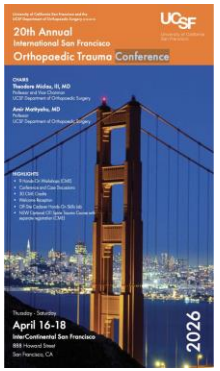
# Hip and Femur: The Top Tips and Tricks I Learned in My Career




Andrew Schmidt, MD

Faculty, Hennepin County Medical Center

Professor, Univ. of Minnesota

HennepinHealthcare

# Femoral neck fracture Tips

- Look at the lateral x-ray!
- Reduction
- Implants

# Imaging

# Does a Traction-Internal Rotation Radiograph Help to Better Evaluate Fractures of the Proximal Femur?

Kenneth J. Koval, M.D., Chong K. Oh, M.D., and Kenneth A. Egol, M.D.

Bulletin of the NYU Hospital for Joint Diseases 2008;66(2):102-6

**Table 2** Correctly Changed Responses after Reviewing Traction-internal Rotation Radiograph

| Classification Changes | Number of Responses |
|---|---|
| Nondisplaced FN to displaced FN | 4 |
| Displaced FN to nondisplaced FN | 2 |
| Displaced FN to stable IT | 10 |
| Stable IT to displaced FN | 5 |
| Stable IT to unstable IT | 15 |
| Unstable IT to stable IT | 18 |
| Unstable IT to subtrochanteric | 3 |
| Total correct changes | 57 |

FN, femoral neck; IT, intertrochanteric

*J Orthop Trauma* • Volume 28, Number 5, May 2014

# Fracture Morphology of High Shear Angle "Vertical" Femoral Neck Fractures in Young Adult Patients

*Cory A. Collinge, MD,*† Hassan Mir, MD,‡ and Robert Reddix, MD§‖*

- Vertical fracture 60°
- Axial fracture obliquity averaged 24°
- Major comminution (>1.5 cm in any dimension) in 96%, mostly inferior and posterior.
- Deformity in external rotation averaged 44 degrees (range, 10–68 degrees) and shortening of the femur averaged 1.8 cm (range, 0.9–4.4 cm).

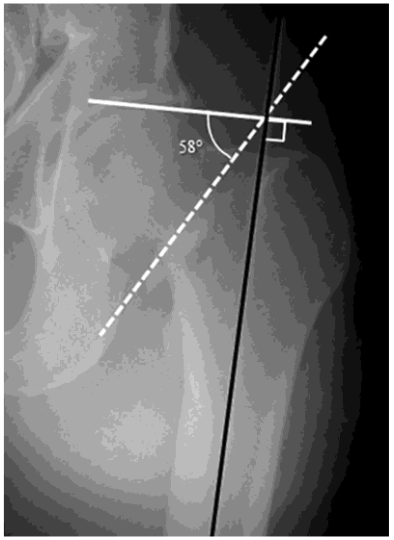



**FIGURE 1.** AP injury plain radiograph of a typical 43-year-old patient with a high shear angle femoral neck fracture measuring 58 degrees.

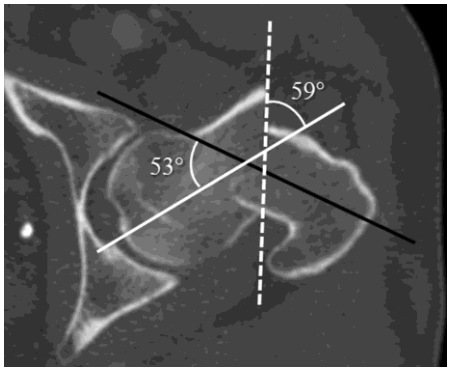



**FIGURE 2.** A, Axial CT image shows typical findings of −59 degrees obliquity of neck fracture (dotted white line) relative to the HNA (solid white line) and 53 degrees external rotation deformities.

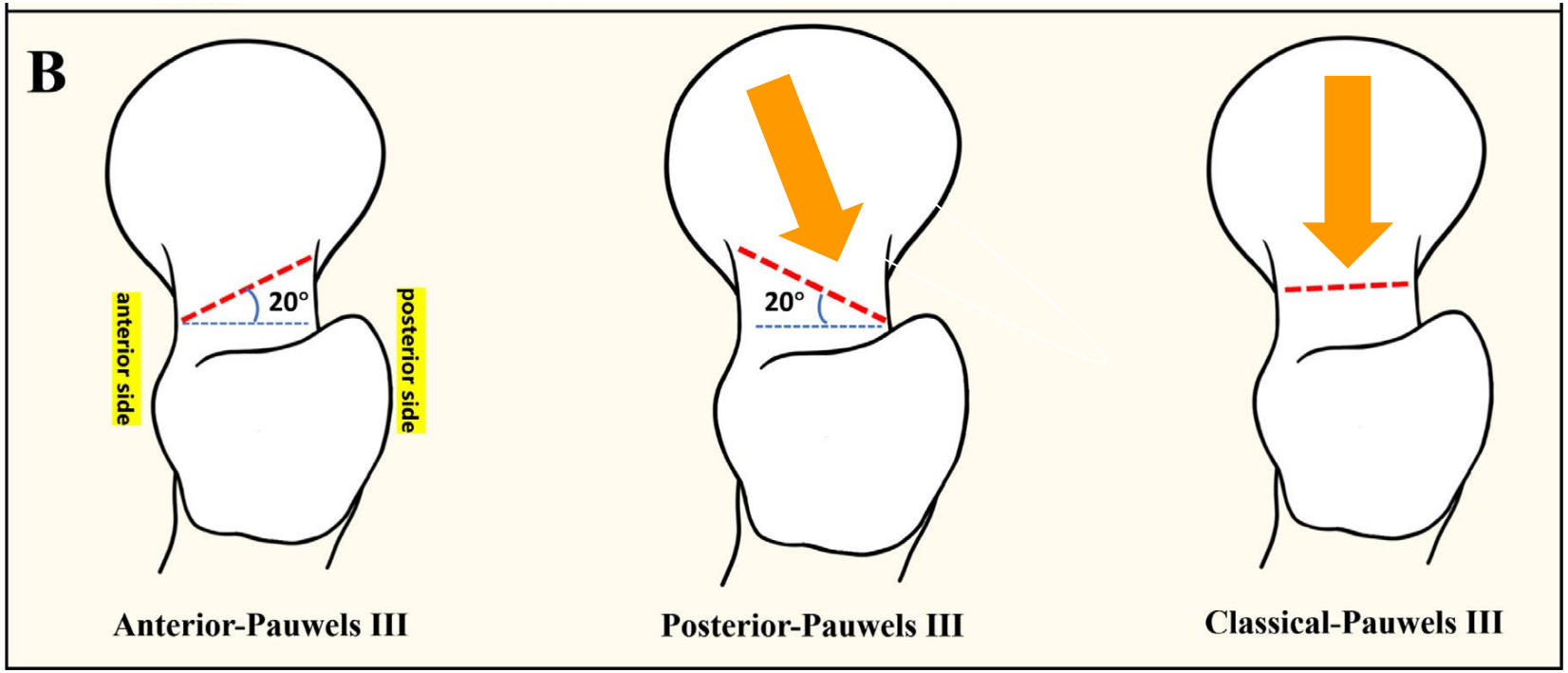
Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

# Fracture morphology and biomechanical characteristics of Pauwels III femoral neck fractures in young adults

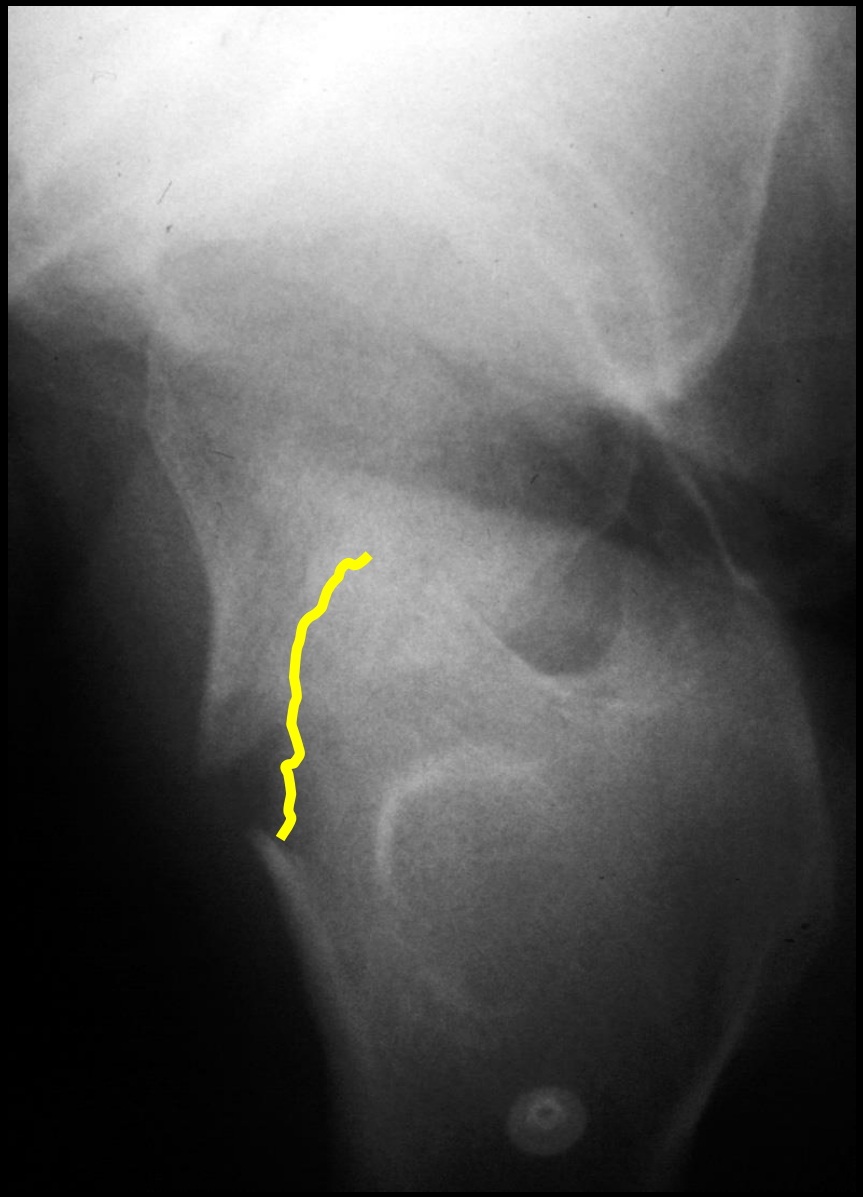
Kaiyang Wang[a,1], Ming Ni[b,1], Peng Liao[a], Bang Dou[c], Xu Yan[a], Lin Lv[b], Fangfang Zhang[d], Jiong Mei[a,*]

