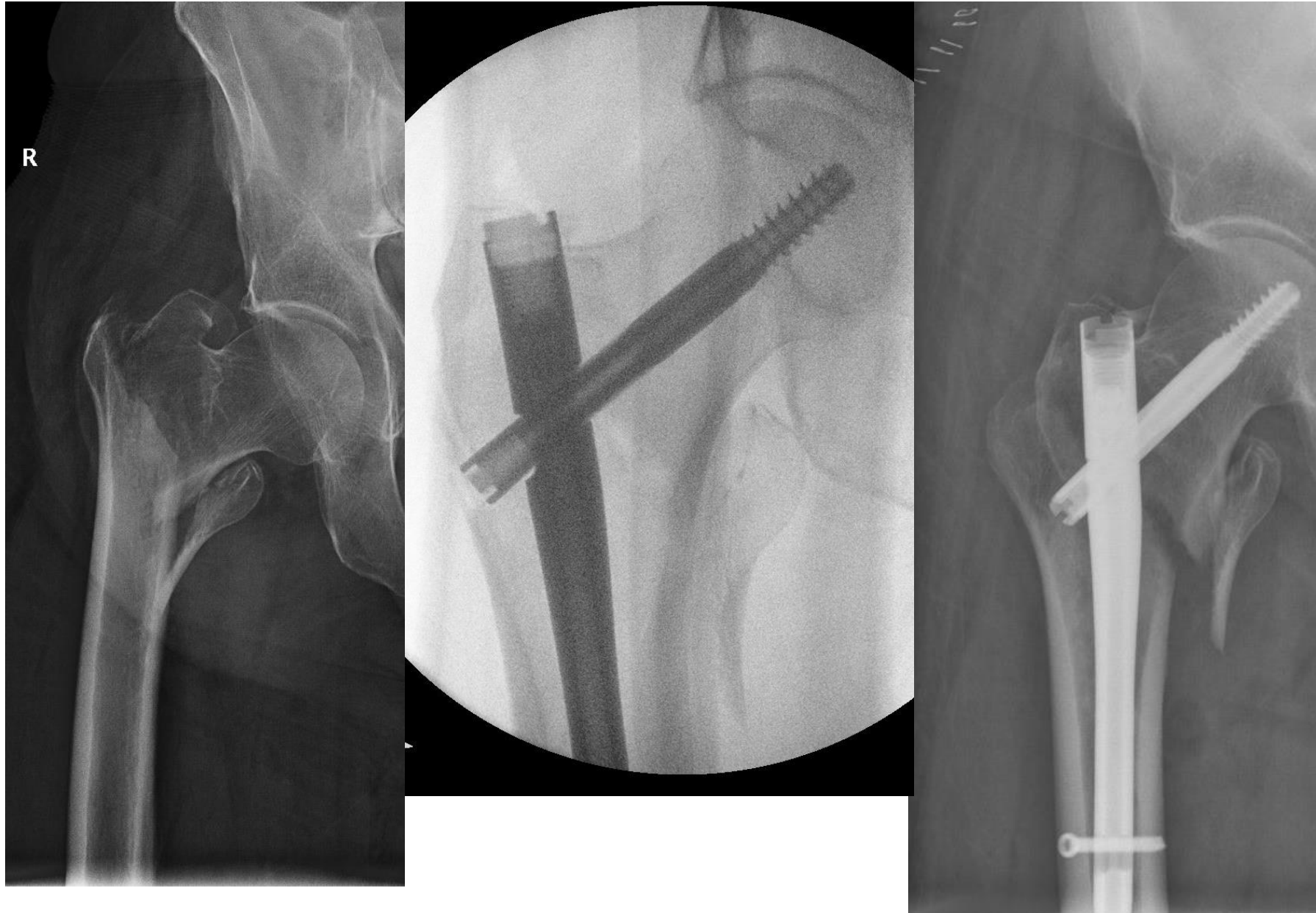
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Anterior reduction

- Inui et al, CORR 2024
 - Anterior mal-reduction associated with a 4.2x greater odds of cutout

