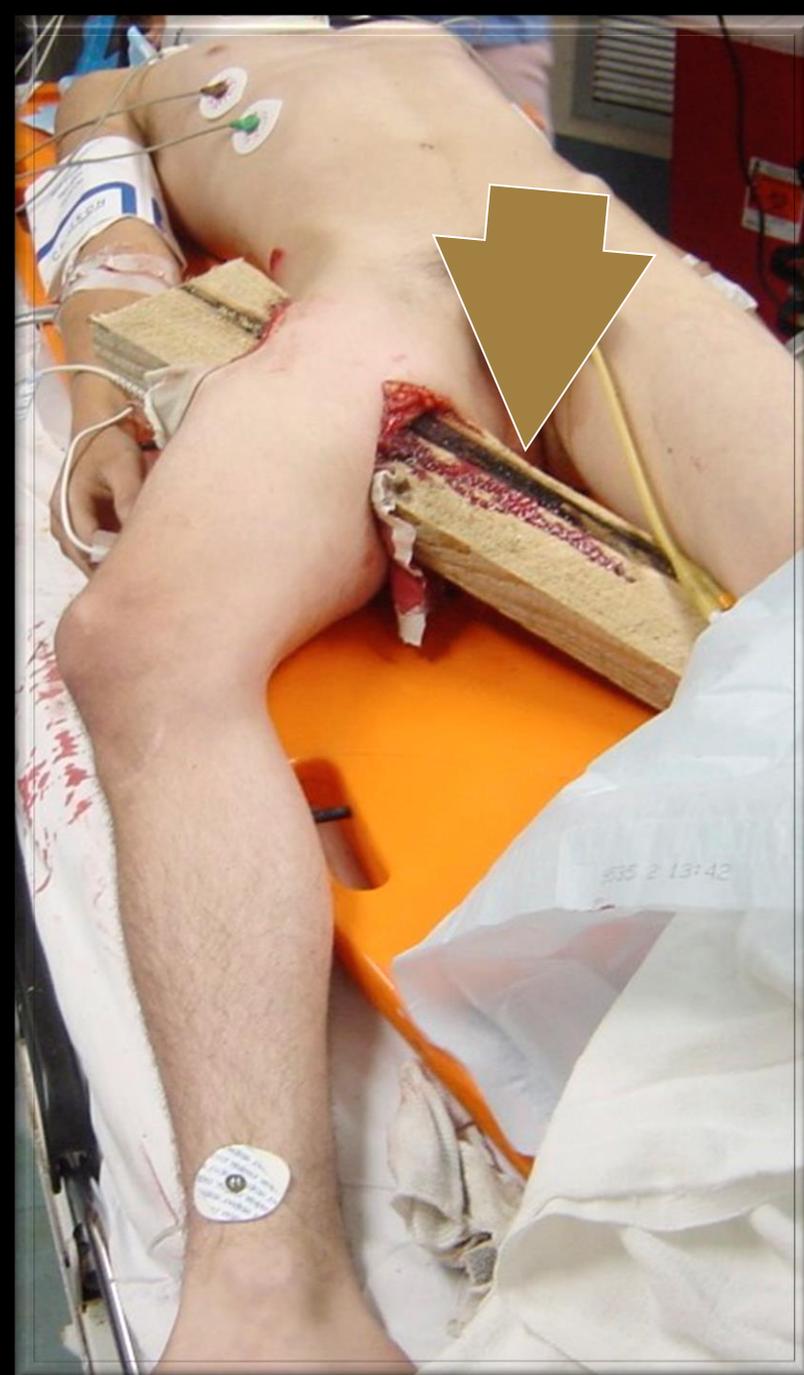


# Nailing Subtrochanteric Short Segment Femur Fractures

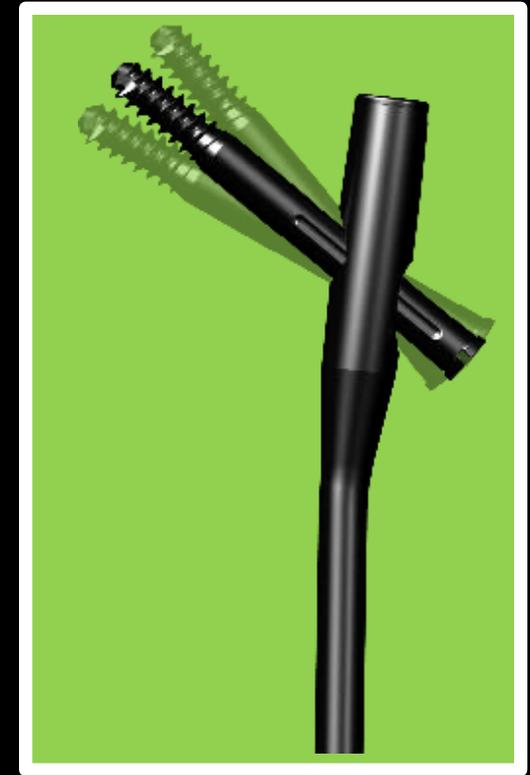
**Amir Matityahu, MD**

Professor of Orthopaedic Surgery  
UCSF and SFGH Departments of Orthopaedic Surgery



# Conflict of Interest

- ❑ Designed variable angle cephalomedullary femoral nail
- ❑ Ownership EPIX Orthopaedics



# Malalignment

- Associated with
  - Proximal 1/3 fx
  - Distal 1/3 fx
  - Comminuted segmental fx
- Less Likely in
  - Middle 1/3 fx
  - Stable fx pattern
- Not due to Method of treatment
- Anterograde vs Retrograde
- Troch vs Piriformis