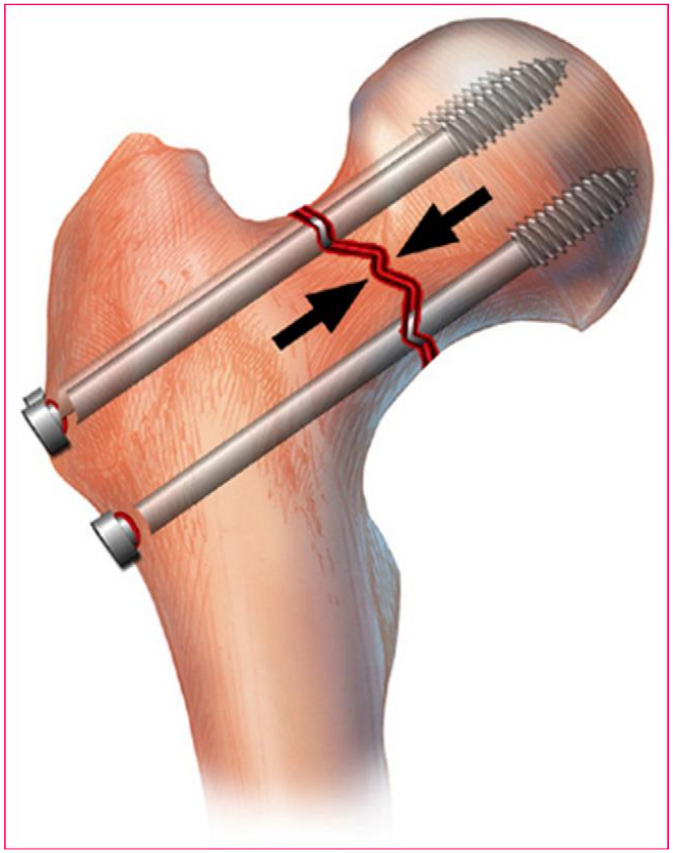


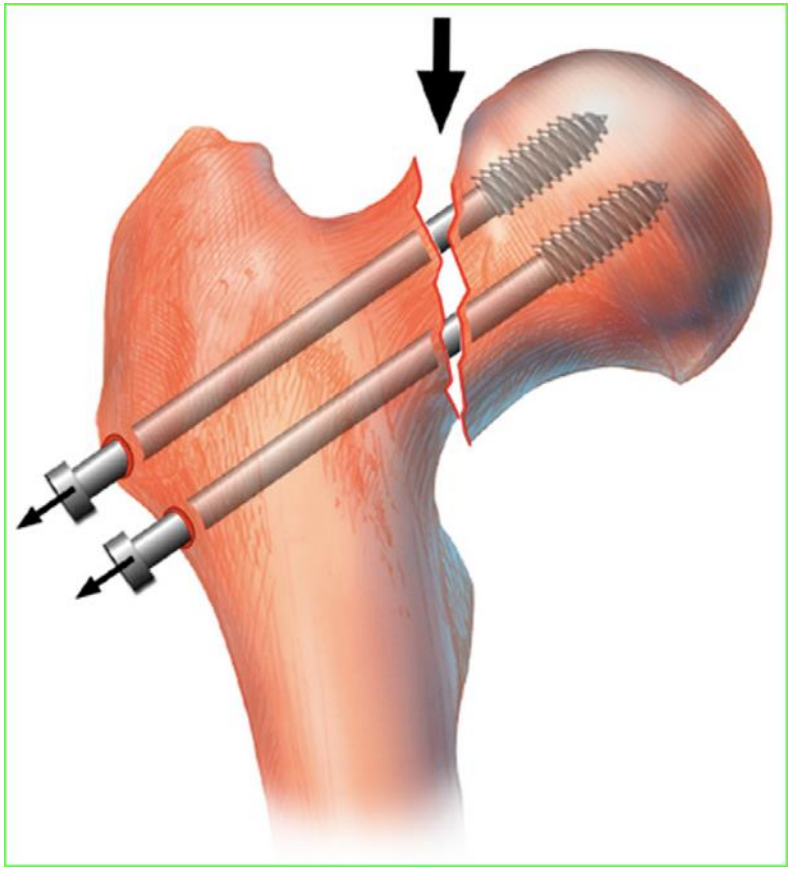

Compress = shear

Compress = stability


48 40



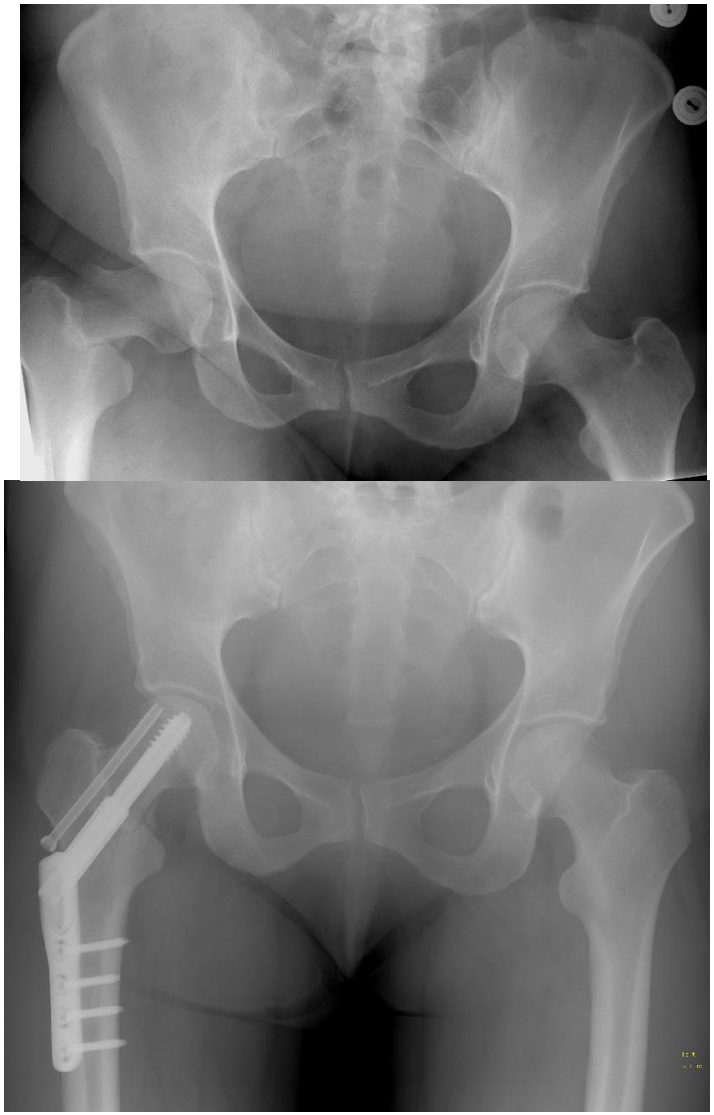




# Fixation Methods

**Unstable fractures**

- Load-bearing implant
  - DHS with antirotation screws
  - Intramedullary nails.



**J Bone Joint Surg Am.** 2008;90:1654-9 •

# Results of Internal Fixation of Pauwels Type-3 Vertical Femoral Neck Fractures

By Frank Liporace, MD, Robert Gaines, MD, Cory Collinge, MD, and George J. Haidukewych, MD

*Investigation performed at North Jersey Orthopedic Institute, Newark, New Jersey, Orthopedic Specialty Associates, Fort Worth, Texas, and Florida Orthopaedic Institute, Tampa, Florida*

International Orthopaedics (SICOT) (2015) 39:2069–2071
DOI 10.1007/s00264-015-2881-9

ORIGINAL PAPER

# A comparative study between multiple cannulated screws and dynamic hip screw for fixation of femoral neck fracture in adults

**Babak Siavashi[1] · Arash Aalirezaei[1] · Mersad Moosavi[1] · Mohammad Reza Golbakhsh[1] · Dariush Savadkoohi[1] · Mohammad Javad Zehtab[1]**

Nonunion

- 19% of fractures treated with screw fixation alone
- 8% of fractures treated with a fixed-angle device

Fixation Failure

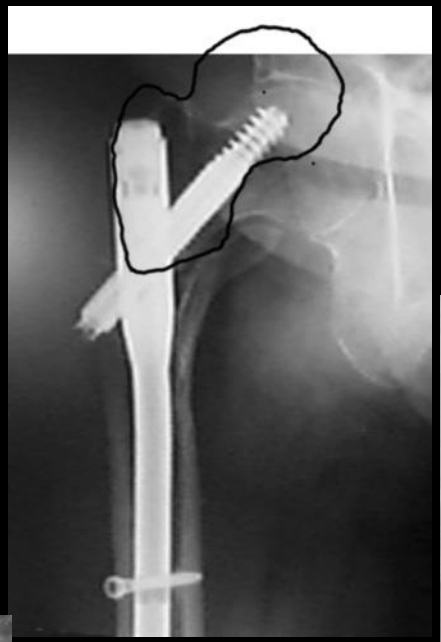
- 18% of fractures treated with screw fixation alone
- 0% of fractures treated with a fixed-angle device


95 (04:05)
2
6 (04:05)
163 (05:03)
2
172 (05:05)
1


Cross Table


55 yr old woman,
Fell in bathroom
Hx bilat TKA's, complex foot reconstruction
COPD, mild psych disease