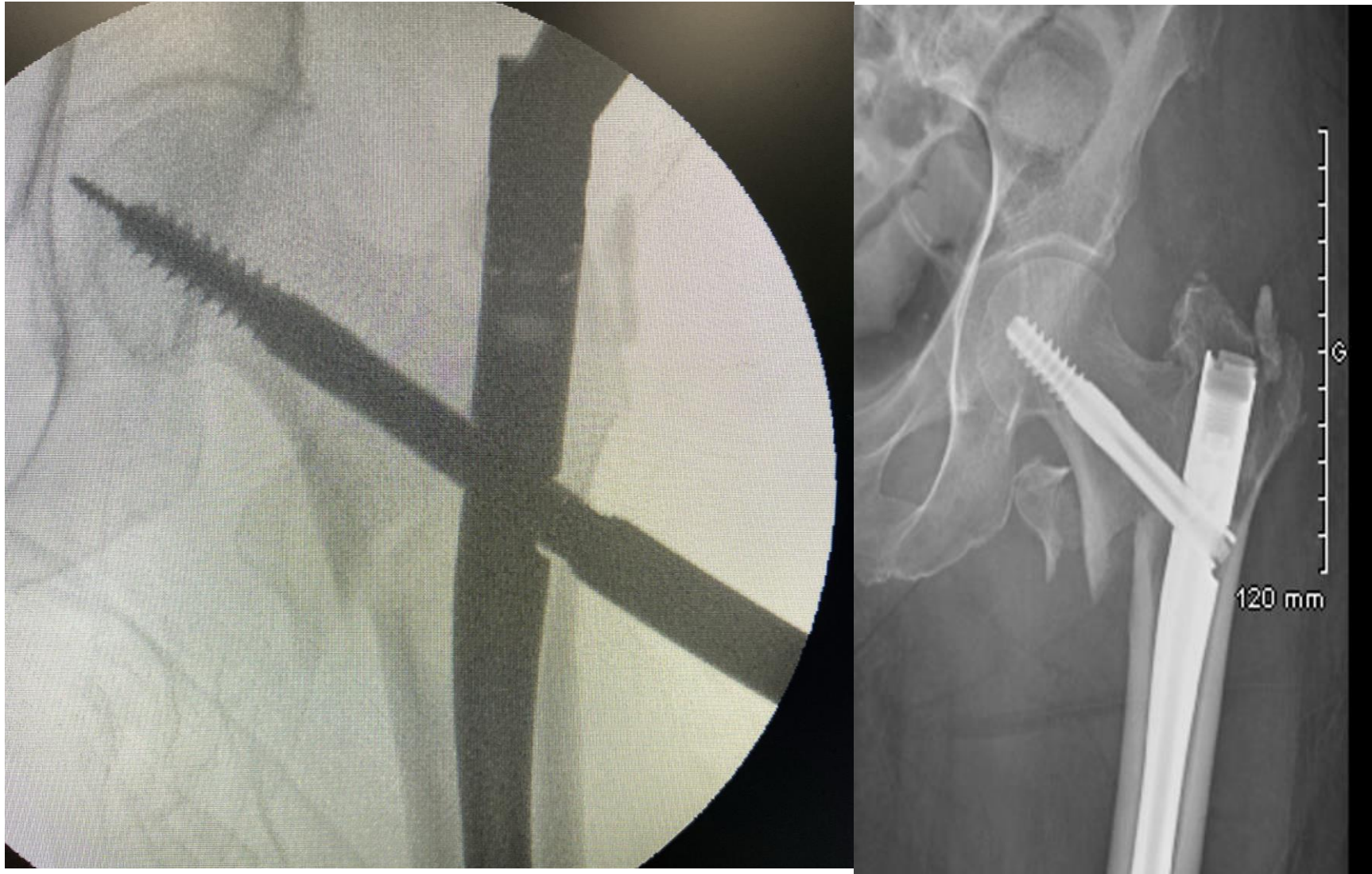


Varus: Image opposite limb



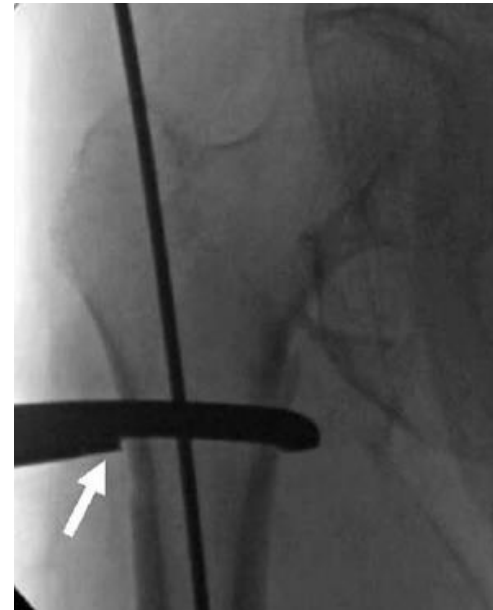


Distraction



Do what it takes to get reduction!

- If necessary open it
- Adjunctive techniques
 - Circlage wires
 - Colinear clamps
 - Mini-fragment plates

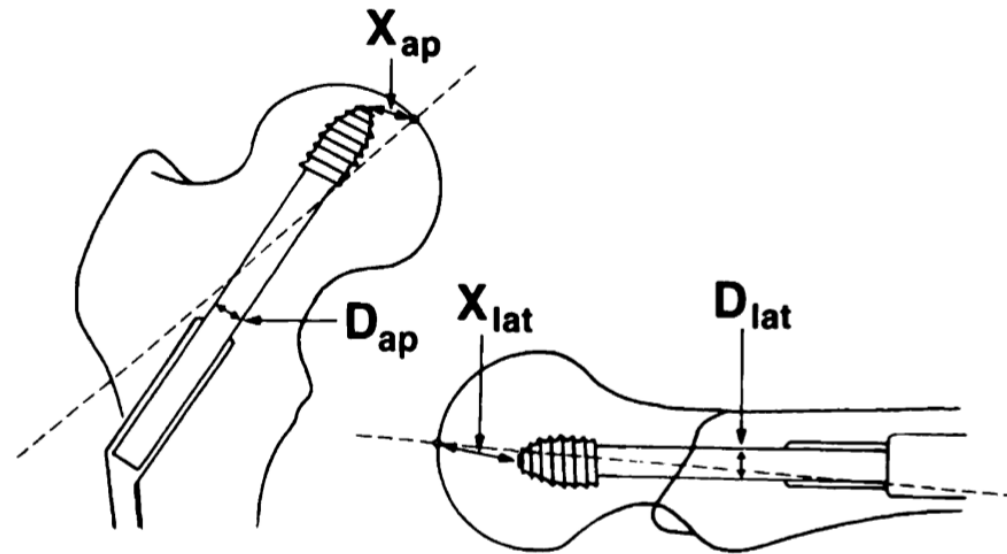


Implant position is key!