# Anatomy of Subtroch Fractures

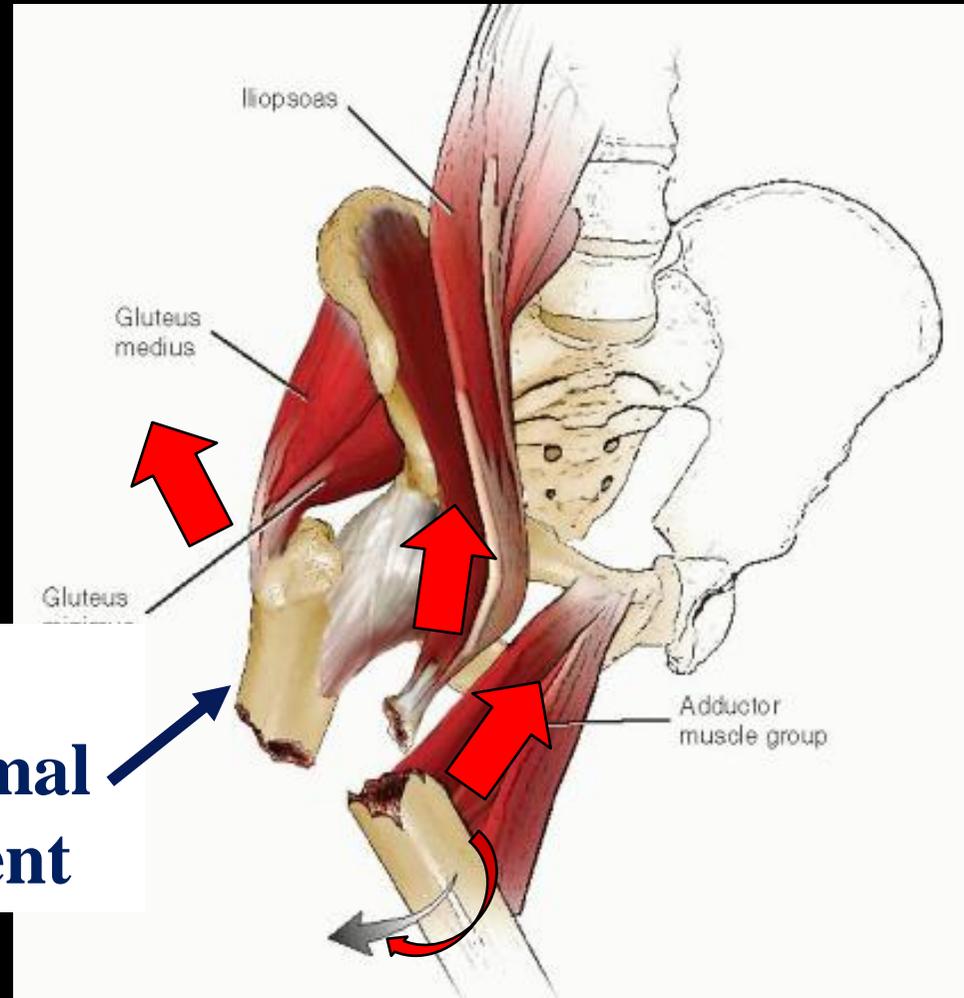
## □ Muscle Pull

### – Proximal

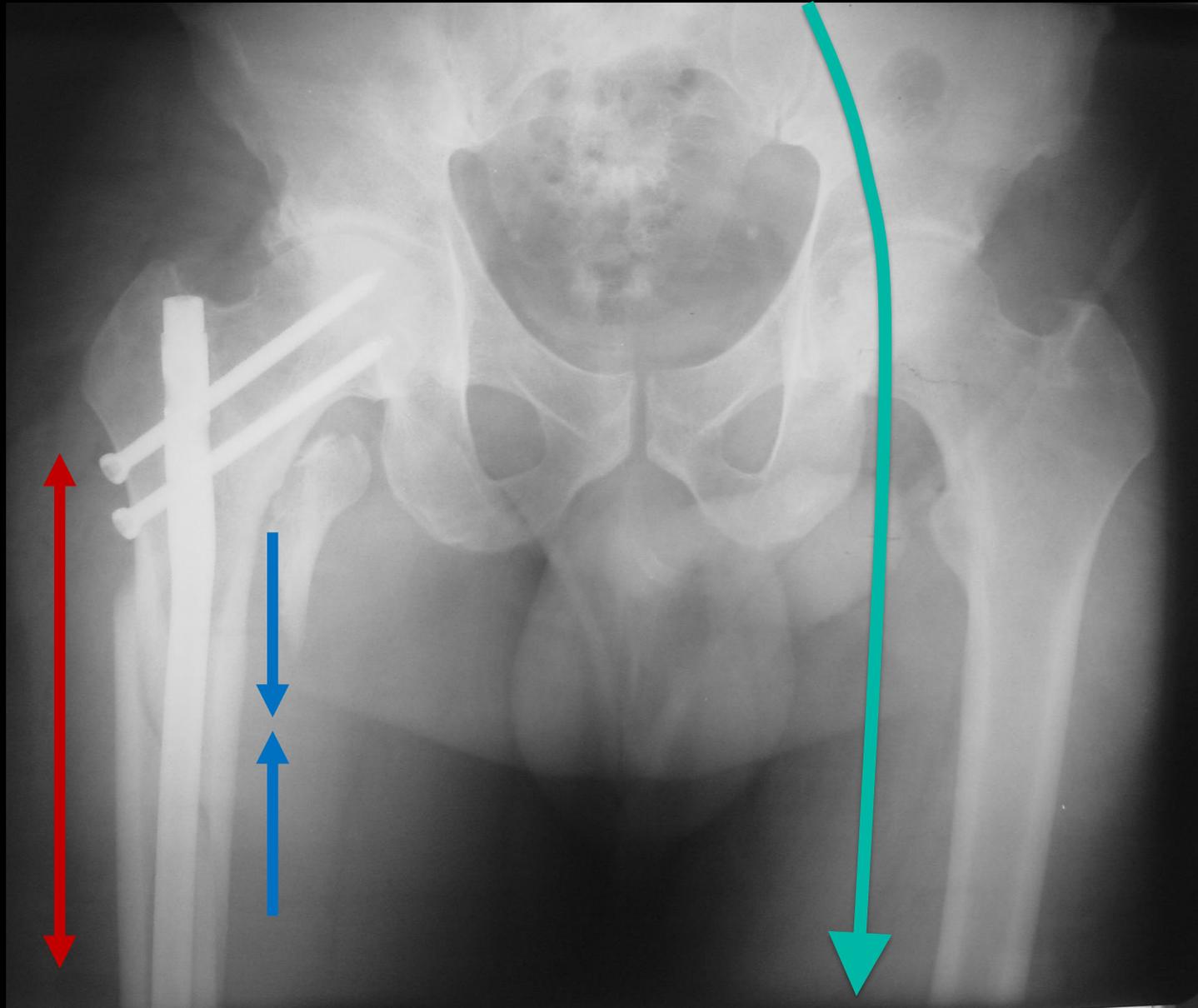
- Abduction
- Flexion
- External rotation

### – Distal

- Short
- Medial
- External rotation



# Forces after fixation



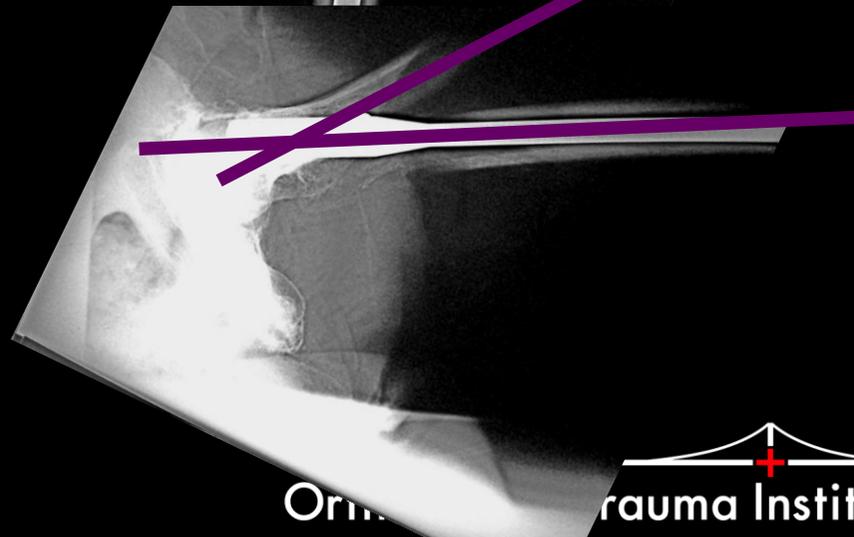
# Malalignment and Varus in Subtroch Fx is Common

- Factors that lead to nonunion
  - Varus and Anterior Apex Angulation  $\approx$ 10-20%
  - Medial Cortical abutment
  - Nail autodynamization

# Varus and Apex Anterior in Subtroch fractures



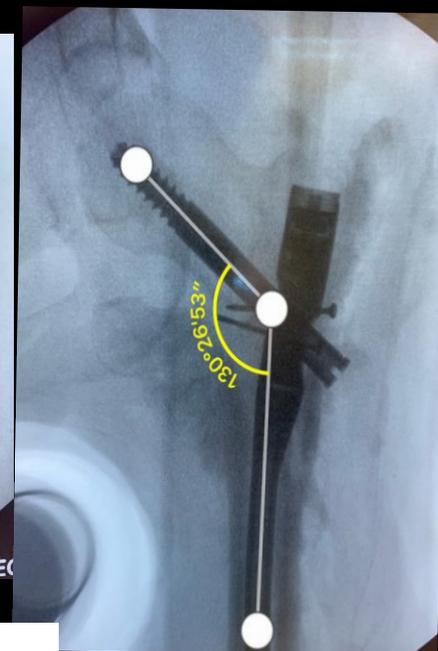
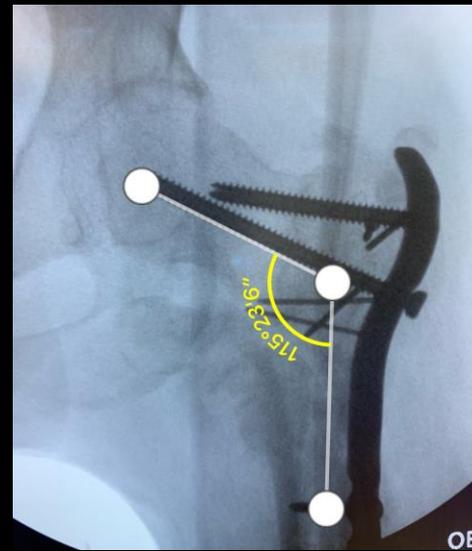
Nail without reduction



# Treatment options

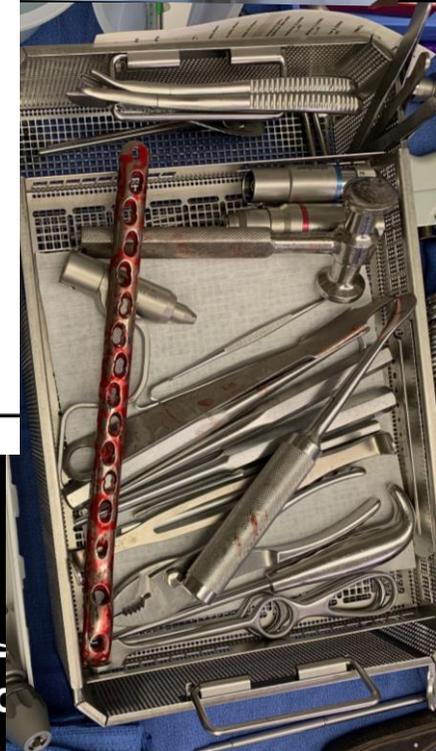
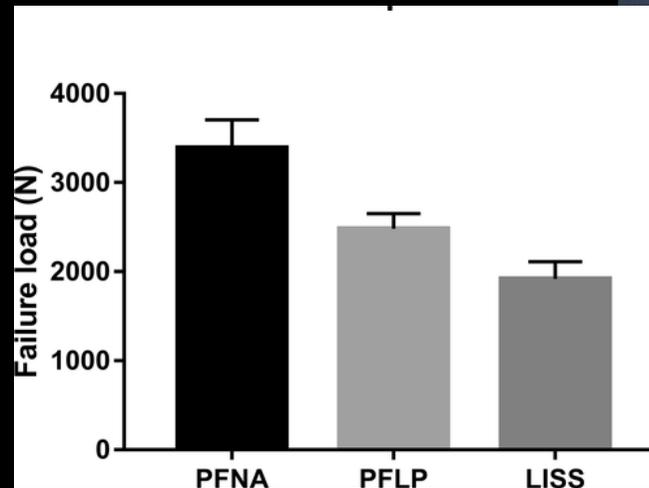
## □ Cephalomedullary nail

- Axial stiffness
- Load to failure
- Cycles to failure



## □ Fixed angle plate

- More lateral position
  - Greater bending forces
  - Decreased load to failure
  - Decreased number of cycles to failure



Kuzyk, P et al. Intramedullary Versus Extramedullary Fixation for Subtrochanteric Femur Fractures. J Orthop Trauma. 2009;23(6):465-470

Biomechanical Study of Intramedullary Versus Extramedullary Implants for Four Types of Subtrochanteric Femoral Fracture

Jie Wang MD, Haobo Jia MD, Xinlong Ma MD, Jianxiong Ma MD, Bin Lu MD, Haohao Bai MD, Ying Wang MD