# Intertrochanteric Fractures

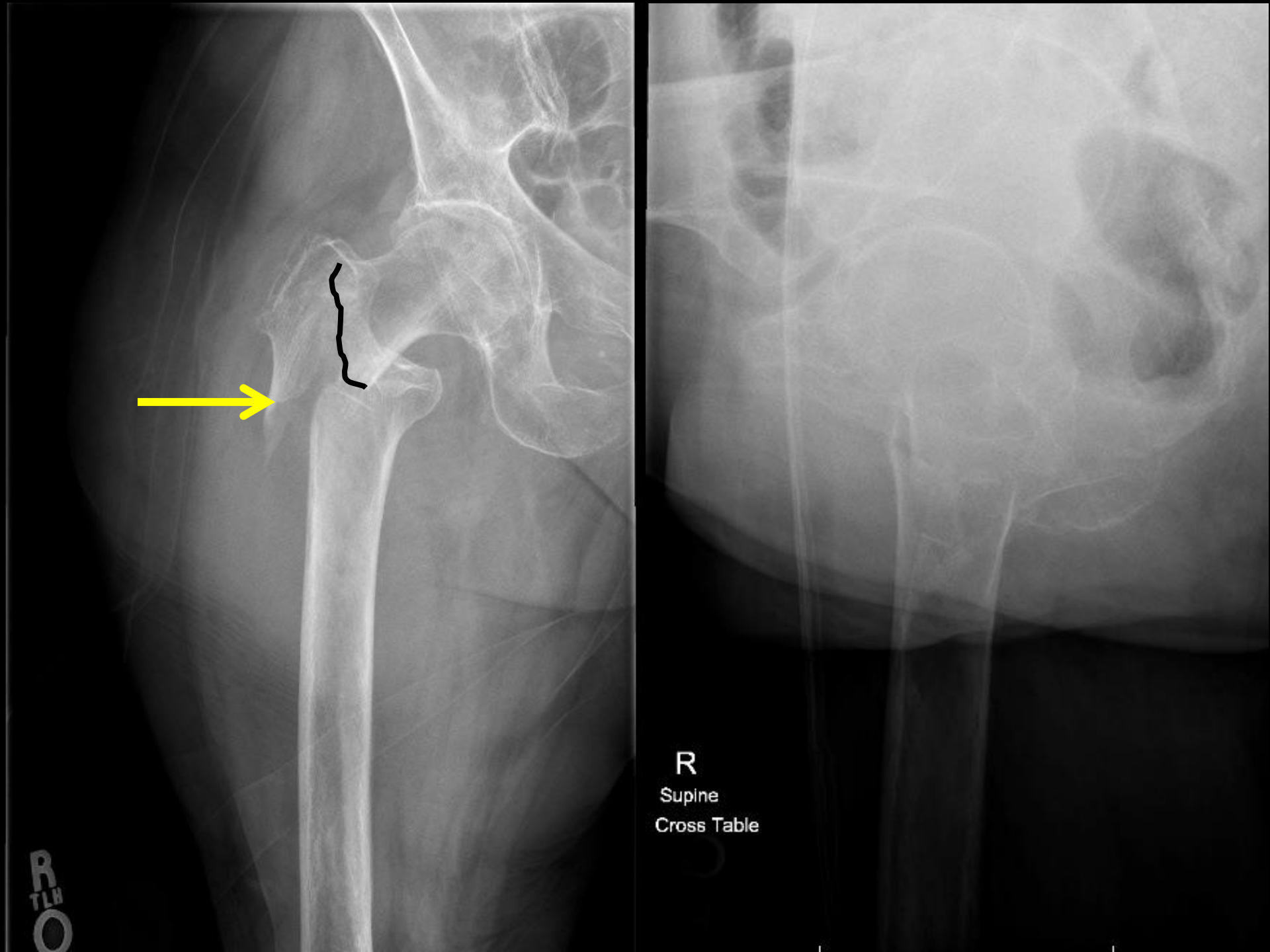



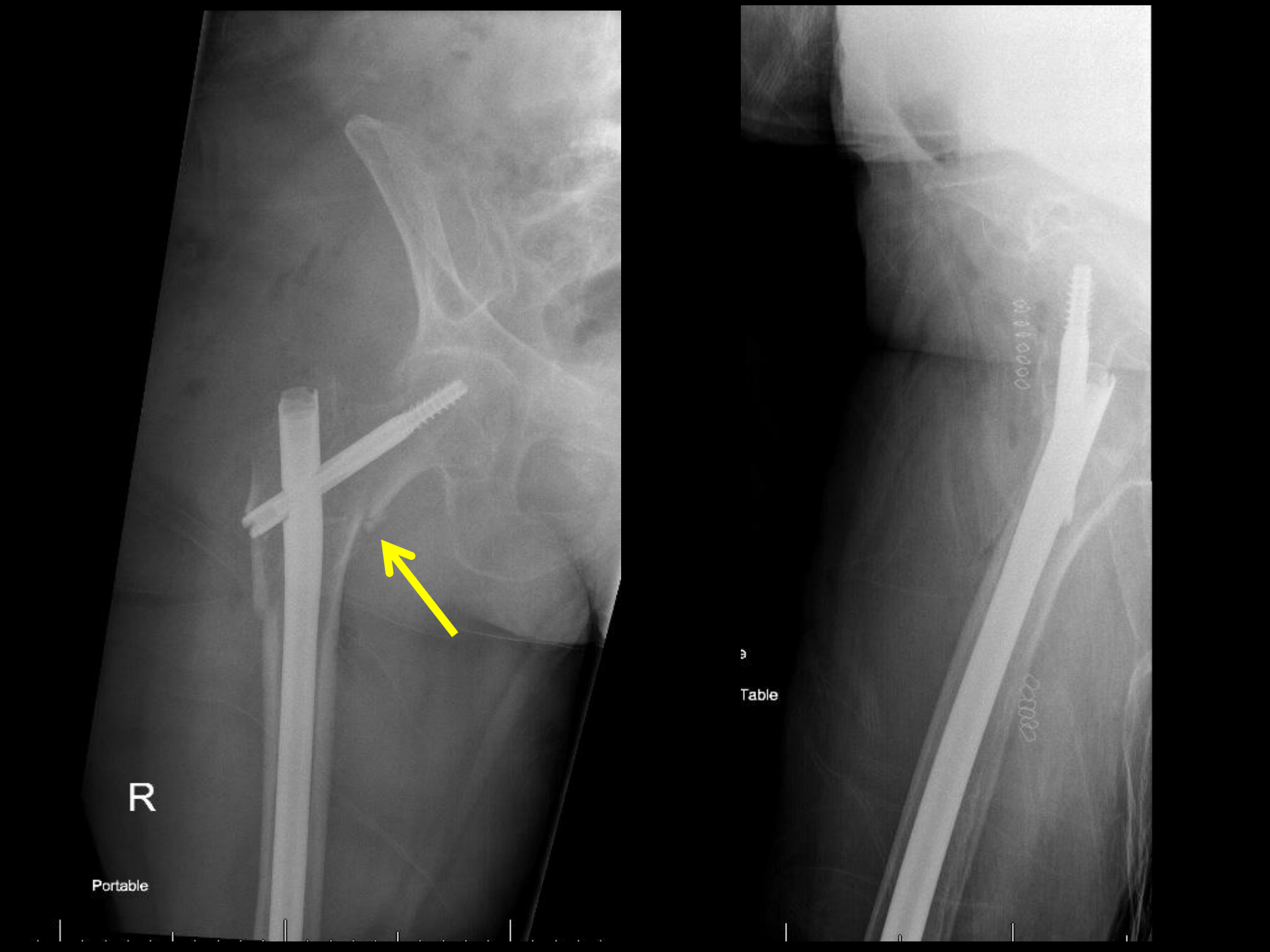


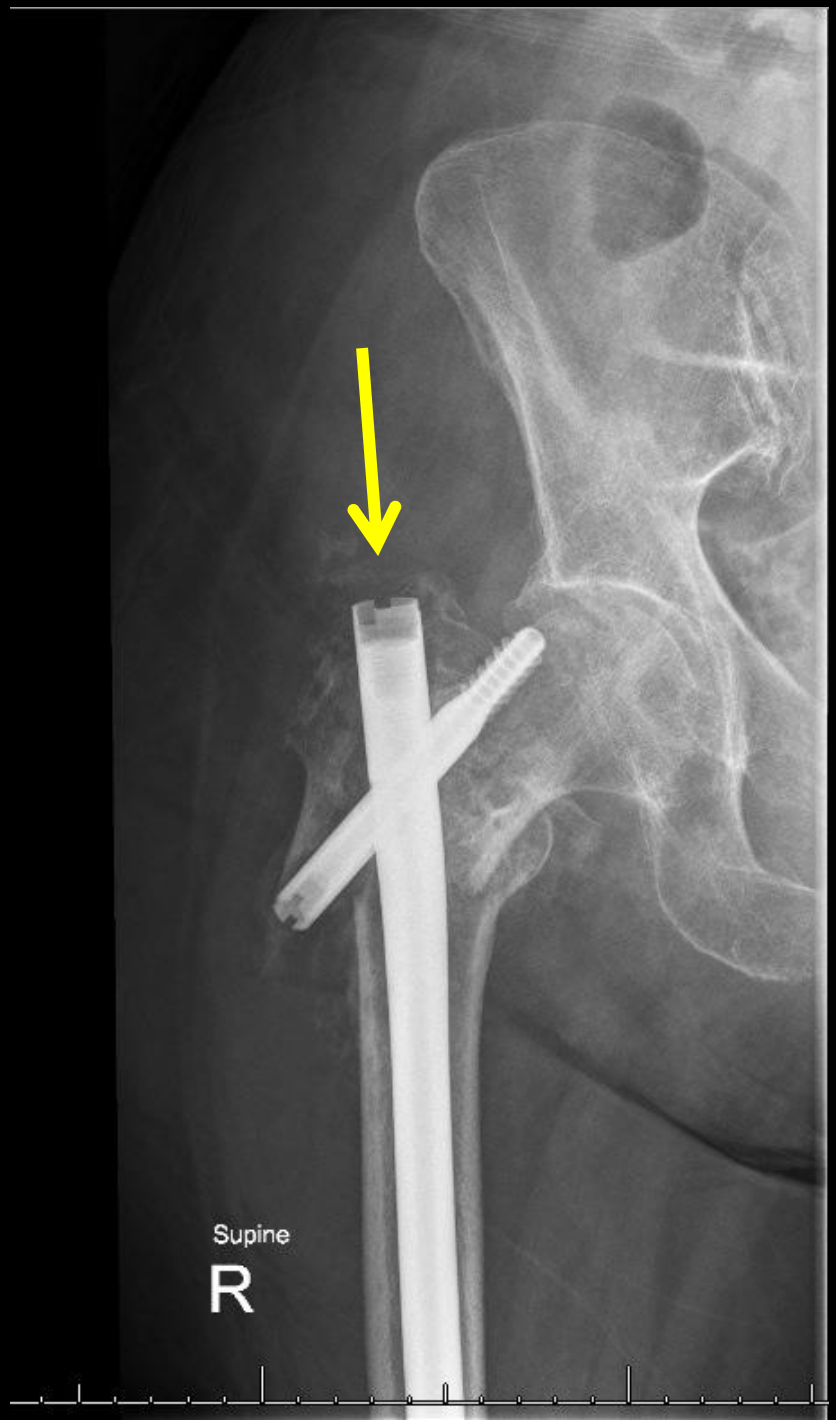
# Failure Modes

- Malreduction
  - Varus
    - Decreased abductor moment arm
  - Malrotation
- Loss of Reduction
  - Collapse/Shortening
    - Loss of length
    - Loss of Offset
  - Progressive Varus
- Loss of Fixation
  - Screw cut out
  - Pull off
  - Rotational failure

“Thou Shalt Not Varus”


R
Supine
Cross Table


R
Portable
Table


Supine
R


Supine

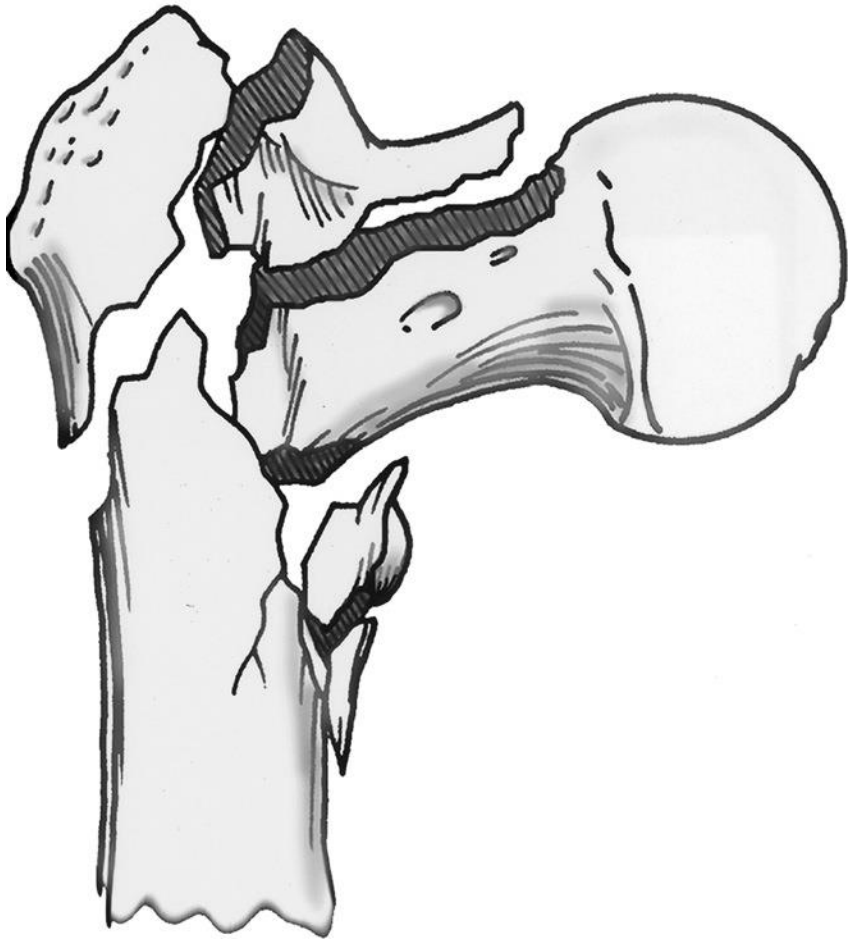

Portable
Supine
L

# Collapse/Shortening

# Implant Failure

Recognize the unstable fractures

Have a plan to reduce the fracture and insert the implant

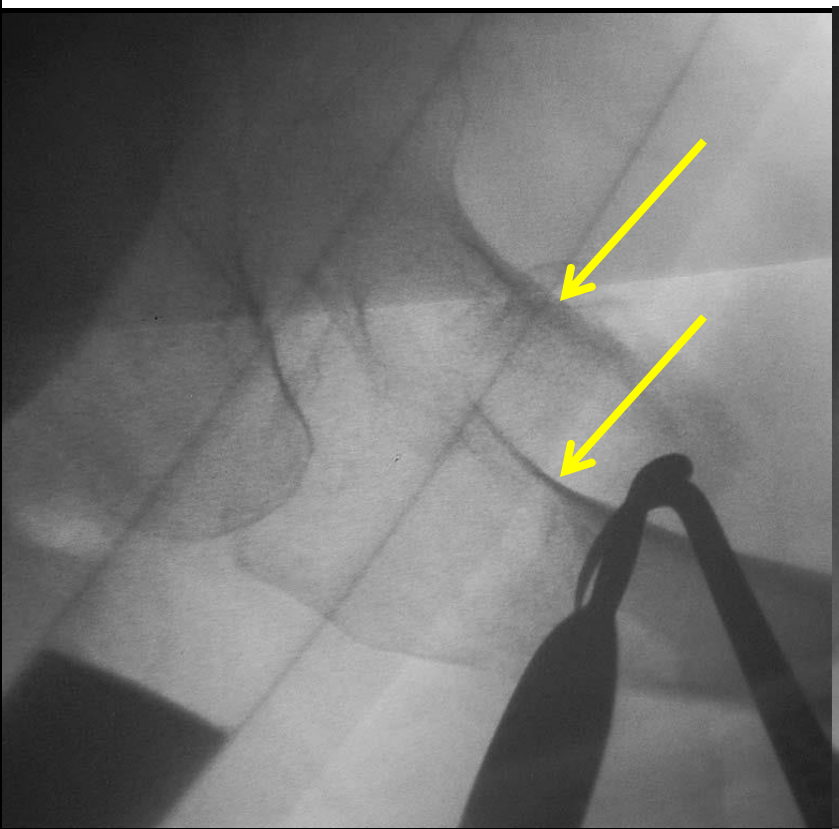


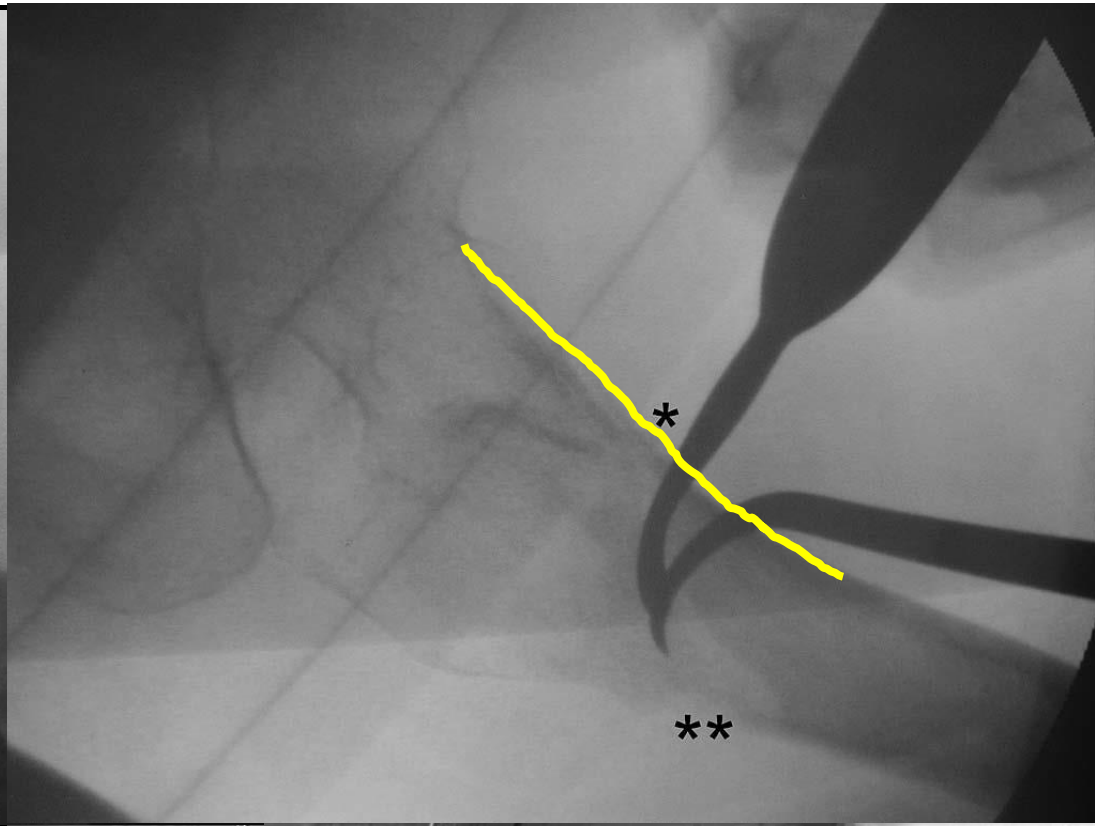
TECHNICAL TRICK

(*J Orthop Trauma* 2007;21:485–489)