The Value of the Tip-Apex Distance in Predicting Failure of Fixation of Peritrochanteric Fractures of the Hip*

BY MICHAEL R. BAUMGAERTNER, M.D.†, STEPHEN L. CURTIN, M.D.†, DIETER M. LINDSKOG, B.A.†,
AND JOHN M. KEGGI, M.D.‡, NEW HAVEN, CONNECTICUT

Investigation performed at the Department of Orthopaedics and Rehabilitation, Yale University School of Medicine, New Haven



$$\text{TAD} = \left(X_{\text{ap}} \times \frac{D_{\text{true}}}{D_{\text{ap}}} \right) + \left(X_{\text{lat}} \times \frac{D_{\text{true}}}{D_{\text{lat}}} \right)$$



■ HIP

Predictors of failure for cephalomedullary nailing of proximal femoral fractures

Retrospective review of 170 fractures treated with cephalomedullary nailing

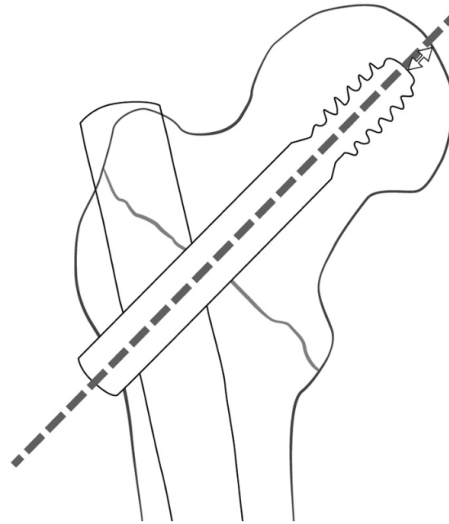


Fig. 1a

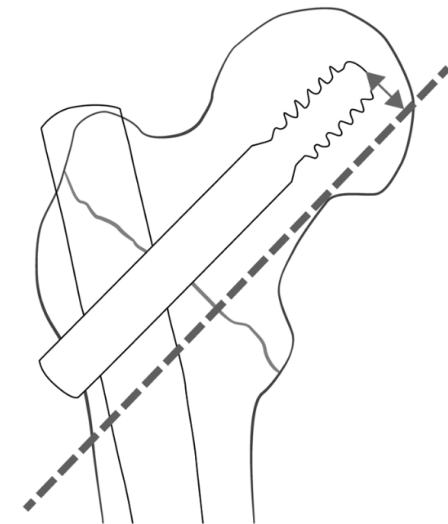


Fig. 1b

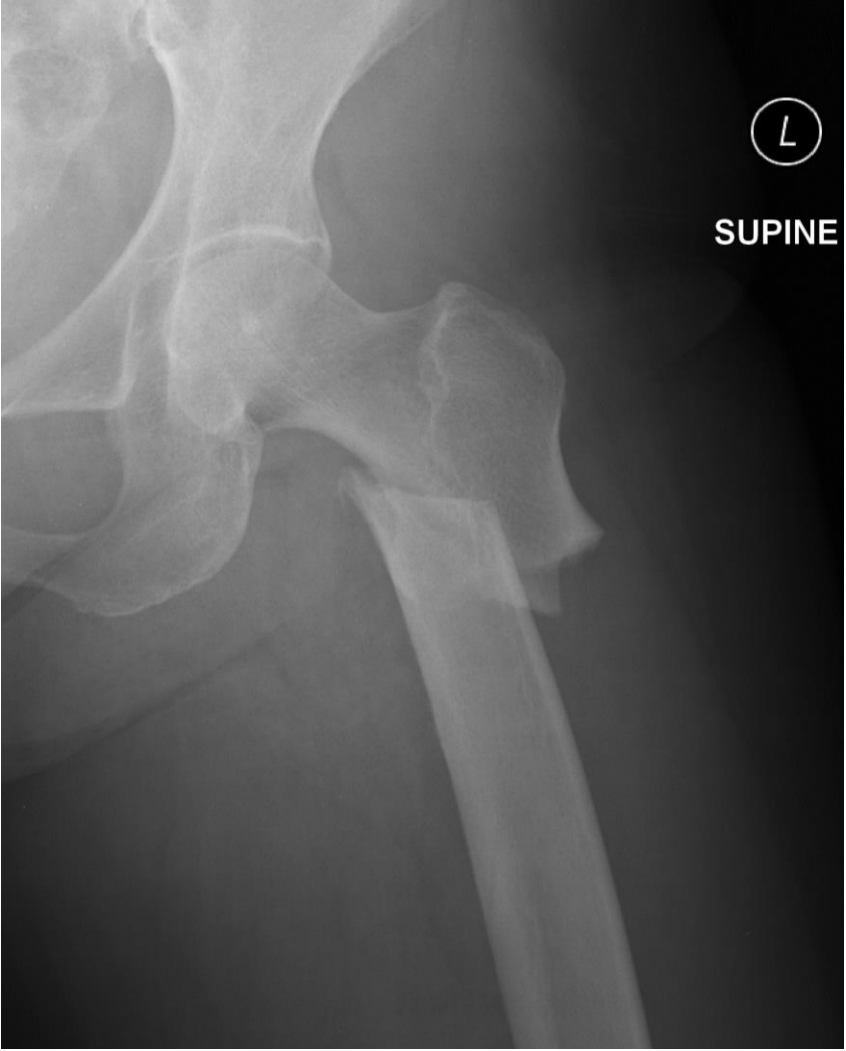
Our data provide the first reported clinical evidence that CalTAD is a predictor of cut-out. The finding of CalTAD as the only significant parameter in the multivariate analysis, along with the univariate significance of Parker's ratio index in the AP view, suggest that inferior placement of the lag screw is preferable to reduce the rate of cut-out.