Orthopaedic Surgery

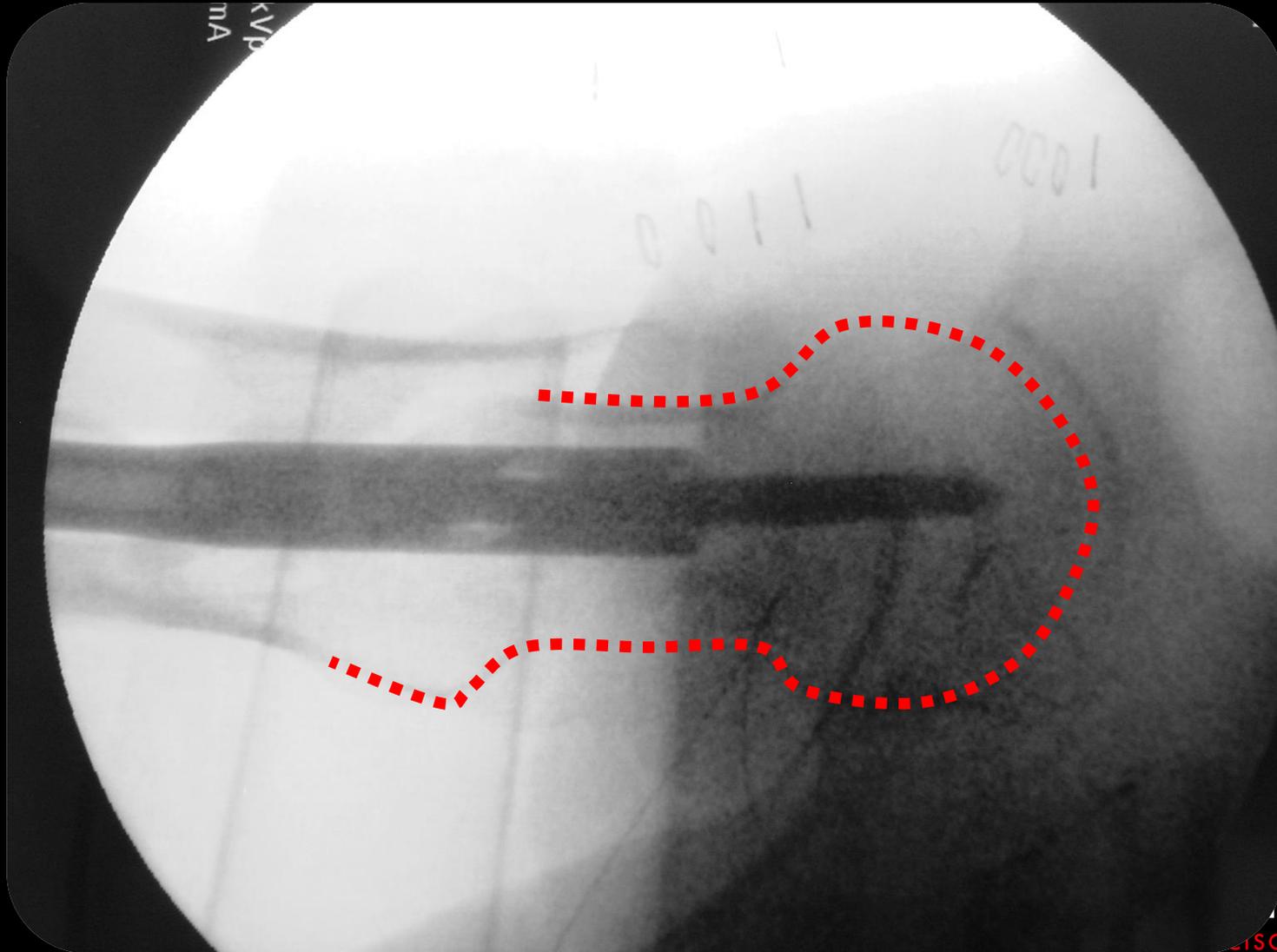
# OR Setup

## Scissor position or Lateral Decubitus

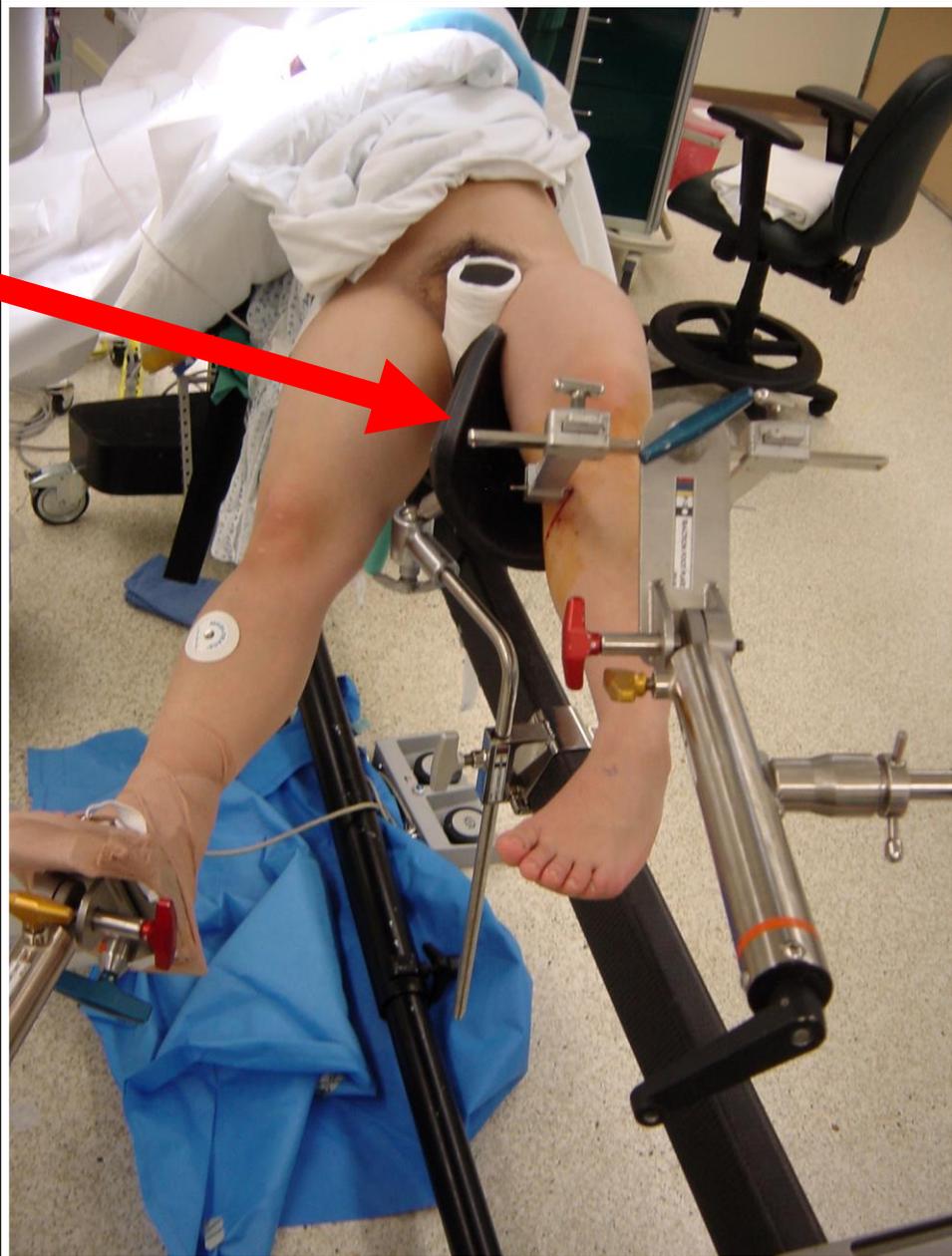
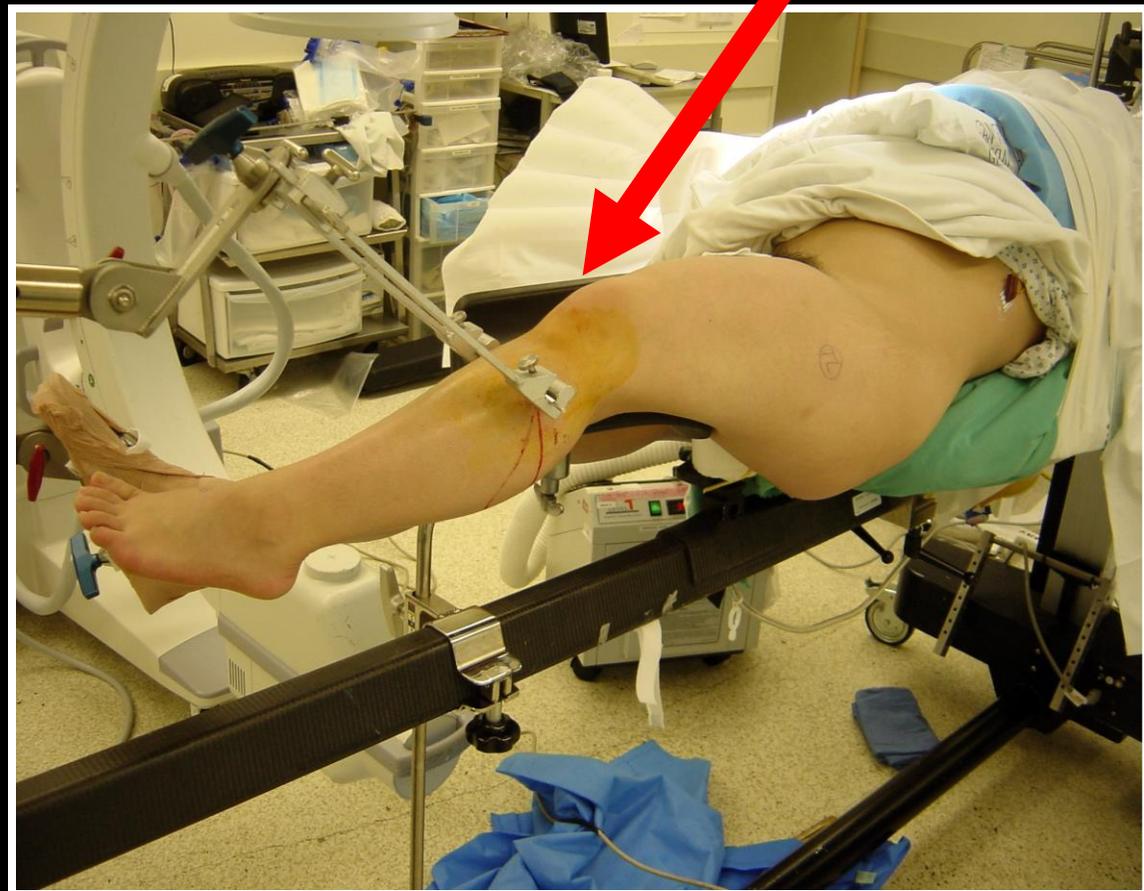