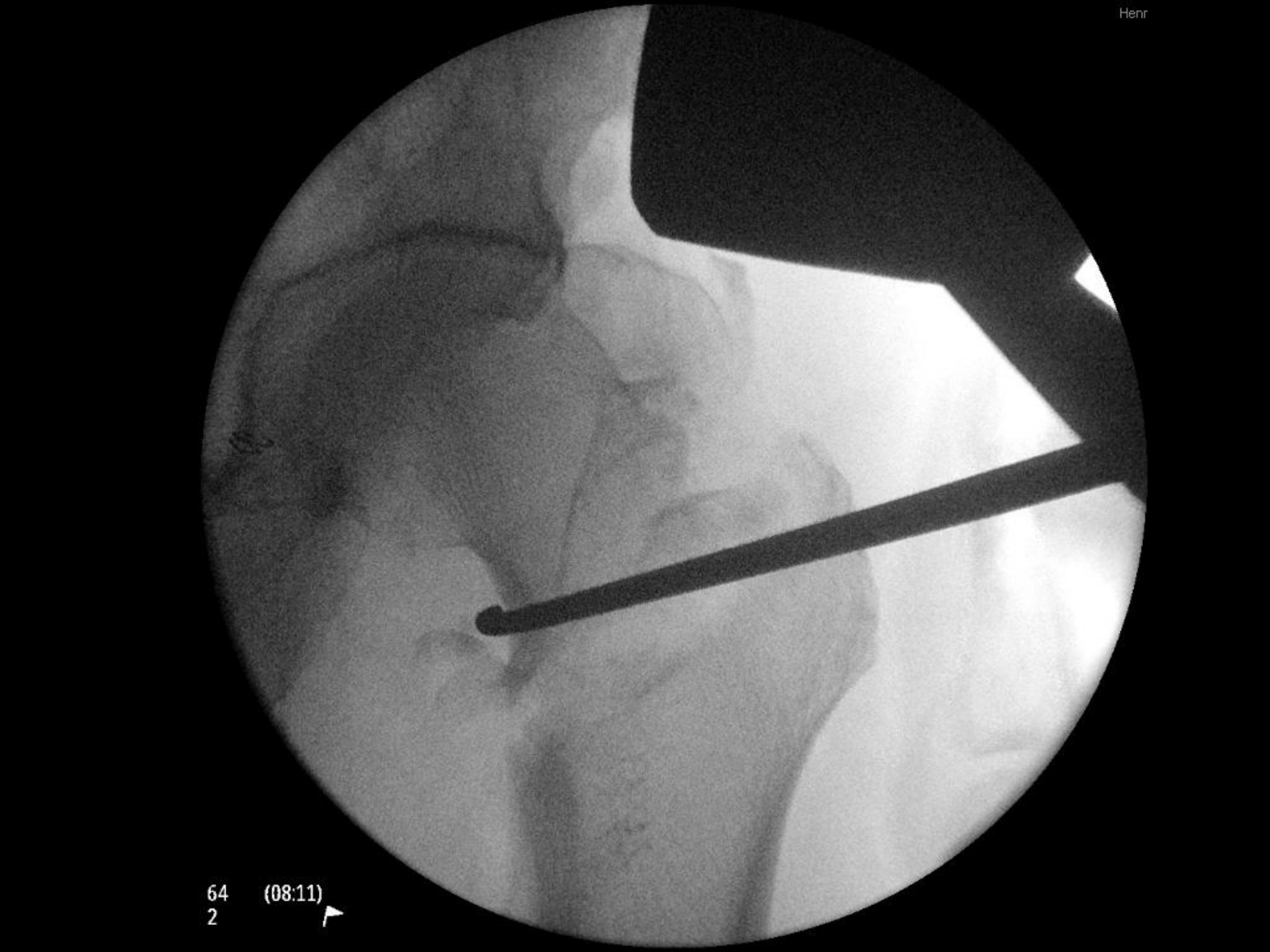
# The Anterior and Medial Reduction of Intertrochanteric Fractures: A Simple Method to Obtain a Stable Reduction

*James B. Carr, MD*






L



Henr
64
2
(08:11)