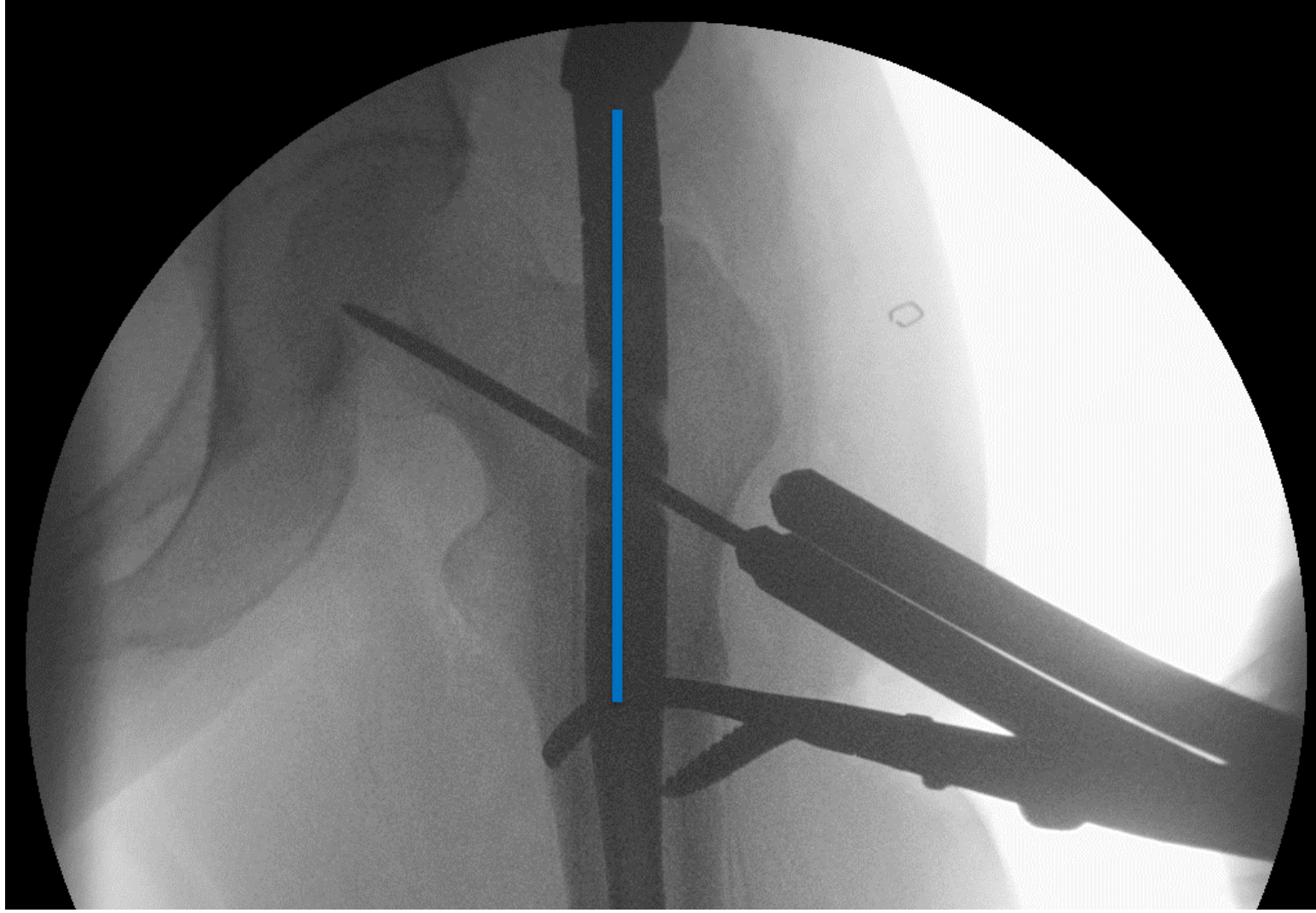
Cut-out

- Cut-out is related to improper surgical technique:
 - Quality of reduction,
 - Implant application

Tips for Success...

- Reduce before reaming
- Ensure correct entry point
- Reaming: must avoid further comminution and lateral drift
- Be aware of lag screw angle
- Beware distal nail perforation
- Check for Rotational deformity
- Atraumatic manual nail insertion







**Intertrochanteric hip fractures:
Is there really no difference
between nails and plates?**

IMHS vs SHS



Original Investigation | Orthopedics

Intramedullary Nailing vs Sliding Hip Screw in Trochanteric Fracture Management The INSITE Randomized Clinical Trial

Emil H. Schemitsch, MD; Lauren L. Nowak, PhD; Arndt P. Schulz, MD, PhD; Ole Brink, MD; Rudolf W. Poolman, MD, PhD; Samir Mehta, MD; Dirk Stengel, MD, PhD, MSc; Chang Qing Zhang, MD, PhD; Saul Martinez, MD; Bernd Kinner, MD, PhD; Timothy J.S. Chesser, FRCS; Mohit Bhandari, MD, PhD, FRCSC; for the INSITE Investigators