preop c-arm

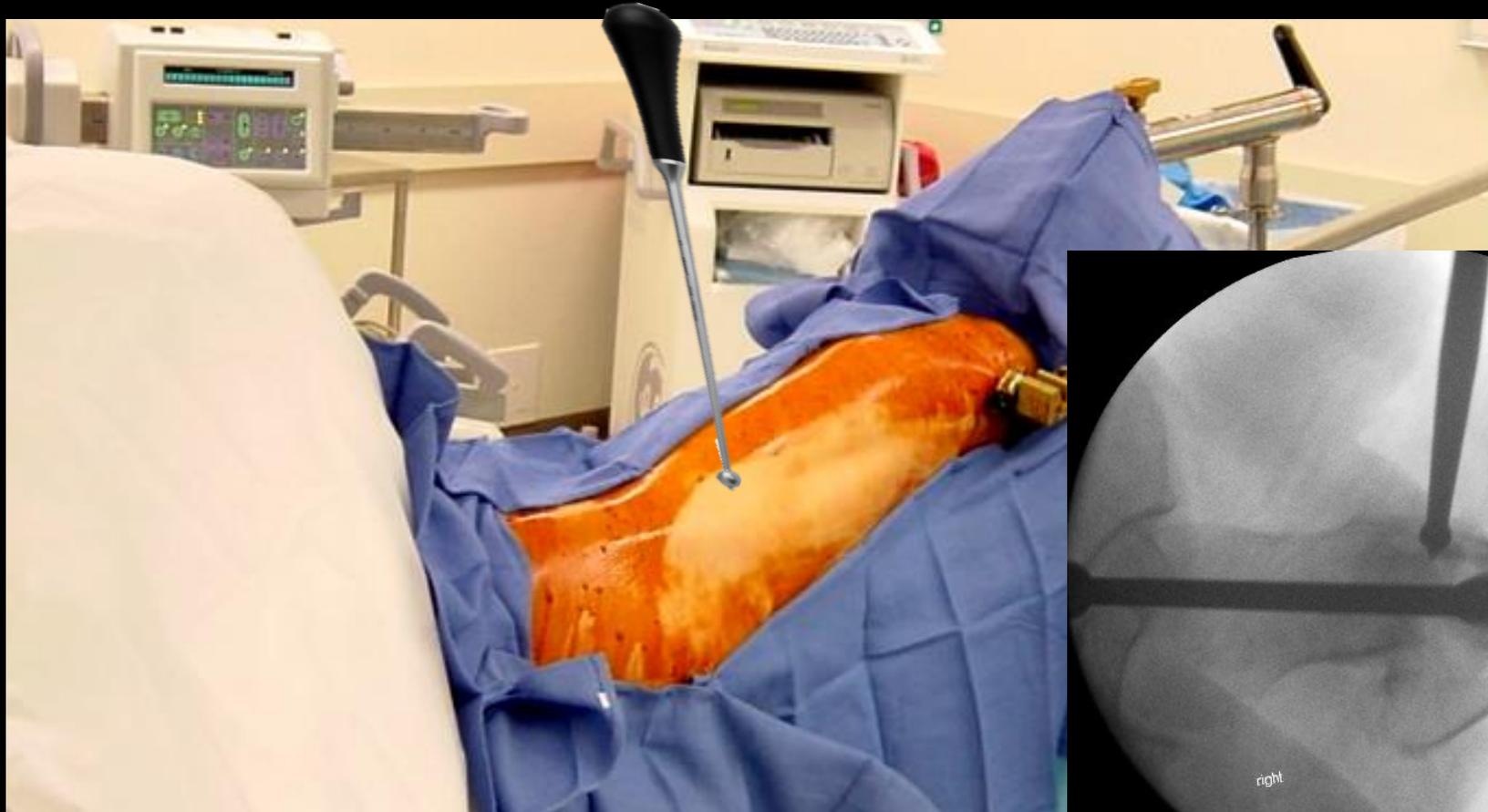
Make sure you can get a perfect lateral of head and neck



# OR Set up EM reduction



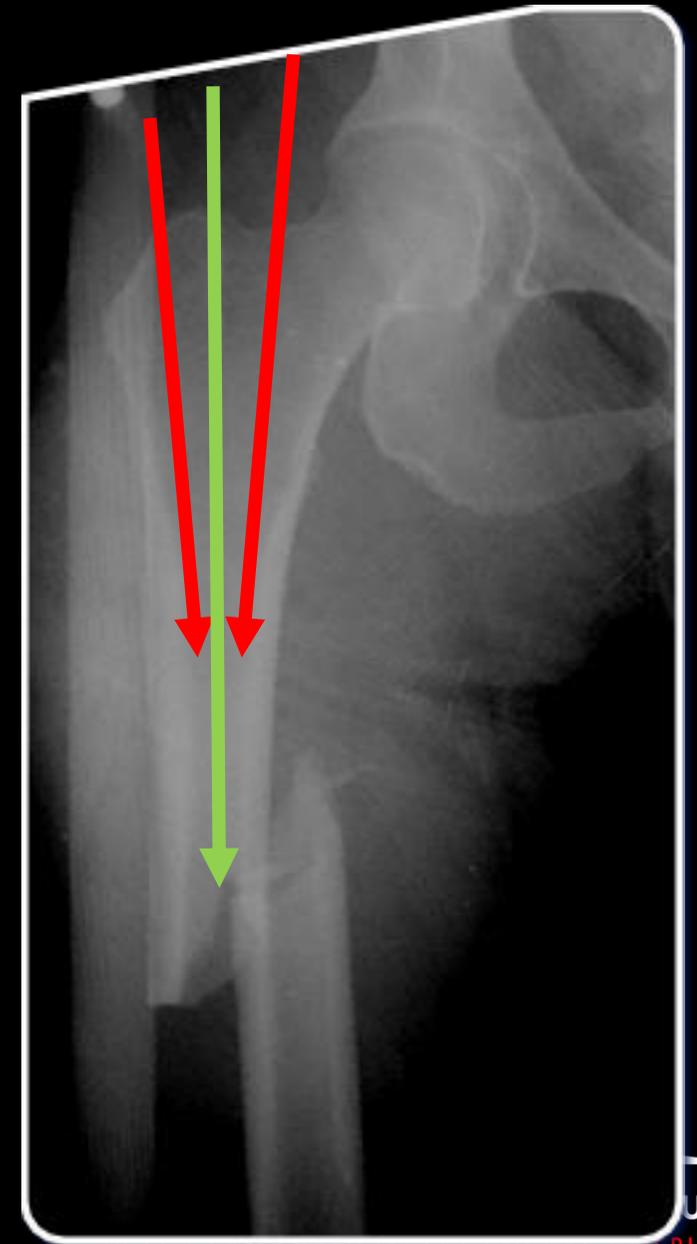
Prep anteriorly in case you need to push down