Henn
113 (08:20)
1


Henn
228 (08:56)
1


L

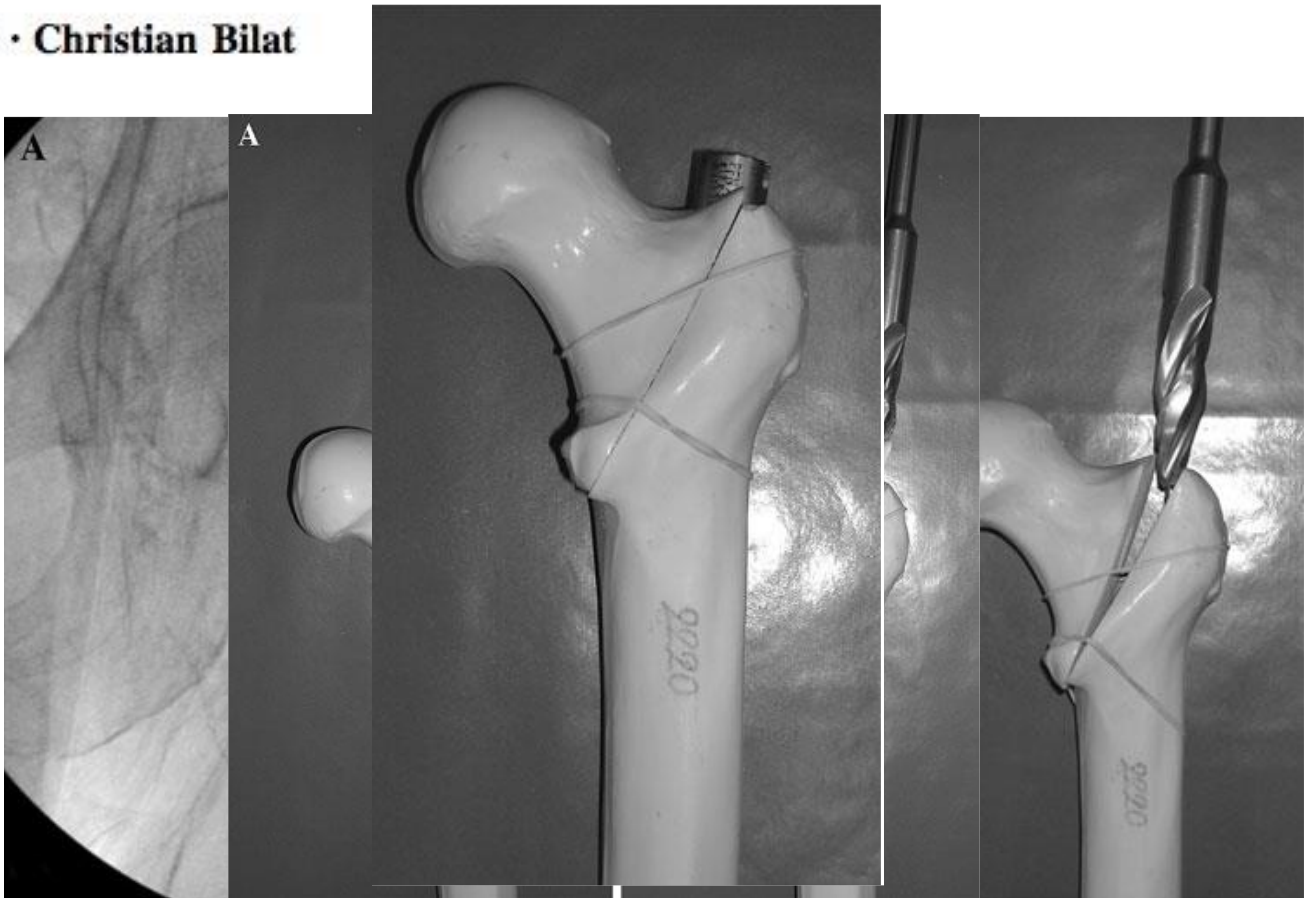

L
X-TABLE

Arch Orthop Trauma Surg
DOI 10.1007/s00402-010-1182-4

TECHNICAL REPORT

# Avoiding varus malreduction during cephalomedullary nailing of intertrochanteric hip fractures

David J. Hak · Christian Bilat



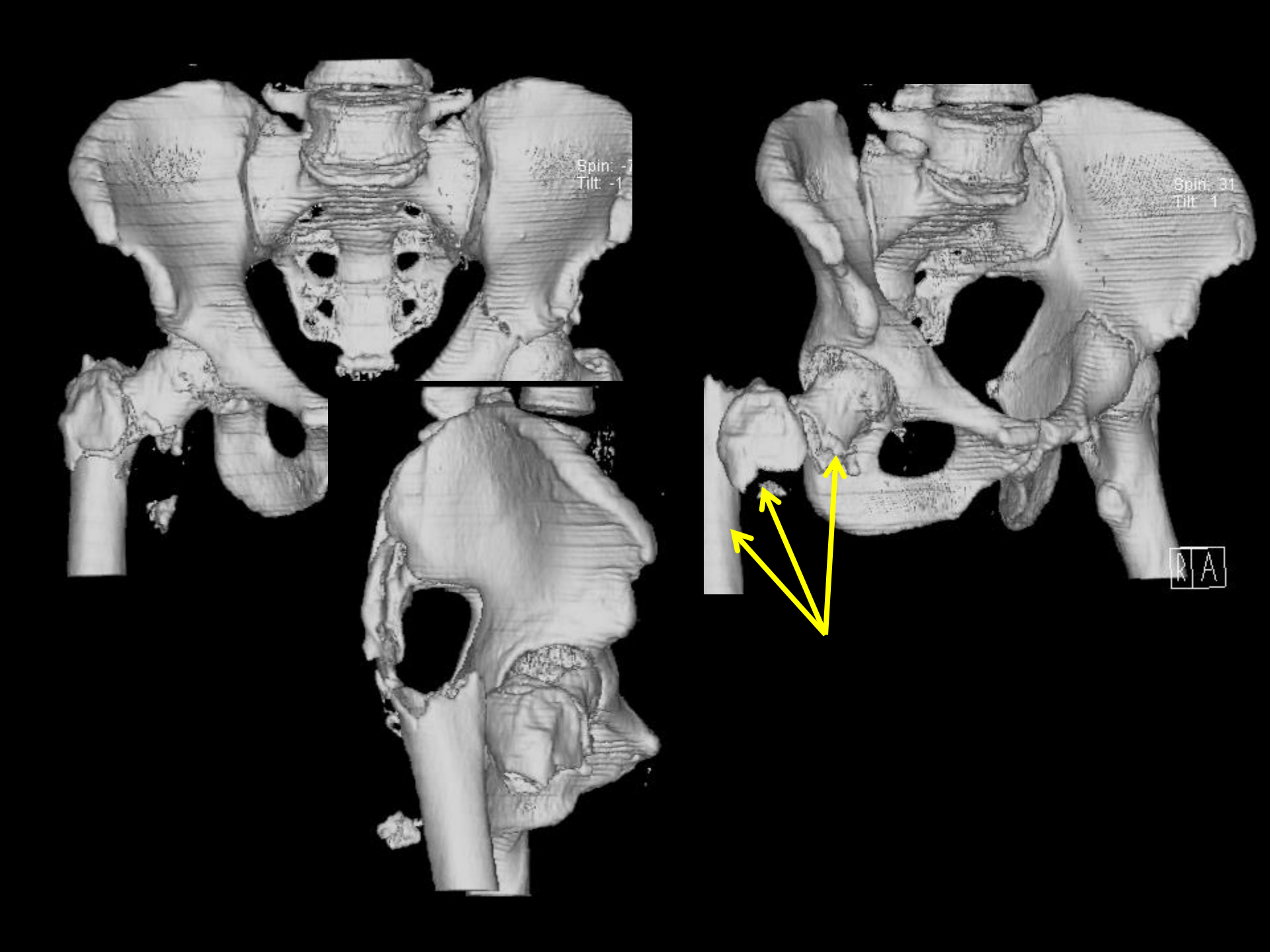
# SHS / Trochanteric buttress plate

Slide courtesy Nirmal Tejwani, MD


SUP
R
A→P

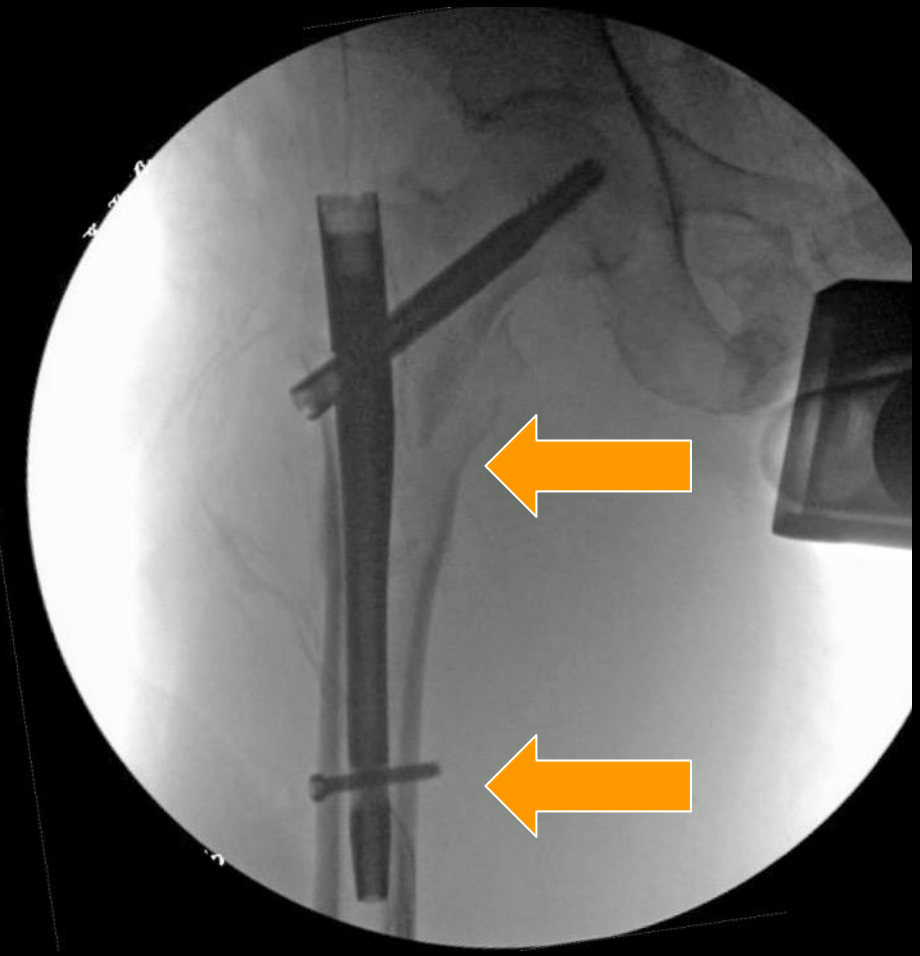

SUPINE
R

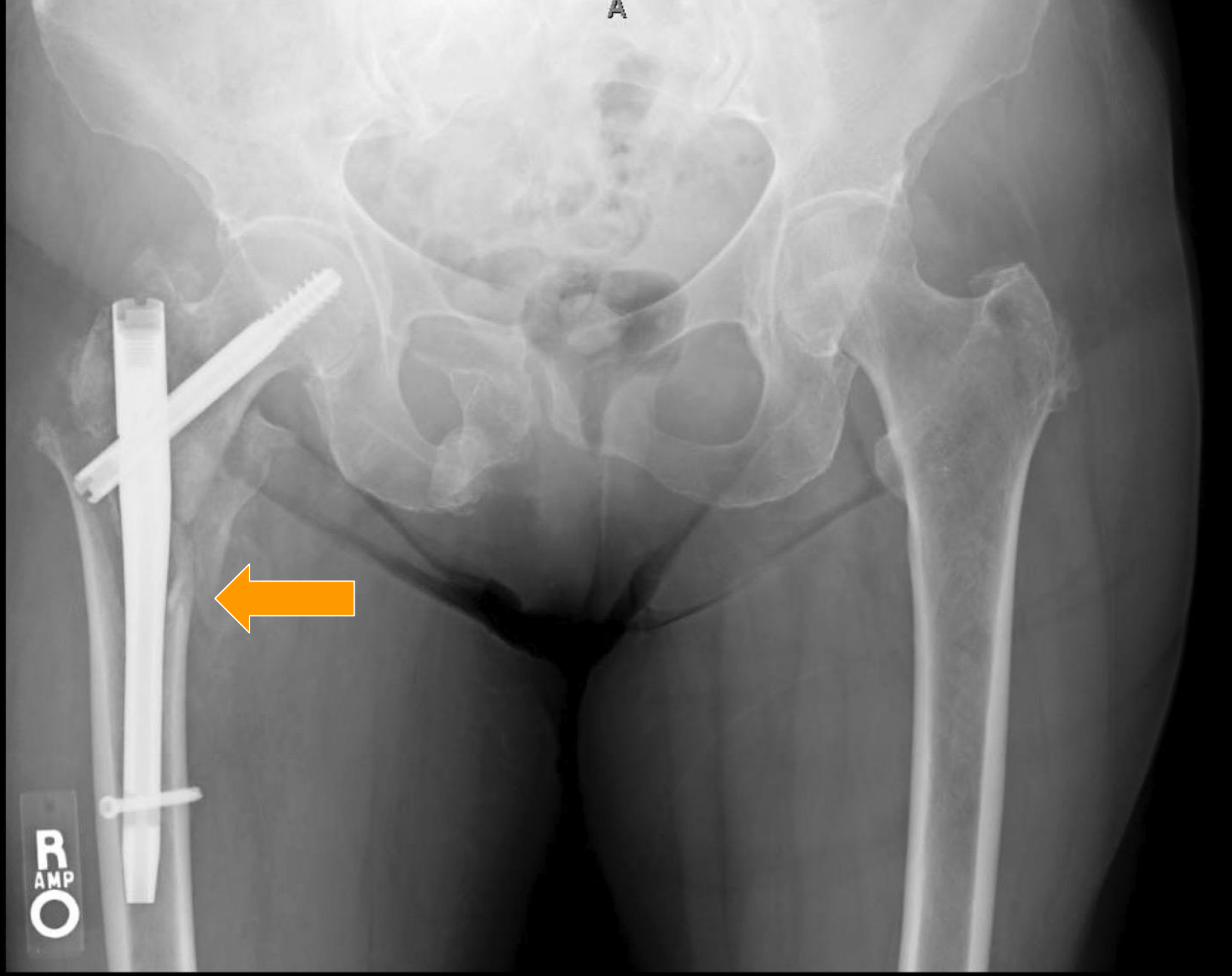

L


Spin: -7
Tilt: -1
Spin: 31
Tilt: 1
R
A

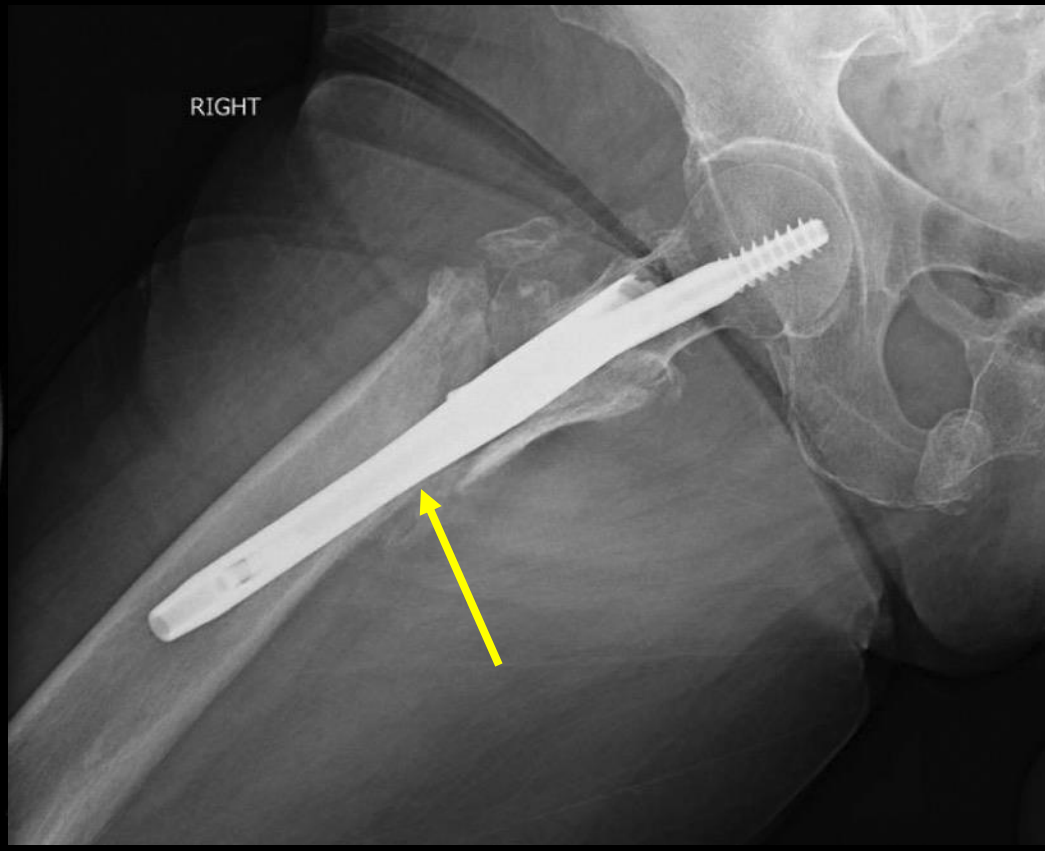
# Short CMN

- I’m a little wary of using these “routinely”



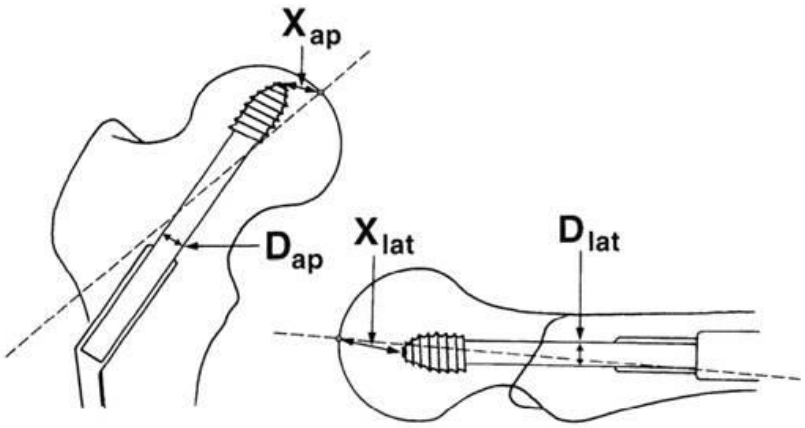

A
R
AMP


Vp

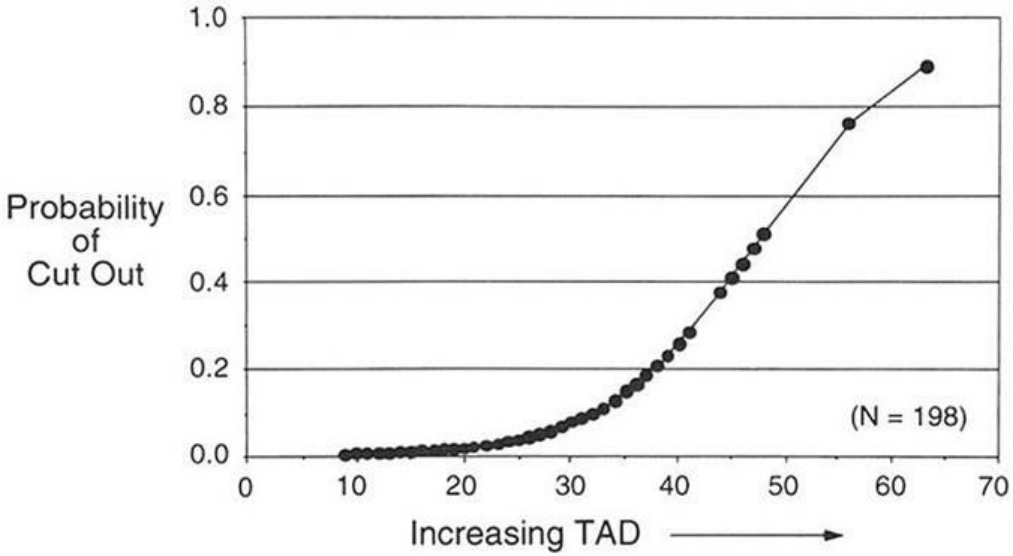

RIGHT


L
Supine

# Tip Apex Distance




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




Baumgaertner et al, JBJS, 1995

International Orthopaedics (SICOT) (2010) 34:719–722
DOI 10.1007/s00264-009-0837-7