TRIAL REGISTRATION ClinicalTrials.gov Identifier: [NCT01380444](https://clinicaltrials.gov/ct2/show/study/NCT01380444)

JAMA Network Open. 2023;6(6):e2317164. doi:[10.1001/jamanetworkopen.2023.17164](https://doi.org/10.1001/jamanetworkopen.2023.17164)

METHODS

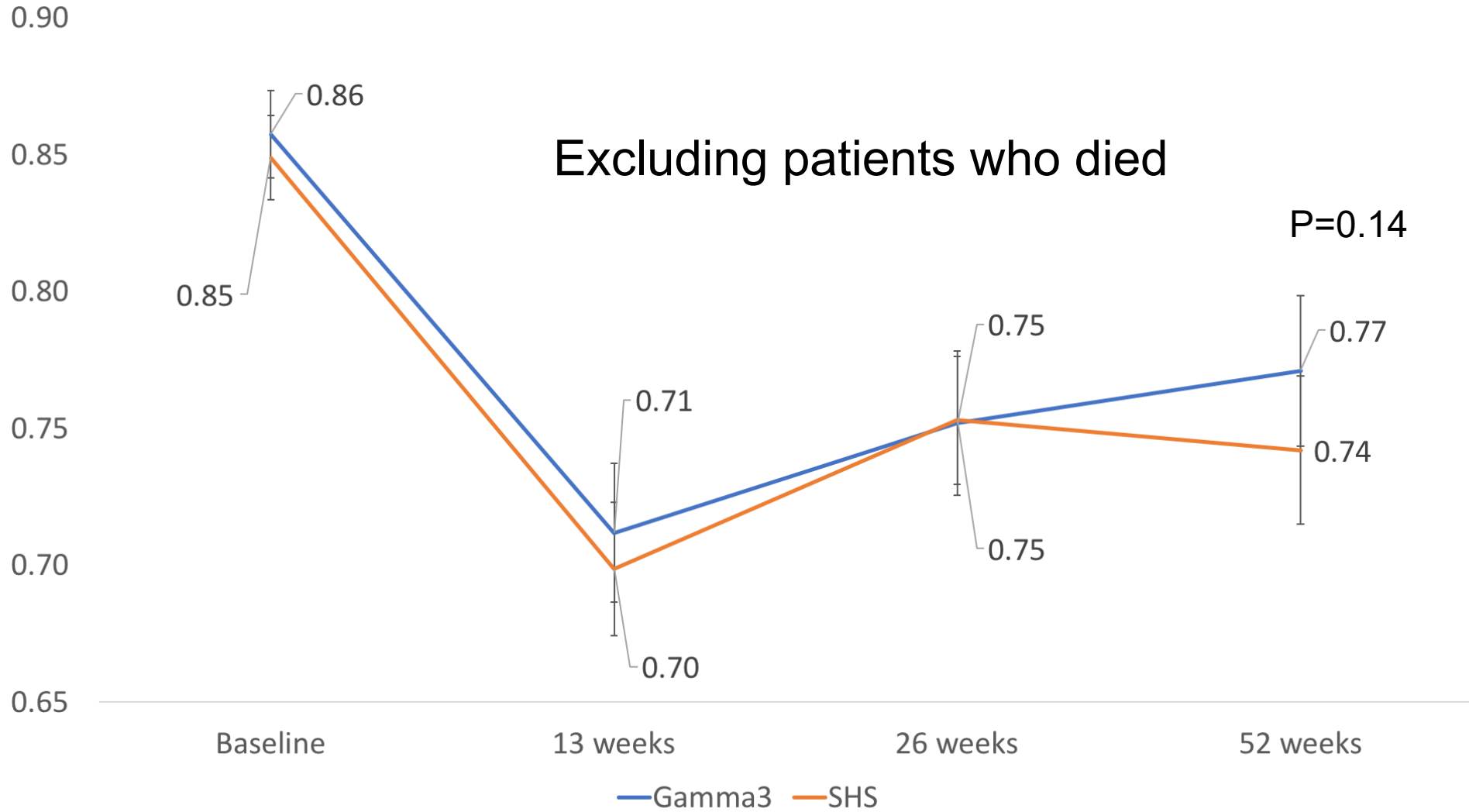
Design:

- Multicenter, international RCT
- Randomized 850 patients across 25 sites

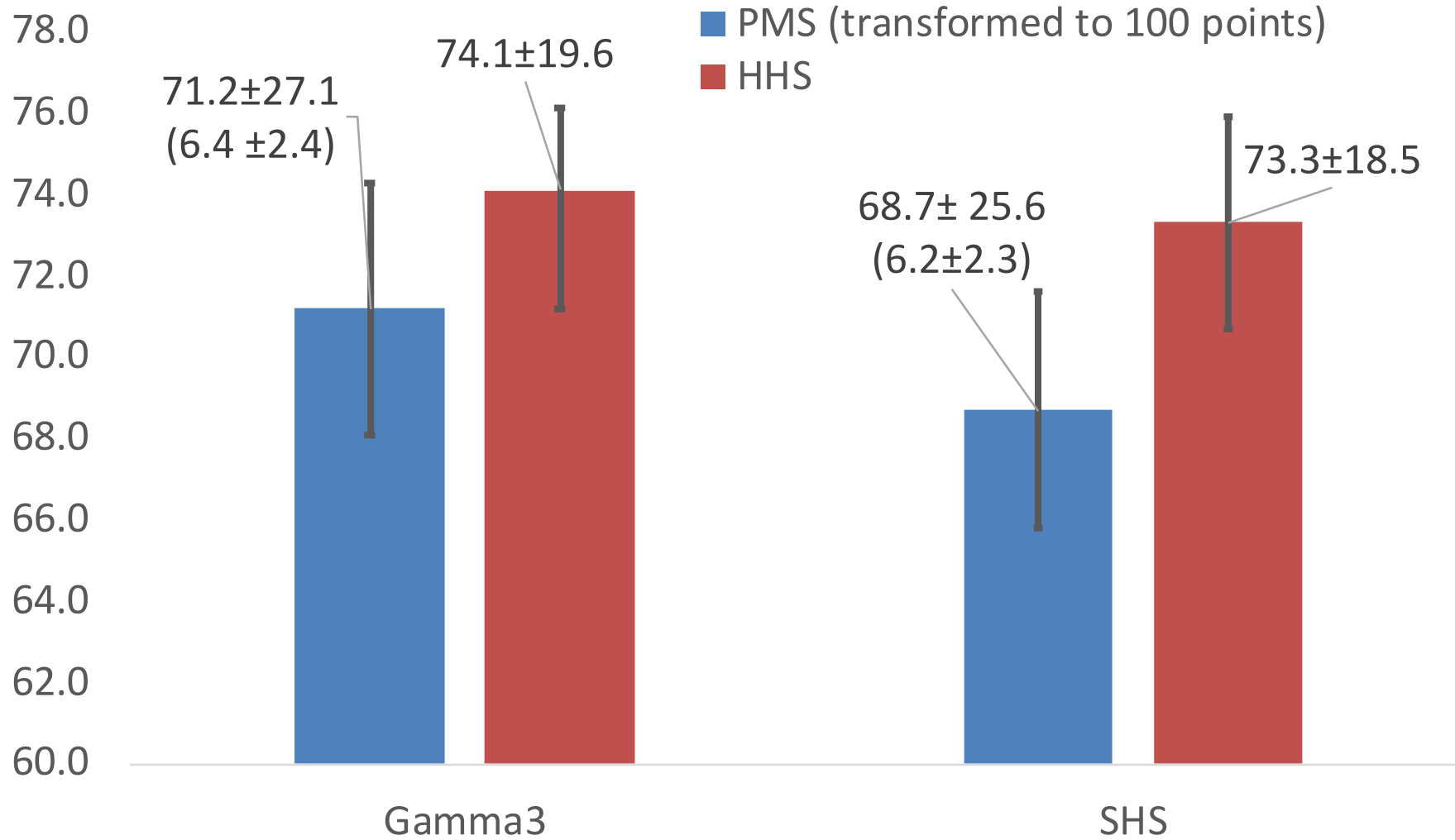
Eligibility Criteria:

- Inclusion: Ambulatory, ≥ 18 years, low-energy # (AO type 31-A1 or A2), surgery within 7 days
- Exclusion: Associated major injuries of lower extremity, retained hardware, pathologic #, obesity, dementia, severe Parkinsons