# Subtrochanteric nails

## Avoiding Varus

- Proper insertion point
  - Trochaformis start site
- Reduction before reaming

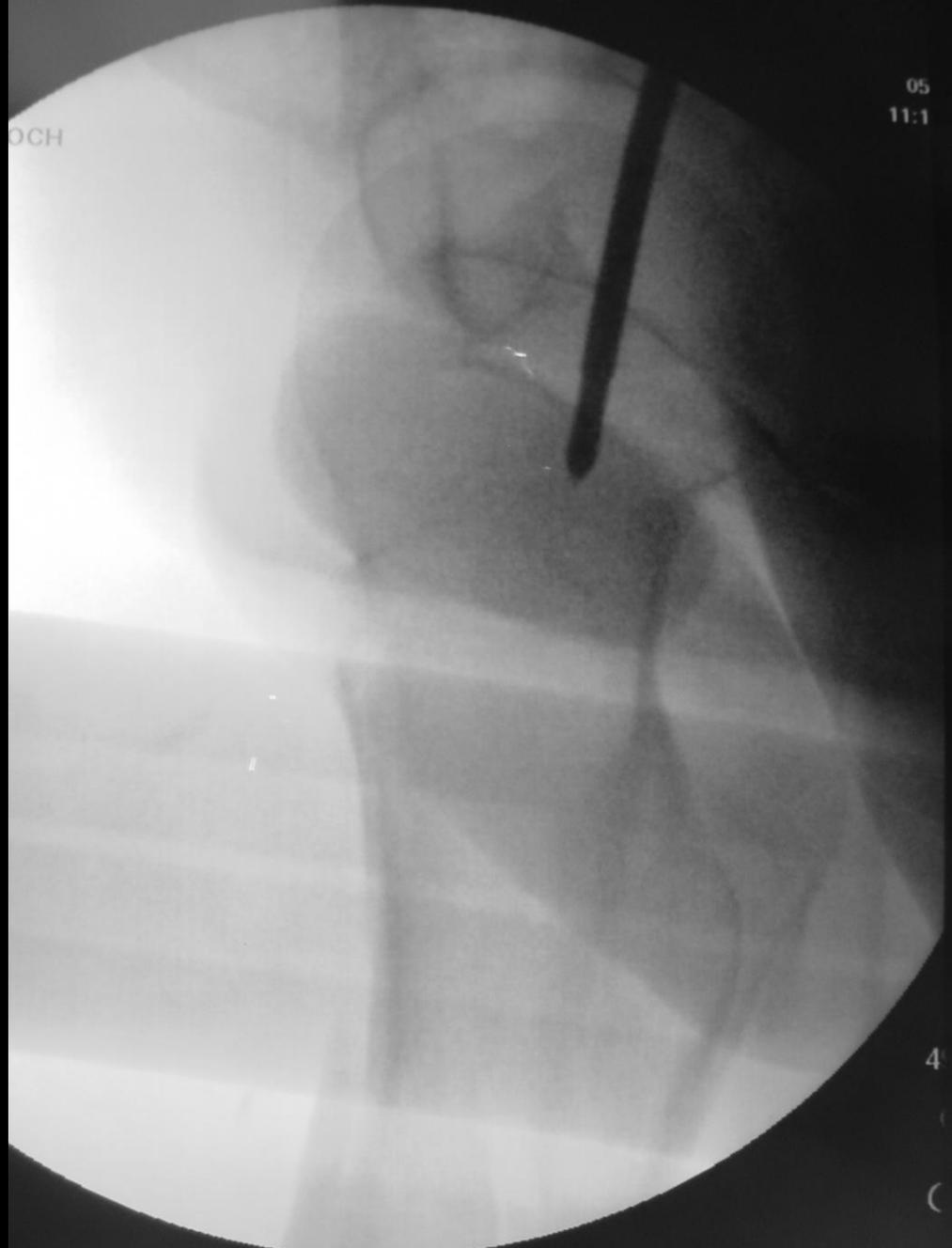






  
**Academic Trauma Institute**

UCSF + SAN FRANCISCO GENERAL HOSPITAL



DCH

05  
11:1

4



**Medical Trauma Institute**

UCSF + SAN FRANCISCO GENERAL HOSPITAL

11:1

YAHU  
IL L PERITROCH



49

1 kVp  
3 mA

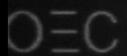
48   
51 



Institute

UCSF + SAN FRANCISCO GENERAL HOSPITAL

MATTI FARI  
IM NAIL L PERITROCH



91 kVp  
4.03 mA  
21



IM NAIL L PERITROCH

11:16:52 AM



91 kVp  
4.06 mA

22

54

27

0

PAGNUCCO  
P

MATITYAHU  
IM NAIL L PERITROCH



86 kVp  
3.56 mA  
24

54 ☀  
16 ●  
OEC

94 kVp  
4.18 mA  
23

PAGNUCCO  
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05/03/2001  
11:19:01 AM  
MATITYAHU  
IM NAIL L PERITROCH

PAGNUCCO

D

MATITYAHU

IM NAIL L PERITROCH



94 kVp

4.18 mA

23



05/03/2006  
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IM NAIL L PERITROCH



46   
0 

87 kVp  
3.65 mA  
25

59   
22   
OEC

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IM NAIL L PERITROCH

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IM NAI



96 kVp  
1.36 mA  
31

55   
27   
OEC

94 kV  
1.31 mA  
32

P

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IM NAIL L PERITROCH

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55 ☀  
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94 kVp  
1.31 mA

OEC

32

51 ☀  
2 ◐

nstitute

UCSF + SAN FRANCISCO GENERAL HOSPITAL

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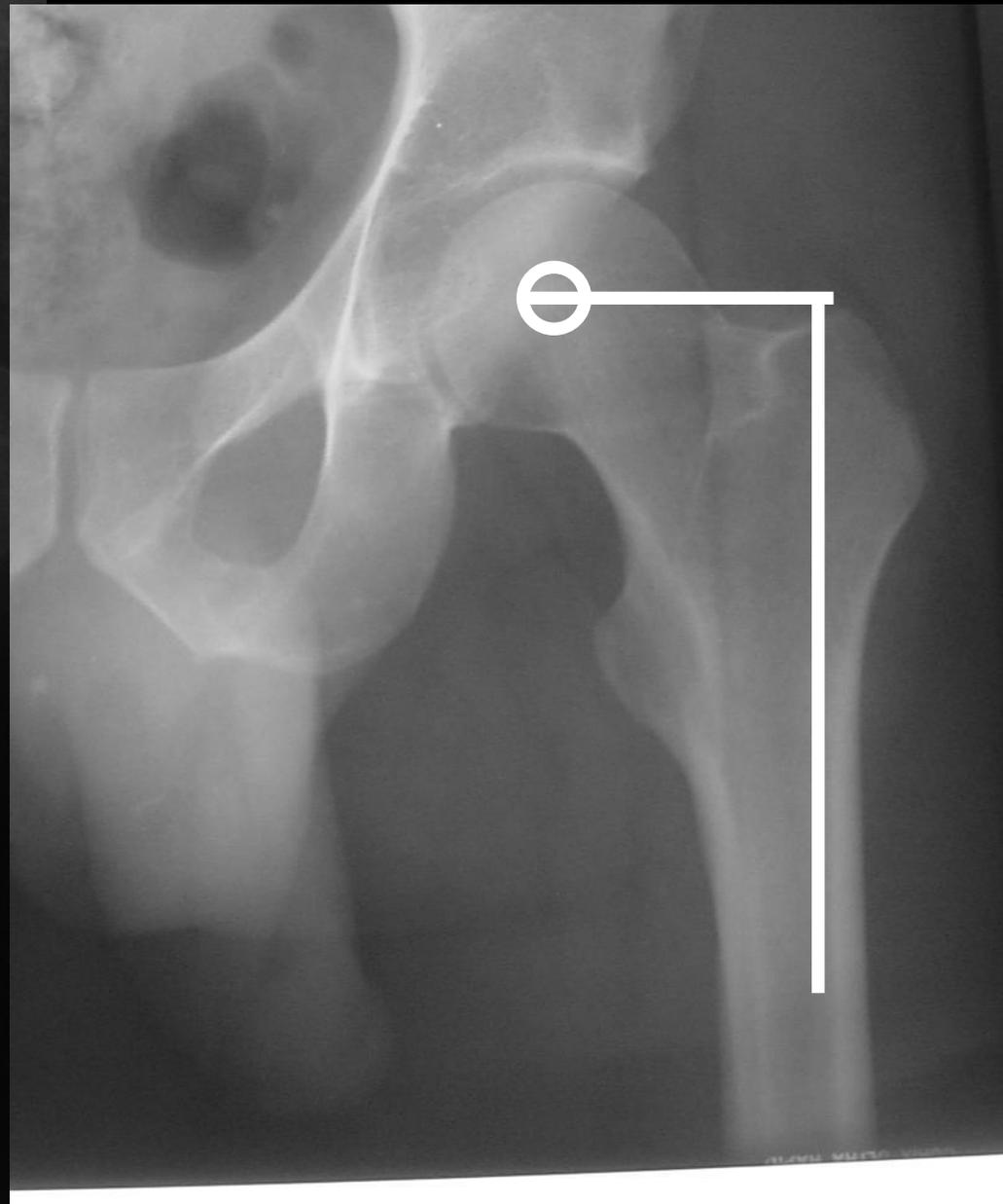
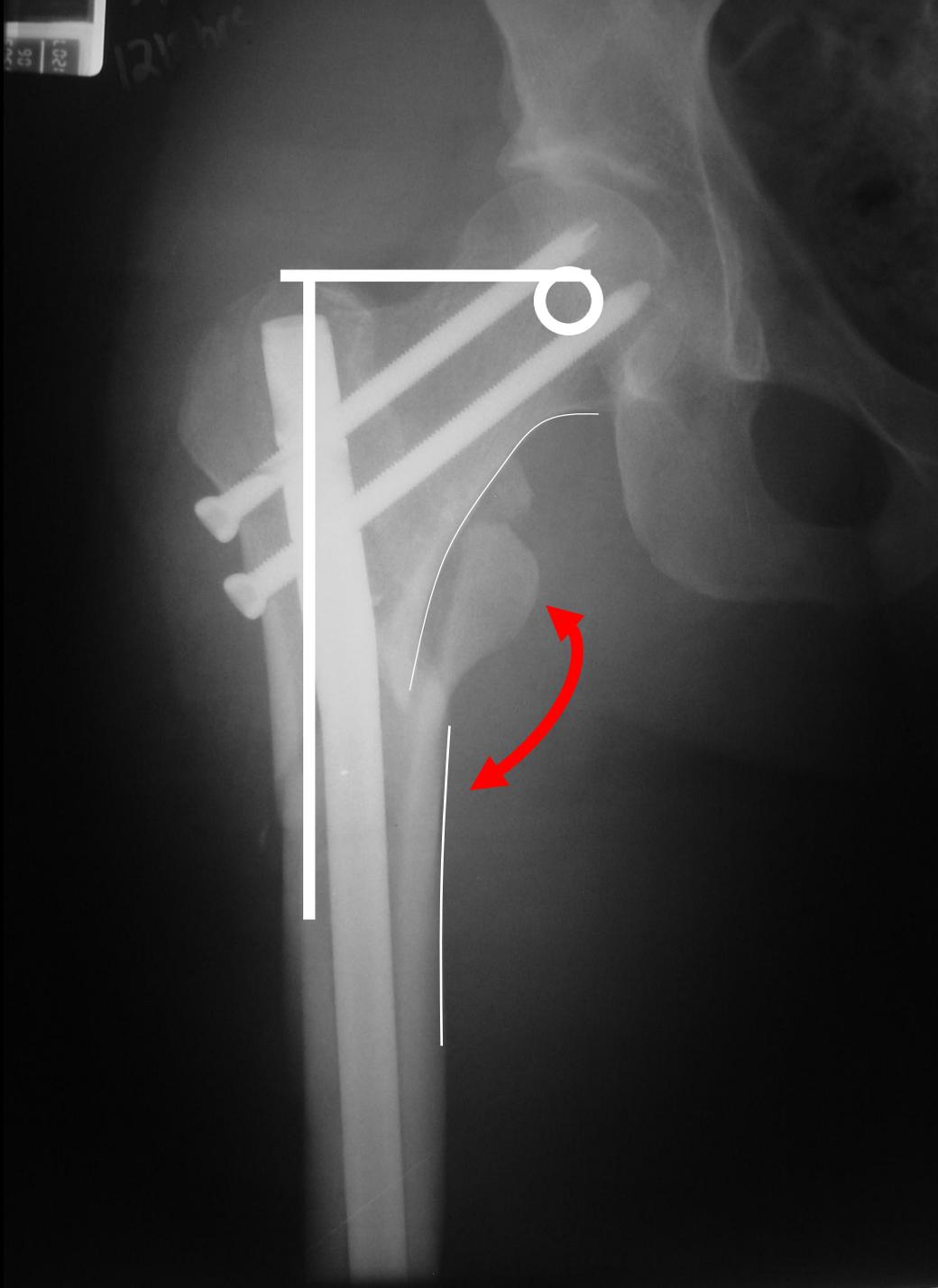