ORIGINAL PAPER

# Tip-apex distance of intramedullary devices as a predictor of cut-out failure in the treatment of peritrochanteric elderly hip fractures

**Jeffrey A. Geller · Comron Saifi · Todd A. Morrison · William Macaulay**

7/16 (44%) TAD > 25 mm cut-out

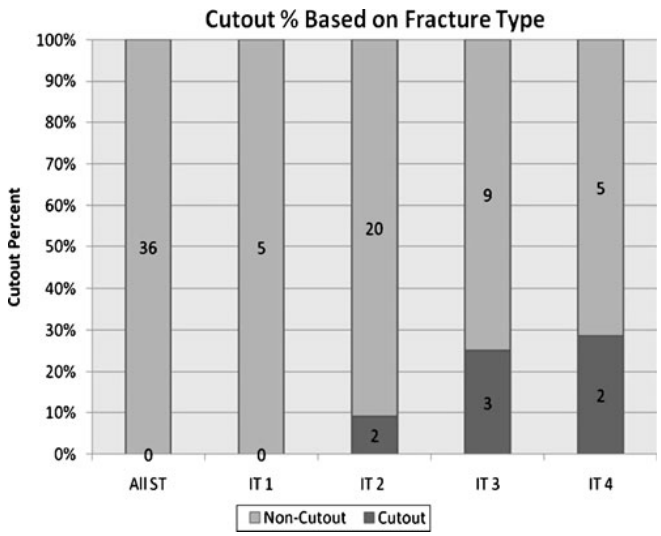



**Fig. 2** Percentage of cut-outs and non-cut-outs for all subtrochanteric (ST) and intertrochanteric (IT) fracture pattern subtypes. The IT fracture patterns were classified according to the system of Muller and Evans as modified by Kyle et al. [13], with types III and IV considered unstable

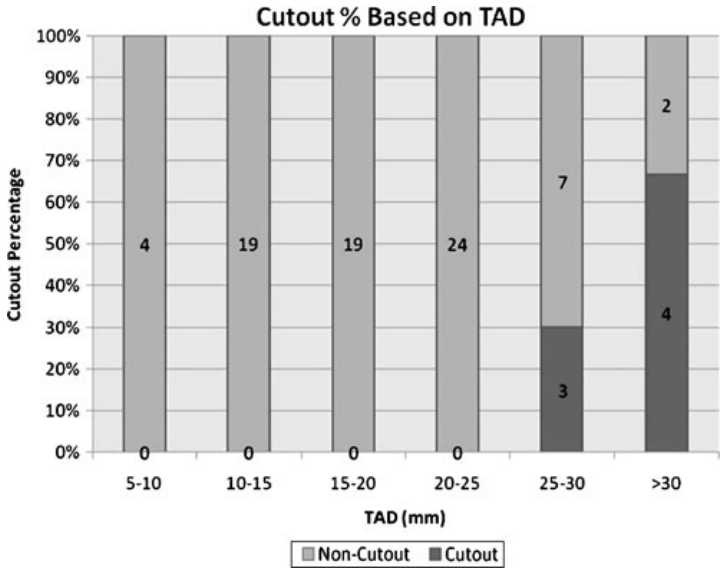
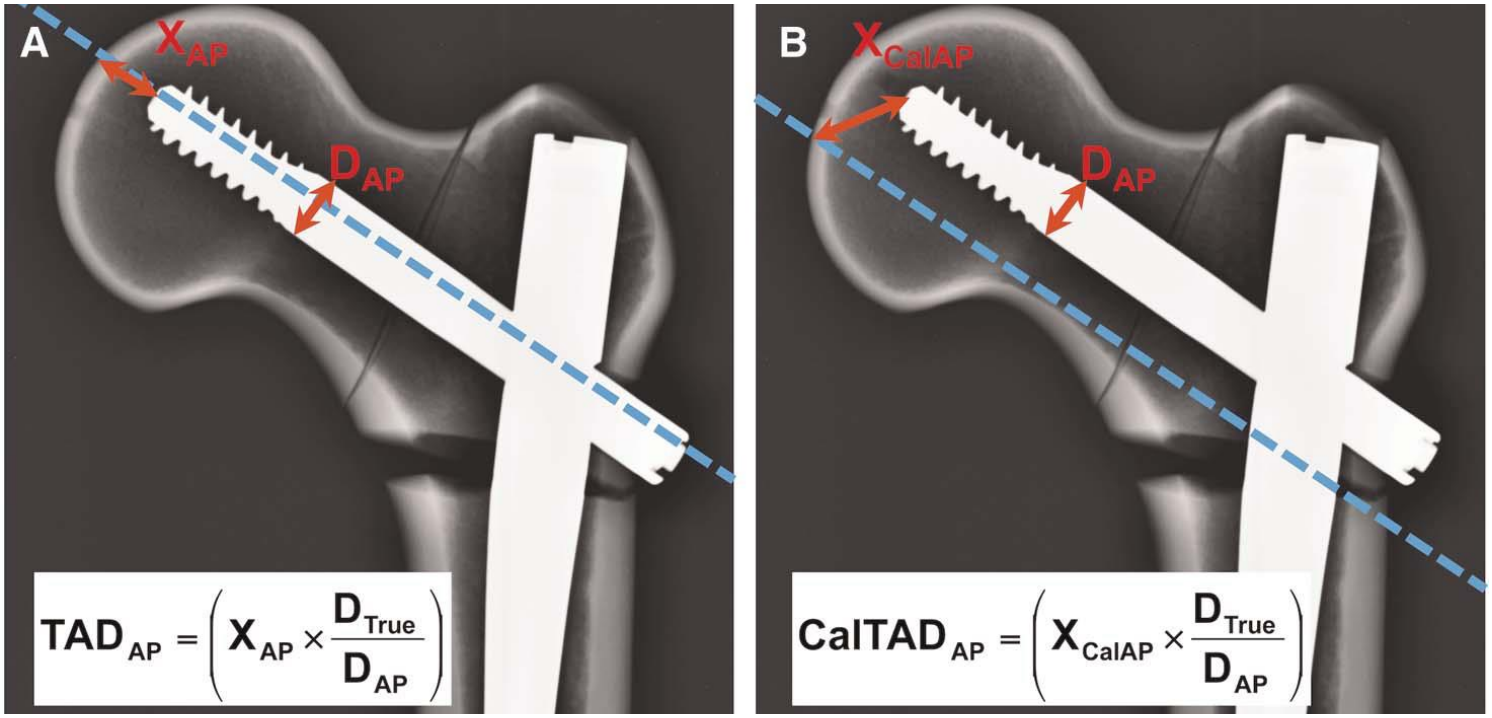



**Fig. 3** Percentage of cut-outs and non-cut-outs withing each respective tip-apex distance (TAD) (mm) range

# Femoral Head Lag Screw Position for Cephalomedullary Nails: A Biomechanical Analysis

*Paul R. T. Kuzyk, BSc(Eng), MASc, MD, FRCS(C),* Rad Zdero, PhD,†‡ Suraj Shah, MEng Candidate,†‡ Michael Olsen, PhD,† James P. Waddell, MD, FRCS(C),* and Emil H. Schemitsch, MD, FRCS(C)*†*



Freely available online OPEN ACCESS

BJR

RESEARCH

# A six-year retrospective analysis of cut-out risk predictors in cephalomedullary nailing for pertrochanteric fractures

## CAN THE TIP-APEX DISTANCE (TAD) STILL BE CONSIDERED THE BEST PARAMETER?

**G. Caruso,**
**M. Bonomo,**
**G. Valpiani,**
**G. Salvatori,**
**A. Gildone,**
**V. Lorusso,**
**L. Massari**

*University of Ferrara, Ferrara, Italy*

**Objectives**

Intramedullary fixation is considered the most stable treatment for pertrochanteric fractures of the proximal femur and cut-out is one of the most frequent mechanical complications. In order to determine the role of clinical variables and radiological parameters in predicting the risk of this complication, we analysed the data pertaining to a group of patients recruited over the course of six years.

**Methods**

A total of 571 patients were included in this study, which analysed the incidence of cut-out in relation to several clinical variables: age; gender; the AO Foundation and Orthopaedic Trauma Association classification system (AO/OTA); type of nail; cervical-diaphyseal angle; surgical wait times; anti-osteoporotic medication; complete post-operative weight bearing; and radiological parameters (namely the lag-screw position with respect to the femoral head, the Cleveland system, the tip-apex distance (TAD), and the calcar-referenced tip-apex distance (CalTAD)).

**Results**

The incidence of cut-out across the sample was 5.6%, with a higher incidence in female patients. A significantly higher risk of this complication was correlated with lag-screw tip positioning in the upper part of the femoral head in the anteroposterior radiological view, posterior in the latero-lateral radiological view, and in the Cleveland peripheral zones. The tip-apex distance and the calcar-referenced tip-apex distance were found to be highly significant predictors of the risk of cut-out at cut-offs of 30.7 mm and 37.3 mm, respectively, but the former appeared more reliable than the latter in predicting the occurrence of this complication.

**Conclusion**

The tip-apex distance remains the most accurate predictor of cut-out, which is significantly greater above a cut-off of 30.7 mm.

Cite this article: *Bone Joint Res* 2017;6:481–488.

G. Caruso, MD, Orthopaedic Surgeon,
M. Bonomo, MD, Orthopaedic Surgeon,
G. Salvatori, MD, Resident,
L. Massari, MD, Professor of Trauma and Orthopaedic Surgery, Department of Morphology, Surgery and Experimental Medicine, University of Ferrara, Via Borsari 47, 44121 Ferrara FE, Italy.
G. Valpiani, BSc, PhD, Statistician, Research and Innovation Office,

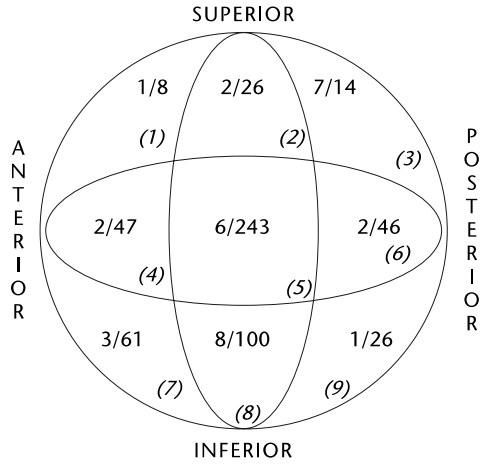



Fig. 4

Diagram showing the number of cut-outs observed out of the total number of lag-screw positions in Cleveland's[10] nine areas.