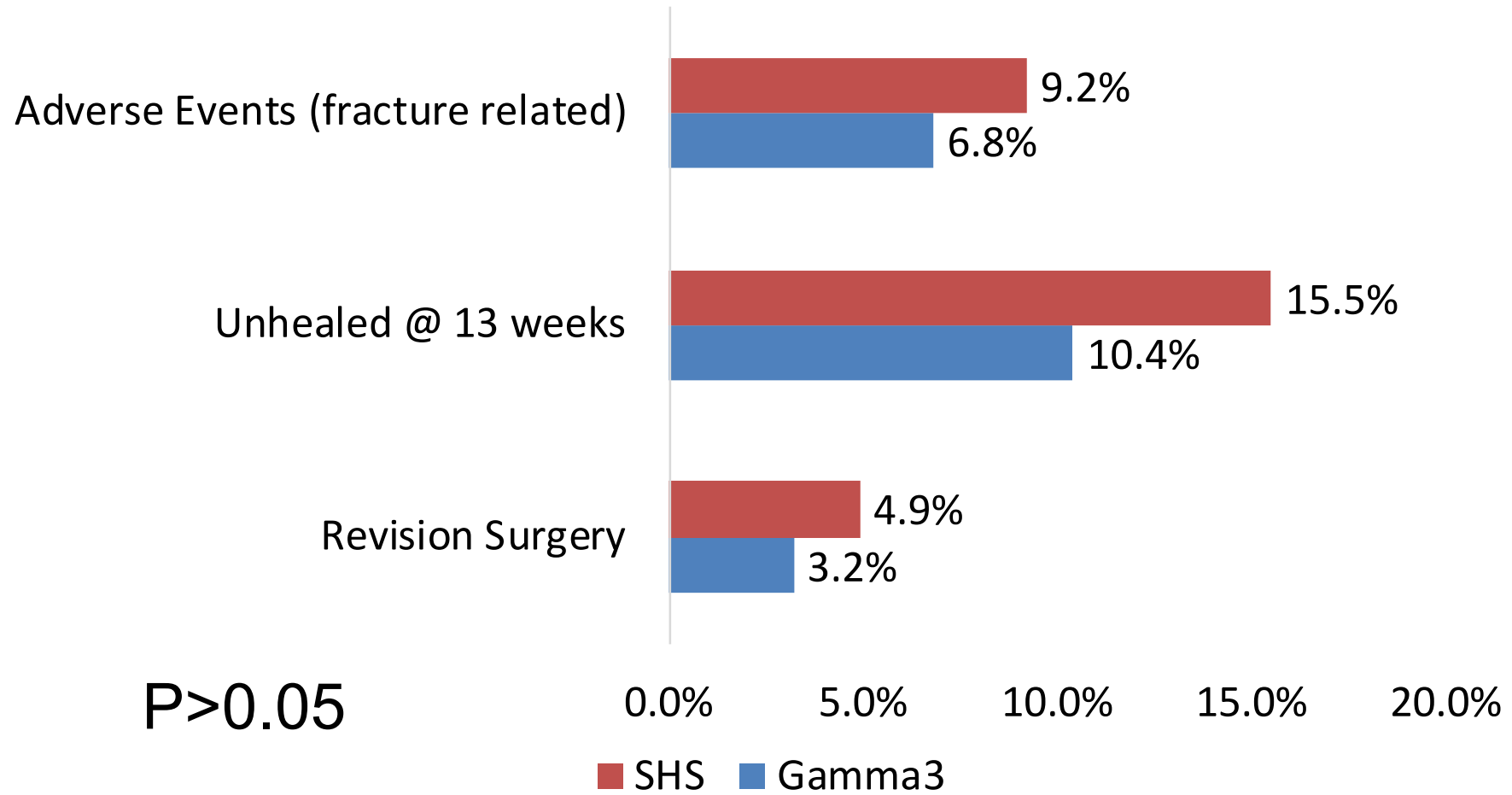
EQ5D



Mobility and Function



Other



SUMMARY

- No significant differences observed in HRQOL, revision surgery, and fracture healing between Gamma3 and SHS
- SHS still has a role to play particularly for stable fractures given its lower cost

What matters!

IM nails preferred:

- Unstable patterns in high demand patients
- Reverse obliquity
- Subtroch extension
- Thin lateral wall



What doesn't matter so much!

- Nail diameter
 - 10 mm works well: Rinehart JOT 2021
 - Not necessary to fill canal: Choi Int Ortho 2024
- Nail design
 - Integrated lag screw fixation controversial

Nail design (Dual vs Single lag screw)

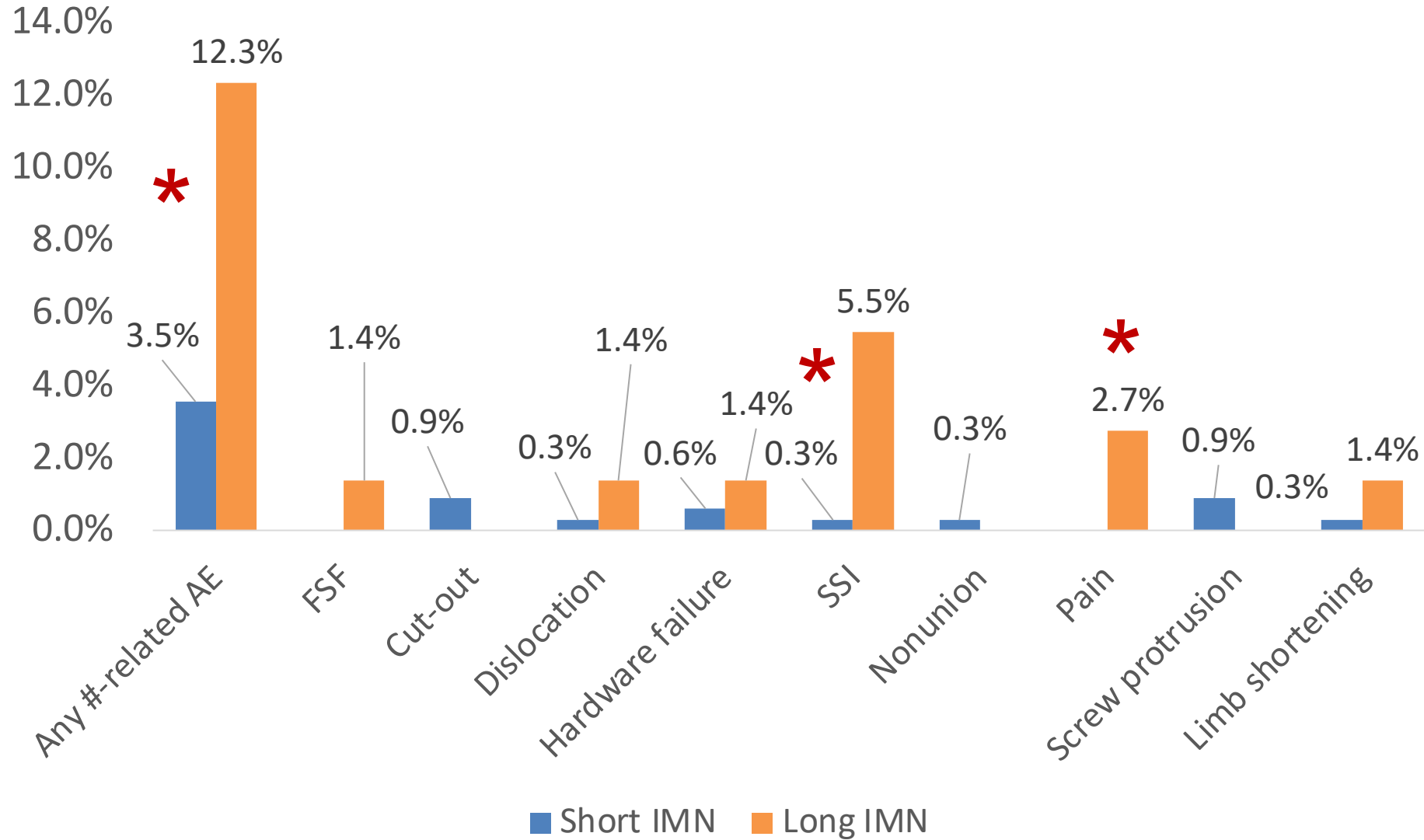
- Ablet et al, JBJS 2024
 - For subtrochanteric and reverse-oblique fractures, dual lag screw design had a lower risk of mechanical failure
- Okike et al, JBJS 2024
 - Intertan had higher risk of aseptic revision vs single screw designs in long nails rather than short nails
- Gonzalez et al, JBJS 2024
 - Integrated dual lag screws were associated with significantly higher odds of reoperation for fixation failure and all-cause reoperation