90 kVp  
21 mA

53  
2  
OEO

ROCH











DUPOINT ULTRA-VISION™ DETAIL PH

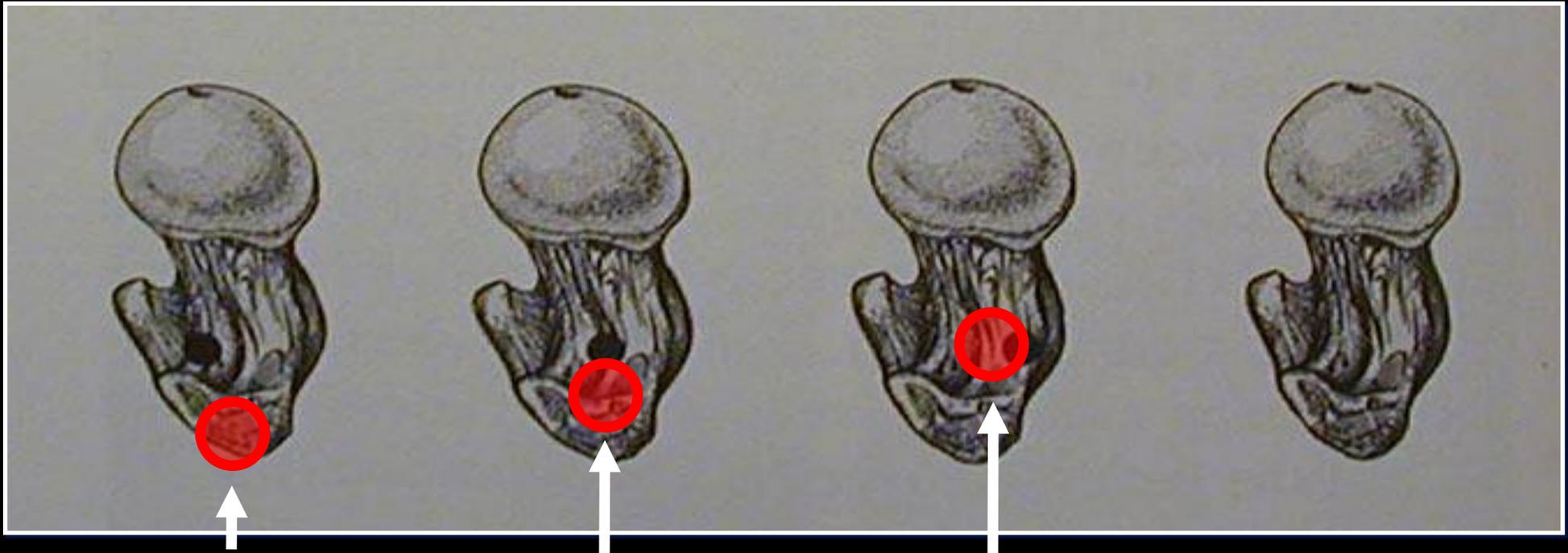
DUPOINT ULTRA-VISION™ DETAIL PH



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# Trochanteric Femoral Nailing

starting point



Too Lateral  
Blow out or Varus

Correct

Too Medial  
Valgus, Increased  
leg length

Ostrum et al JOT 2005

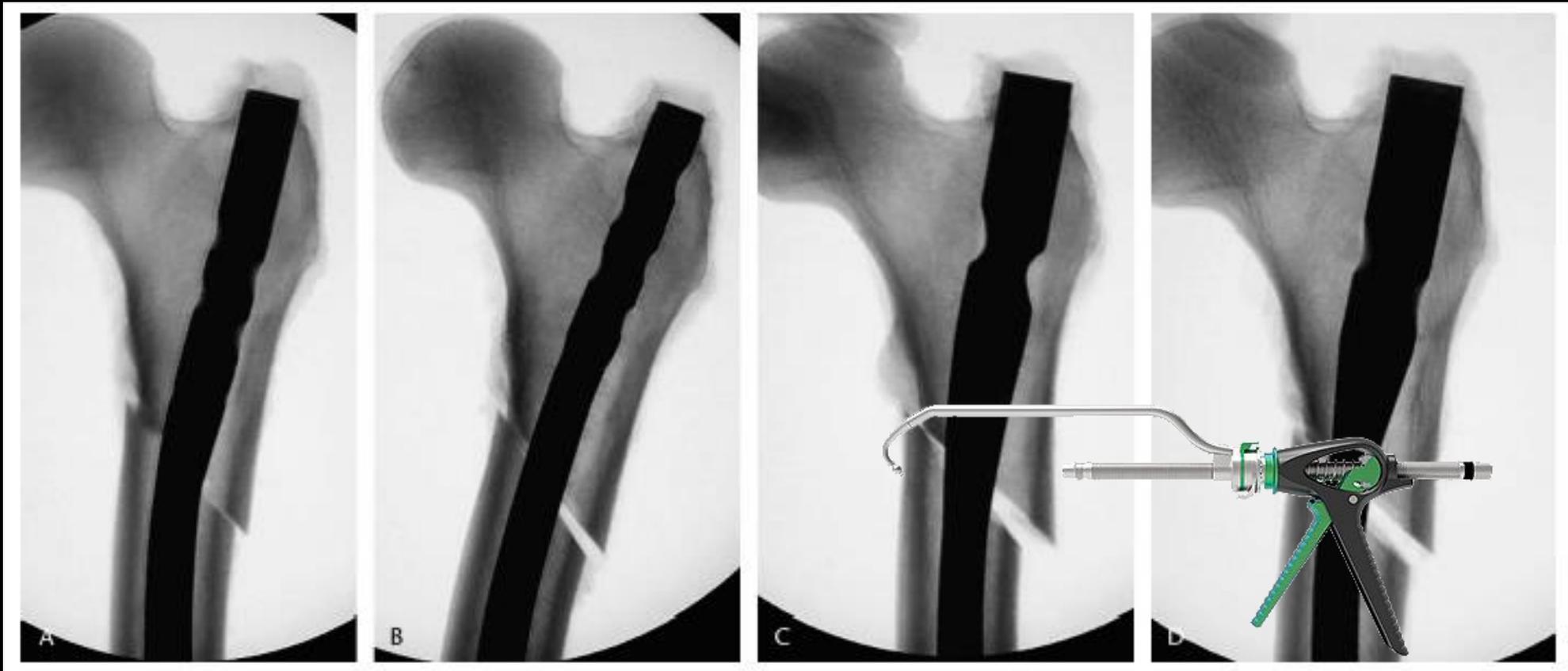
# Trochanteric Start



	Holland	TAN	TFN	Gamma 2	Gamma 3
<b>Proximal bend</b>	10	5	6	4	4
<b>Rad of Curv</b>	300mm	350mm	150mm	300mm	200mm

Ostrum et al JOT 2005

Know your nail's anatomy  
variable proximal bend and thickness  
Tip of the greater troch may be too lateral