**The tip-apex distance and the calcar-referenced tip-apex distance were found to be highly significant predictors of the risk of cut-out at cut-offs of 30.7 mm and 37.3 mm, respectively, but the former appeared more reliable than the latter in predicting the occurrence of this complication.**

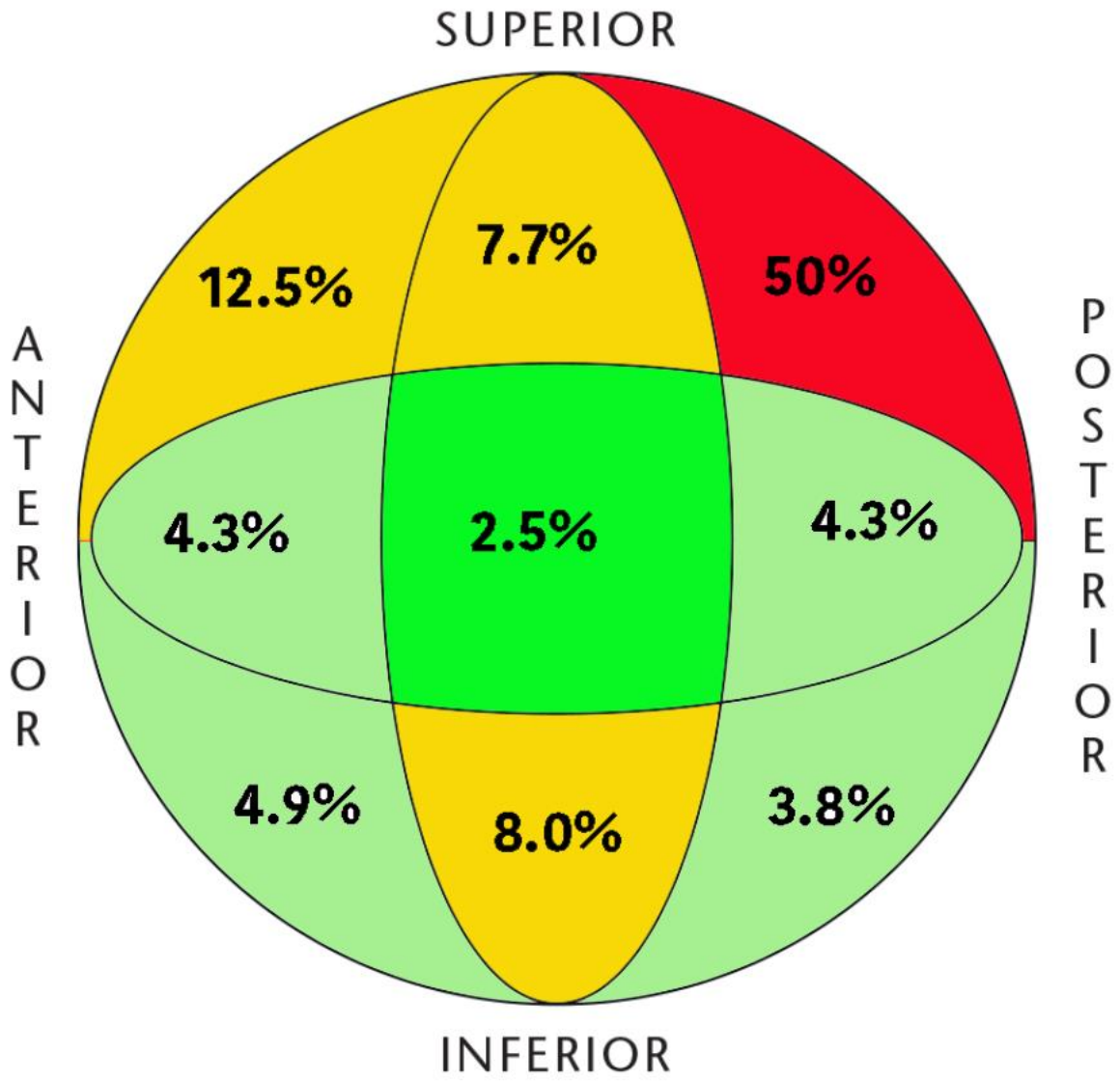



Fig. 4

Diagram showing the number of cut-outs observed out of the total number of lag-screw positions in Cleveland's[10] nine areas.

# Other Considerations

- Long vs Short nail
- Whether to use distal interlocking.

# Femoral Shaft Fractures

# Femoral Shaft Fractures

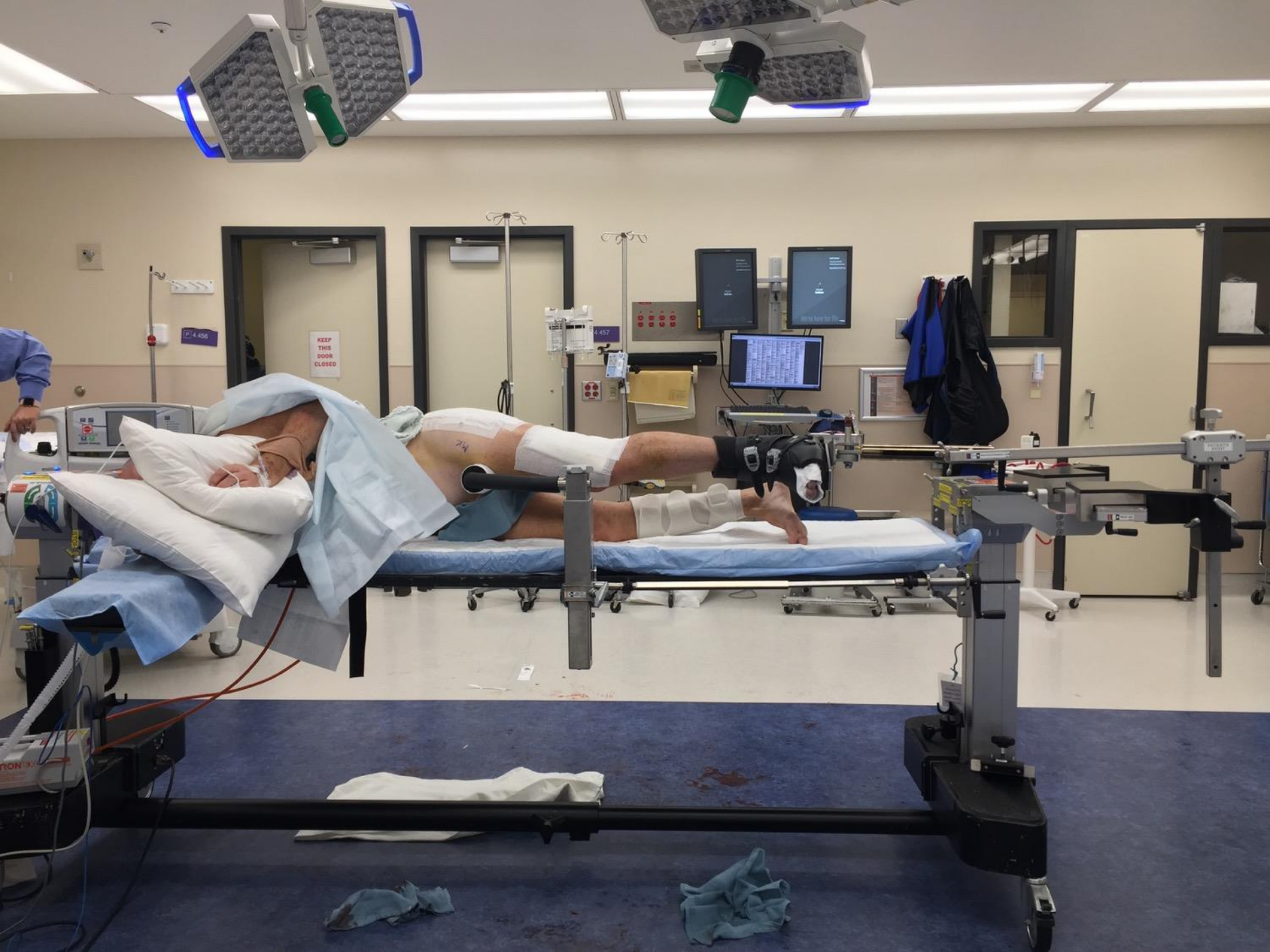
- It's all about the starting point!
- Small errors propagate during the case…
- Don't take anything for granted.
  - Interlocking screws are not a given, even when using a jig!
- Have a plan for assessing length and rotation – they aren't as obvious as alignment

# Positioning / Reduction

- Flat-top
  - Simple midshaft – distal
  - Fresh “off-the-street”
  - Some assistance

- Fracture Table  - Lateral position
  - All subtrochs and intertrochs
  - Delayed nailing


HCMC Patient Safety Time Out
Counts
Blades
Cautery Tips
Hypo's
Needles
Instruments
Laps
THE SKELETAL SYSTEM