Short vs Long nail?

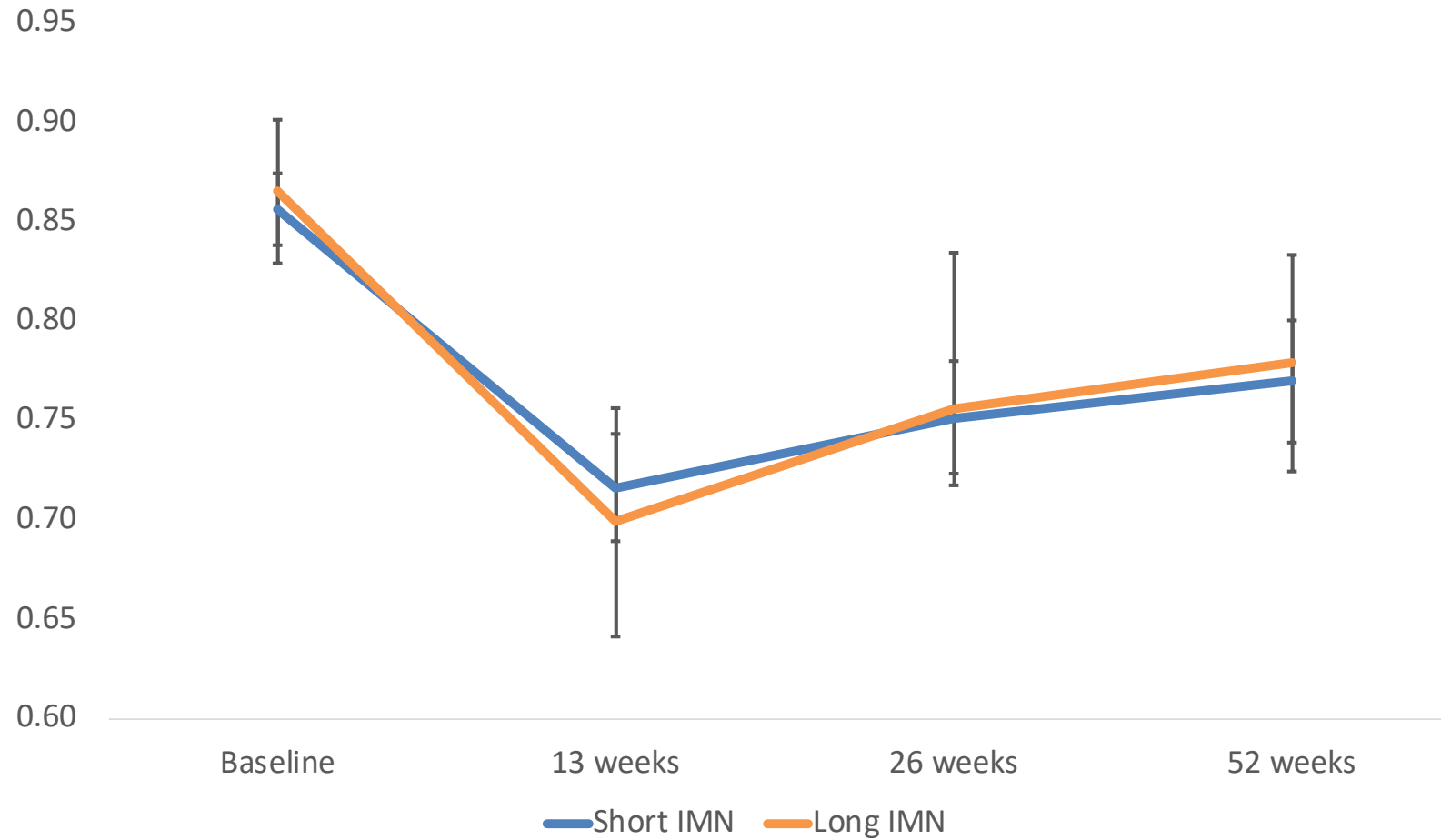


- The ideal length of intramedullary implants for the fixation of trochanteric fractures remains under debate

RESULTS: Fracture-Related AE



RESULTS: EQ5D



Take Home Message

- Vast majority of intertrochanteric fractures managed with a nail can be safely treated with a short nail

Intertrochanteric: Bottom line

- Outcome is most related to proper surgical technique:
 - Quality of reduction, implant application
- Open and clamp assisted reduction play an important role
- No pivotal RCTs have shown superior fixation with any specific device or method
- Primary treatment is with well done internal fixation in the vast majority of cases

Thank you