Holland

TAN

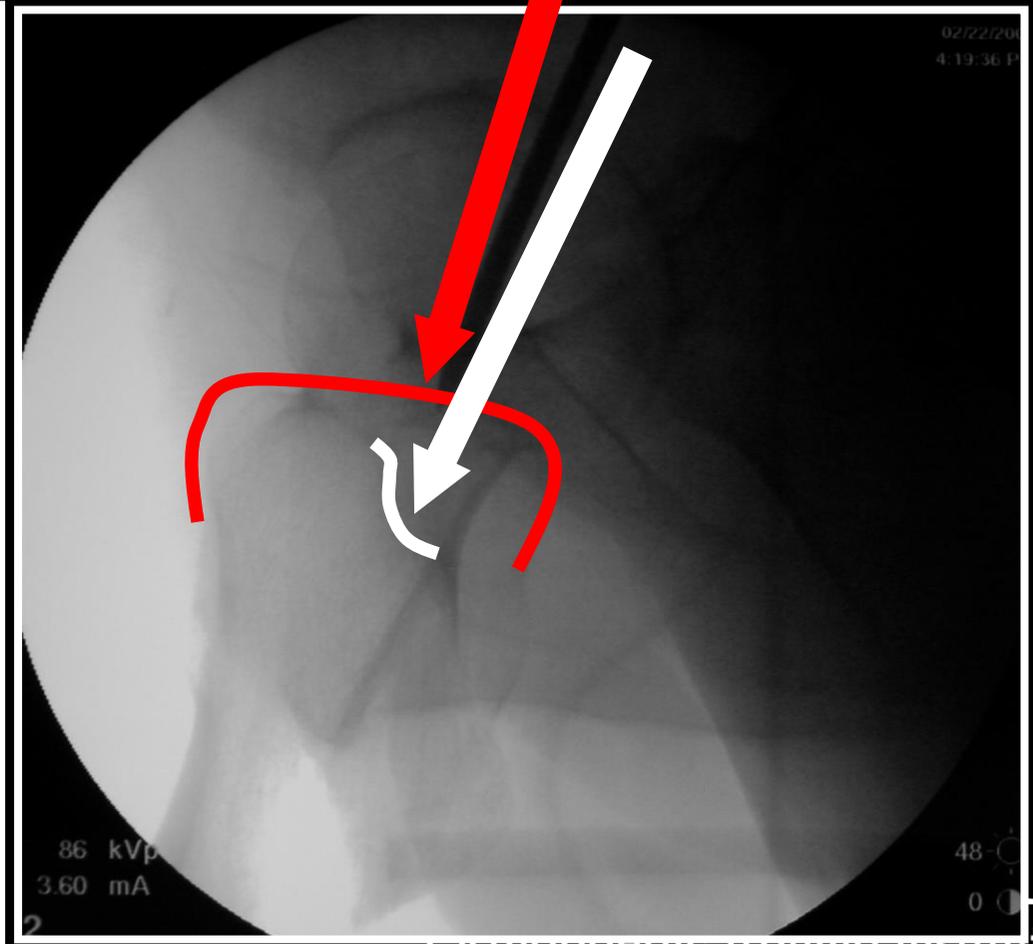
Gamma

TFN

Ostrum et al JOT 2005

# Piriformis Fossa is a posterior structure

## Trochanter is bulbous

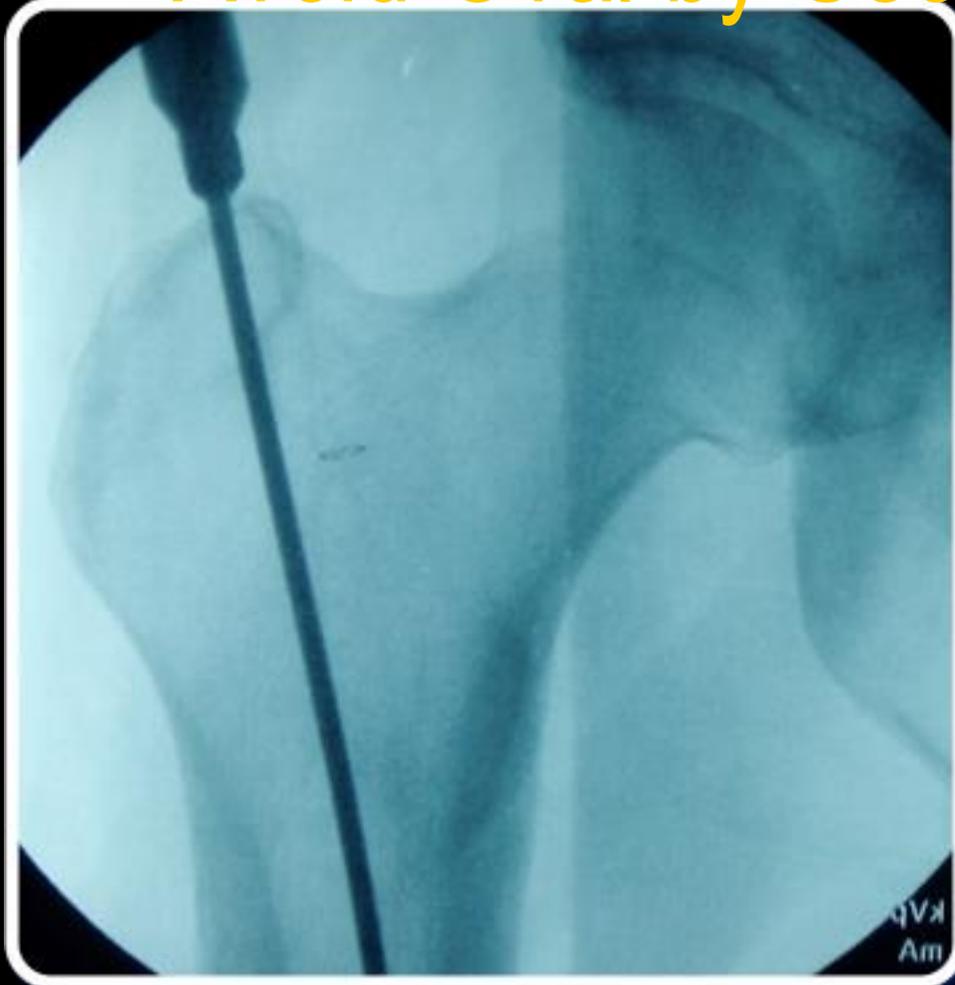


# Trochanteric entry nail: IS entry easier to access?

- Watch out for the Oval
  - Reaming sequentially causing an oval entry hole and varus

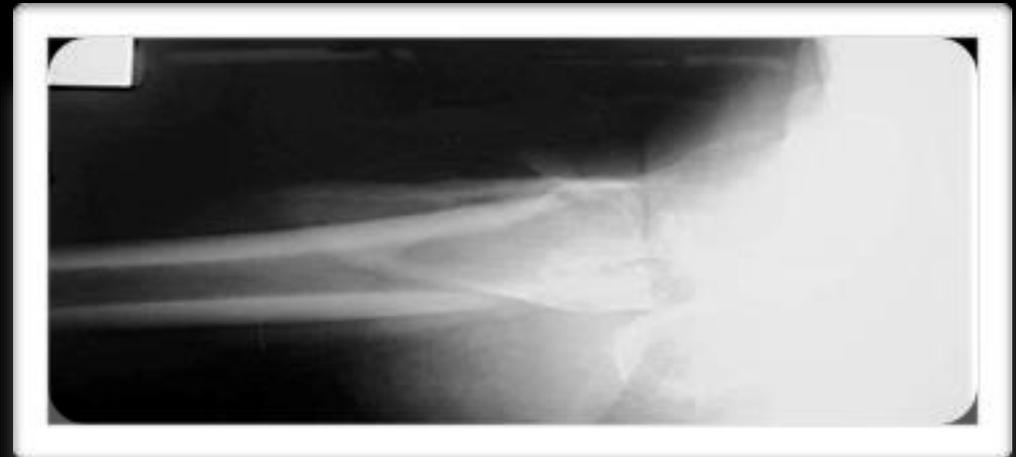


Avoid Varus with correct entry!  
Avoid reaming laterally!  
Avoid Oval by Use of one step reamer!