KEEP
THIS
DOOR
CLOSED


HCMC Patient Safety Time Out
Patient / Time Out
Counts


B
M
lsera

# “Trochaformis”

- Just lateral to the medial wall of the greater trochanter

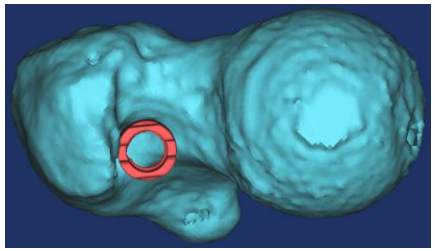


**Fig. 2.** The proximal end of the nail was centrally placed over the trochanteric fossa.

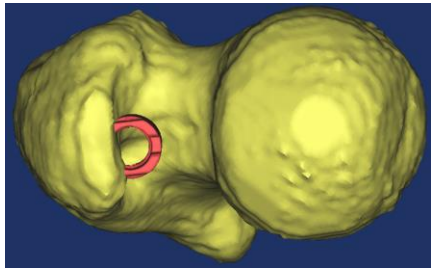


**Fig. 3.** The proximal end of the nail partially overlapped with the trochanteric overhang.

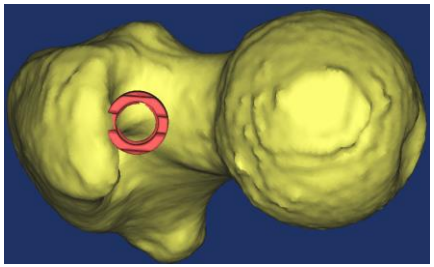
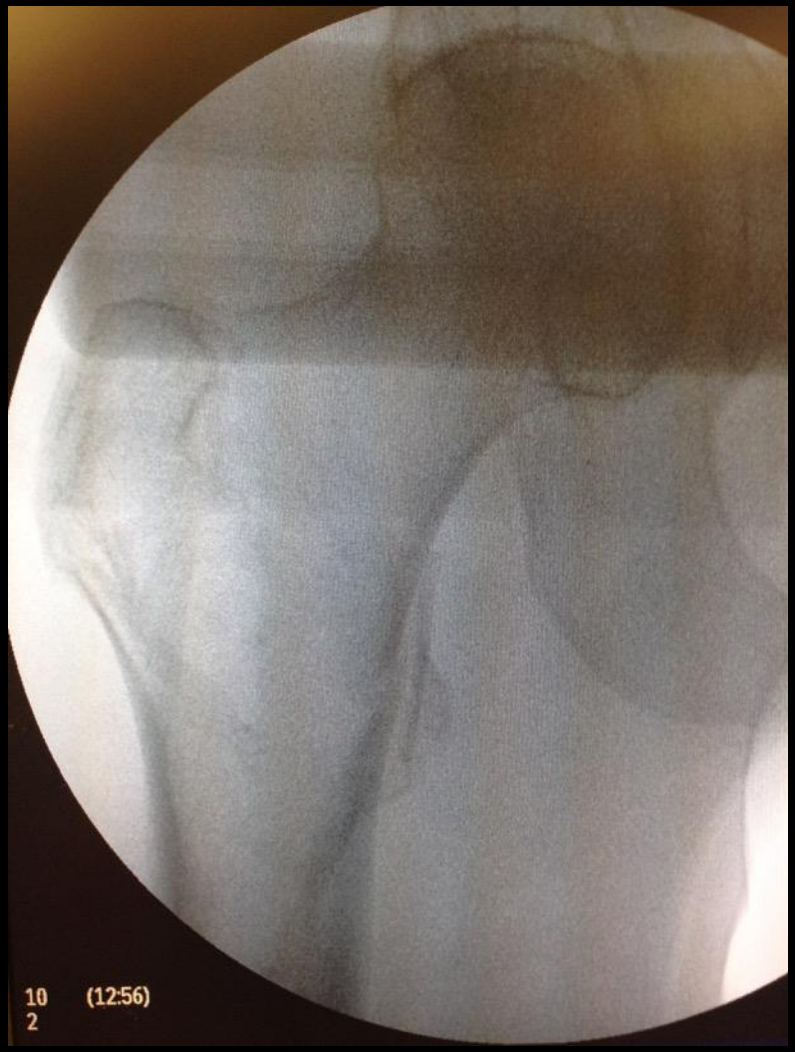
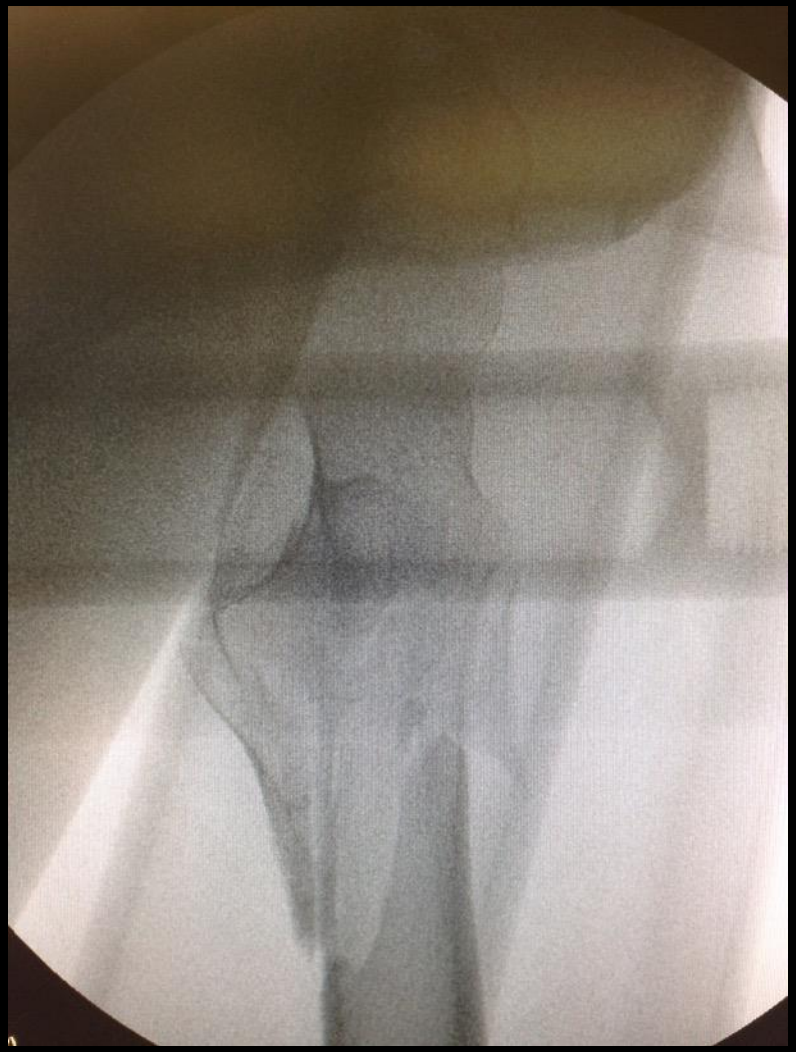
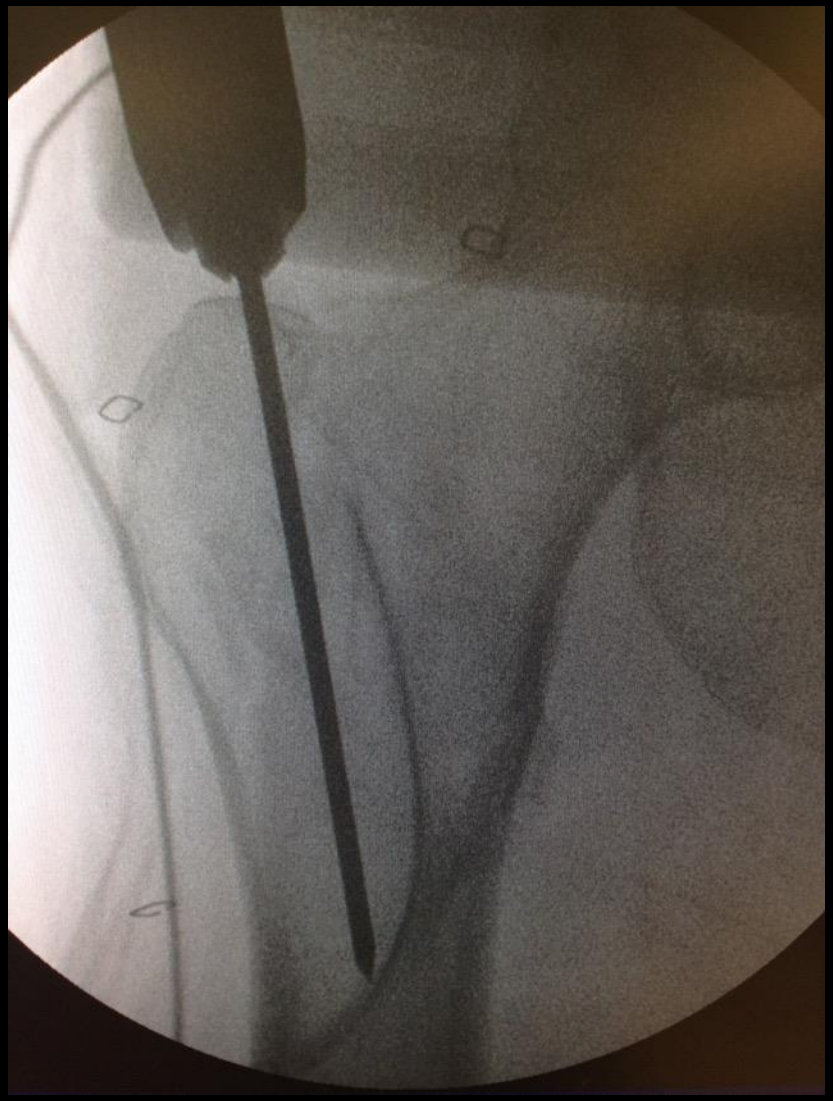


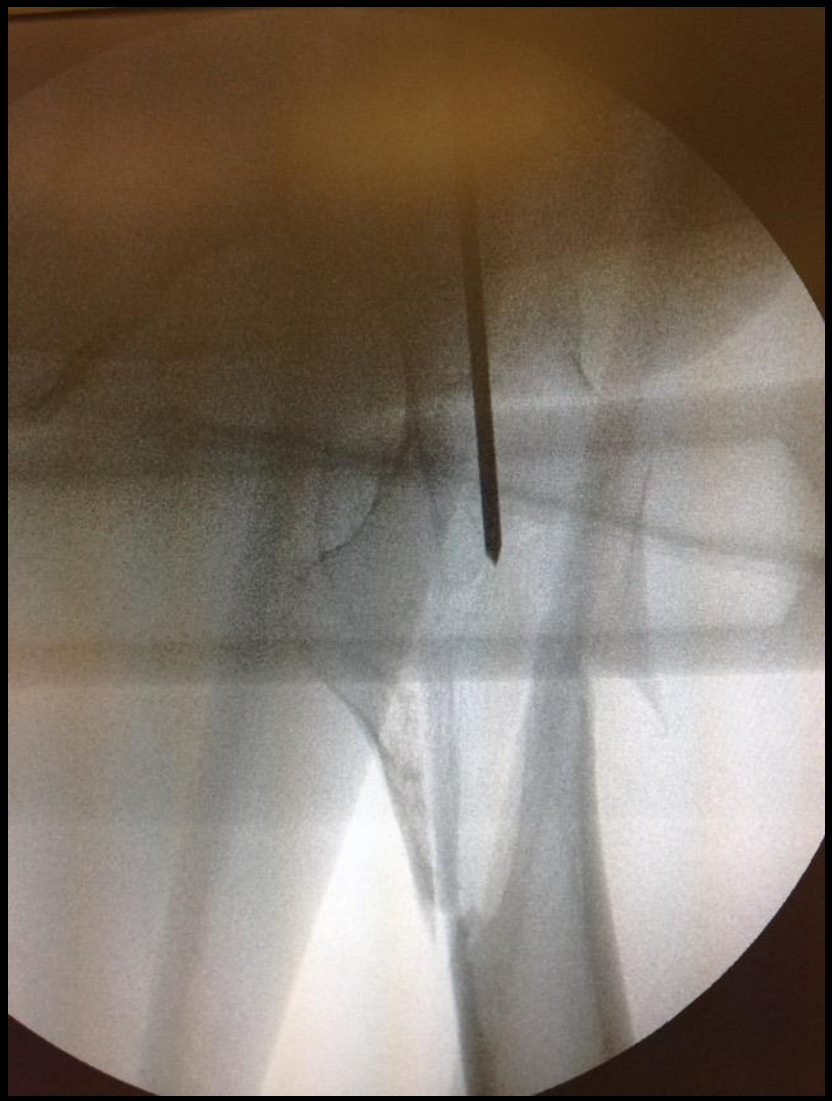
**Fig. 4.** In models with non-trochanteric entry points, the entry points were placed around the anterior border of the trochanteric fossa and not shifted medially except in one case.

Byun et al, Injury 2016


10
2
(12:56)







# Starting point Tips

- Only simple mid-diaphyseal fractures “reduce” themselves (still have to figure out rotation)
- All others – reduce fracture before reaming / nailing
- Make sure you can “see” before you start

# Interlocking Screws

- Beware of the "invisible gorilla" phenomenon (you don't see what you're not looking for)



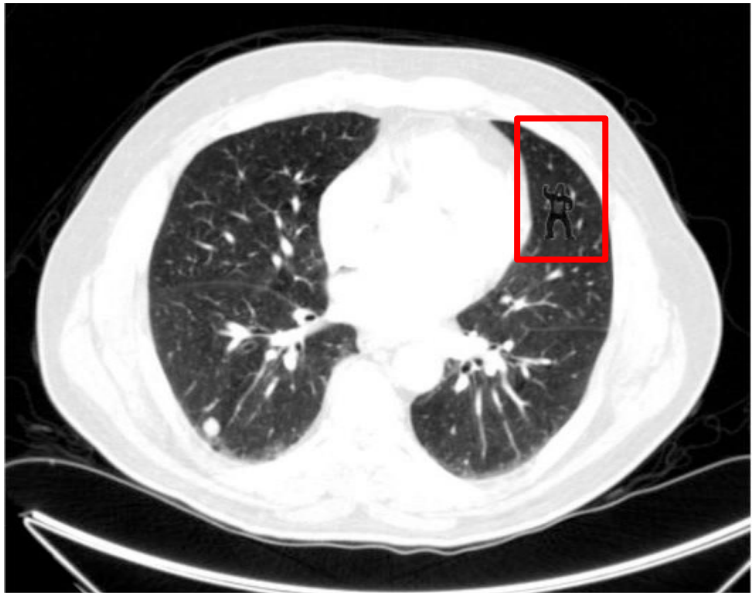
Perfect circles every time, for each screw !

*Psychol Sci*. 2013 September ; 24(9): 1848–1853. doi:10.1177/0956797613479386.

# "The invisible gorilla strikes again: Sustained inattentional blindness in expert observers"

**Trafton Drew**, **Melissa L. H. Vo**, and **Jeremy M. Wolfe**
Trafton Drew: TraftonDrew@gmail.com

- 24 radiologists performed a familiar lung nodule detection task.
- A gorilla, 48 times larger than the average nodule, was inserted in the last case.
- 83% of radiologists did not see the gorilla.
- Eye- tracking revealed that the majority of the those who missed the gorilla looked directly at the location of the gorilla.



*Psychol Sci*. 2013 September ; 24(9): 1848–1853. doi:10.1177/0956797613479386.

## "The invisible gorilla strikes again: Sustained inattentional blindness in expert observers"

**Trafton Drew**, **Melissa L. H. Vo**, and **Jeremy M. Wolfe**
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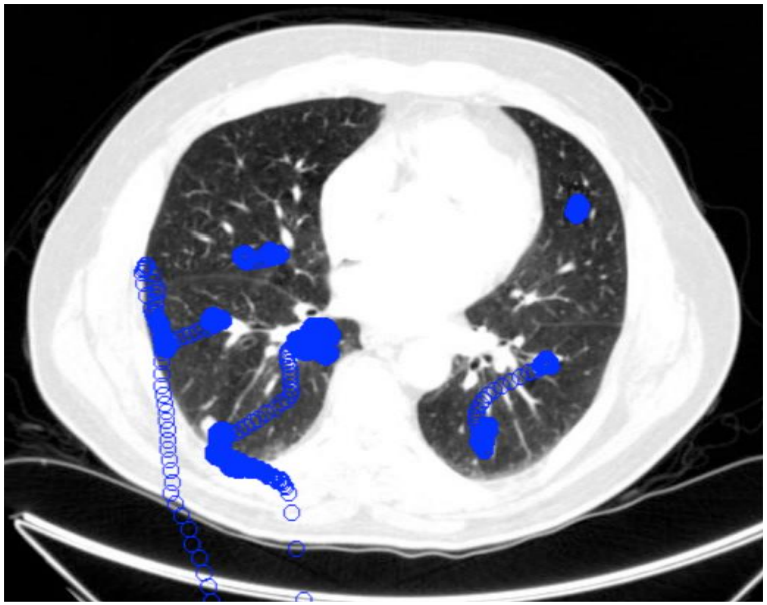

Thank You