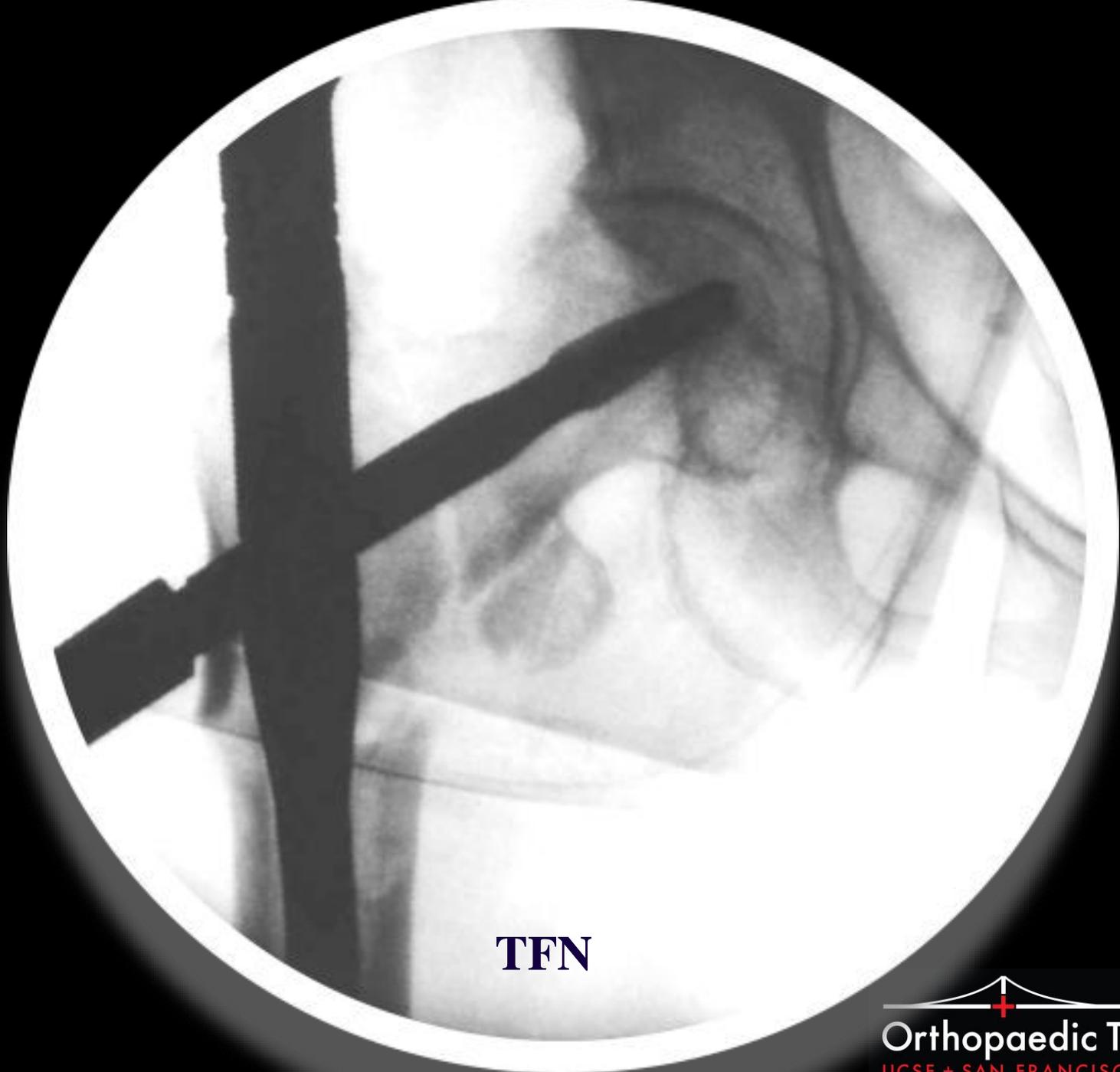


# 85 year old female post PVA

Sup/peritrochanteric fracture Jan 2006





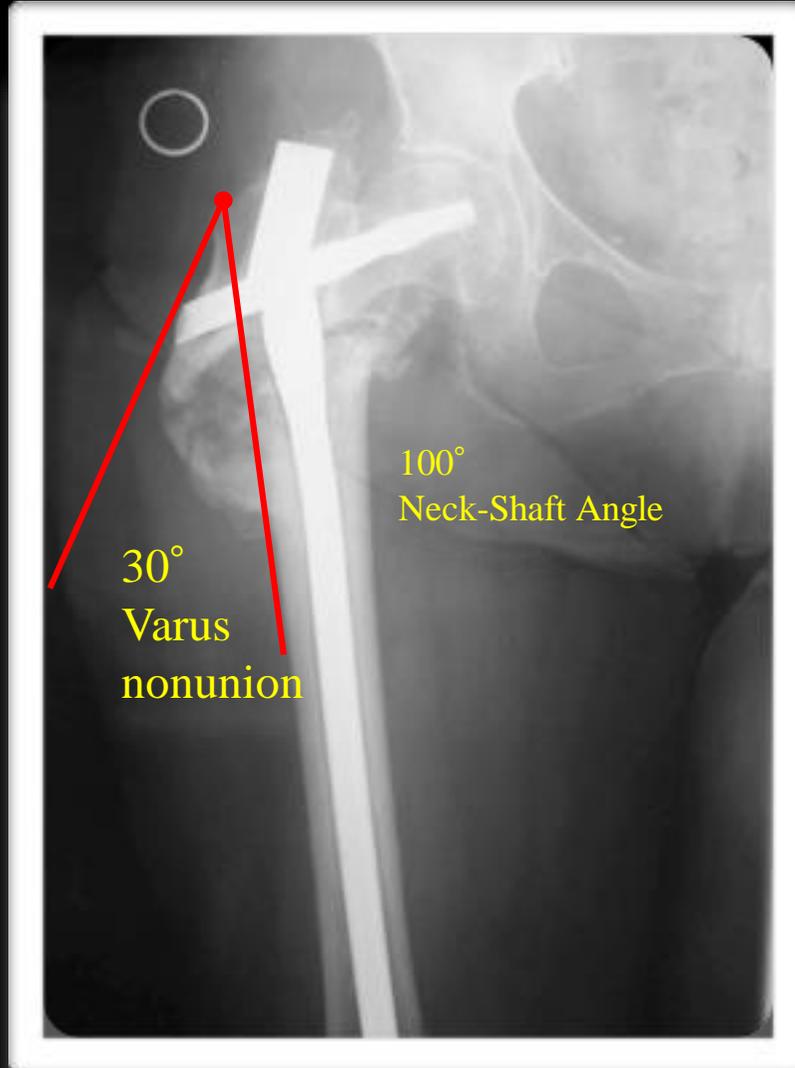


**TFN**

# 14° VARUS Medial Translation



# 2 years post op Nonunion and Hardware Failure

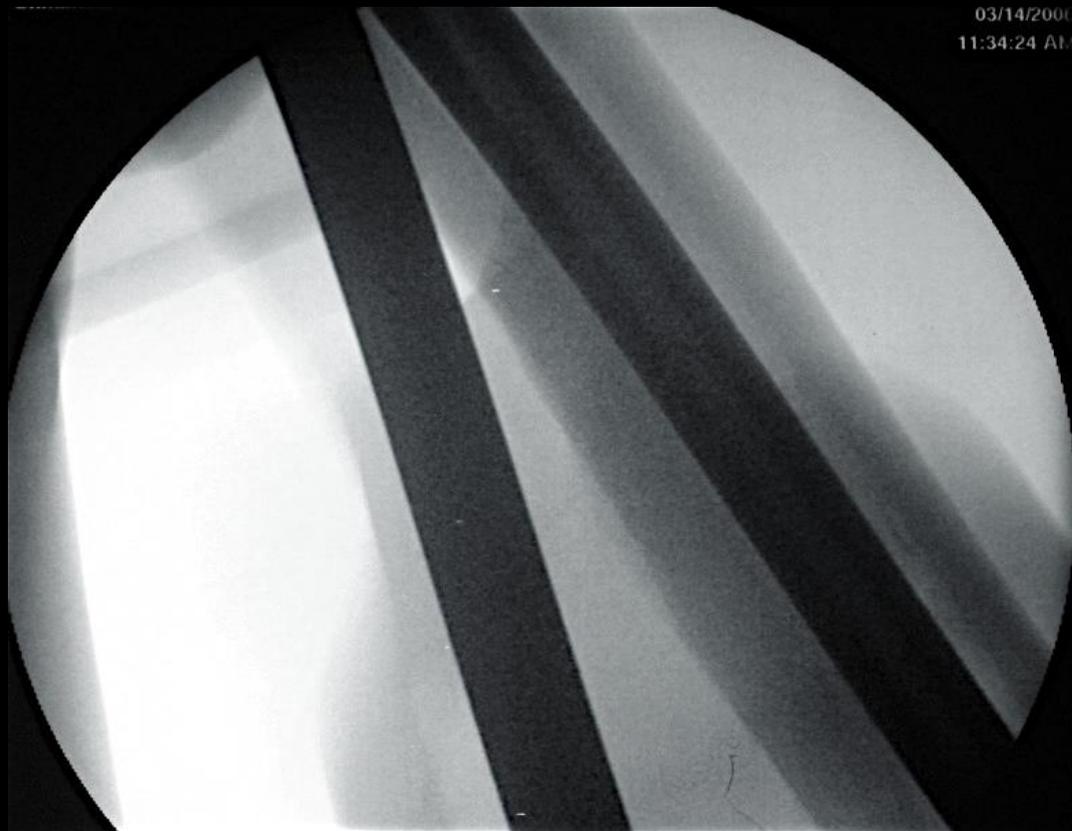


# Lateral Decubitus Position



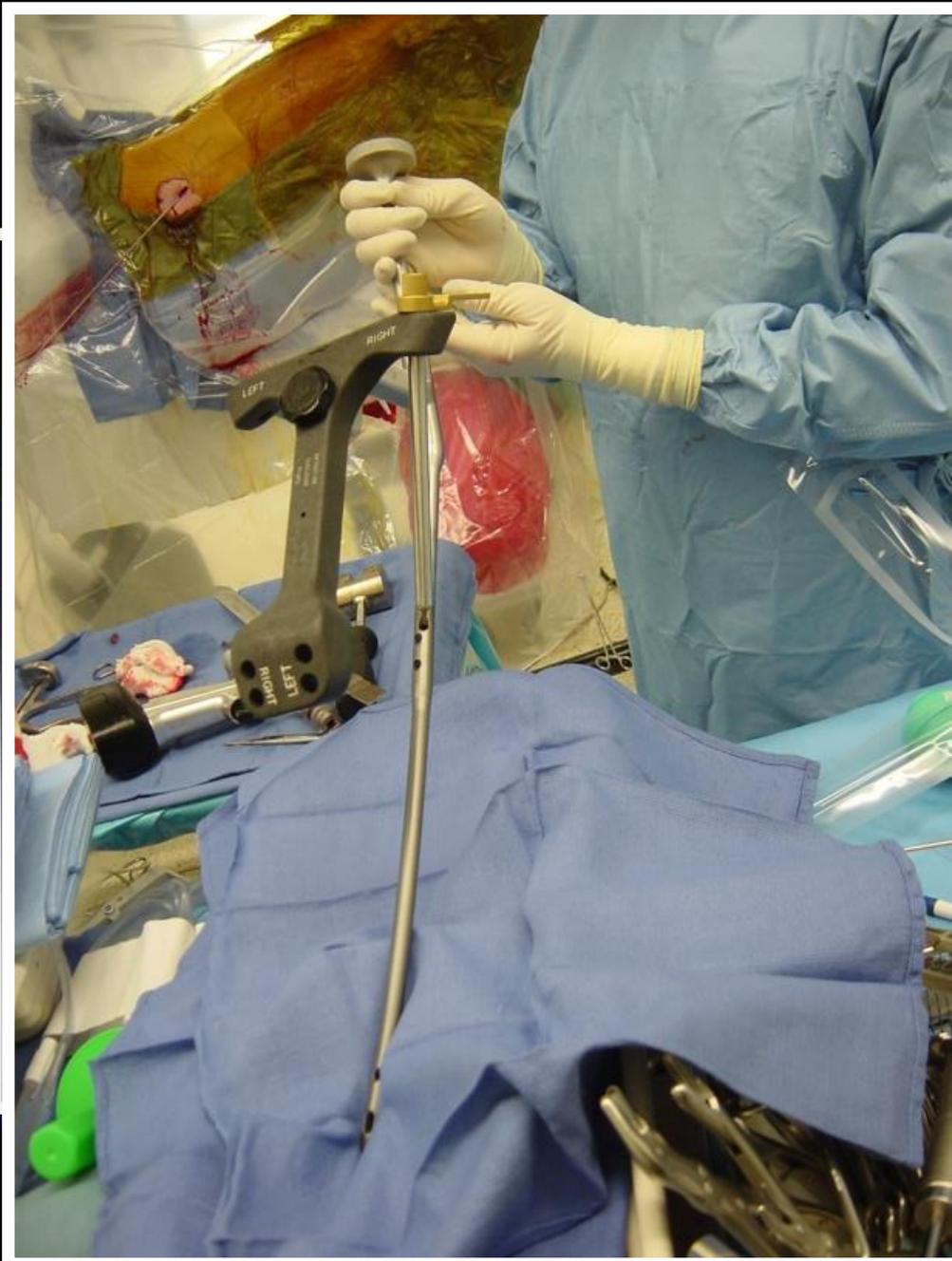
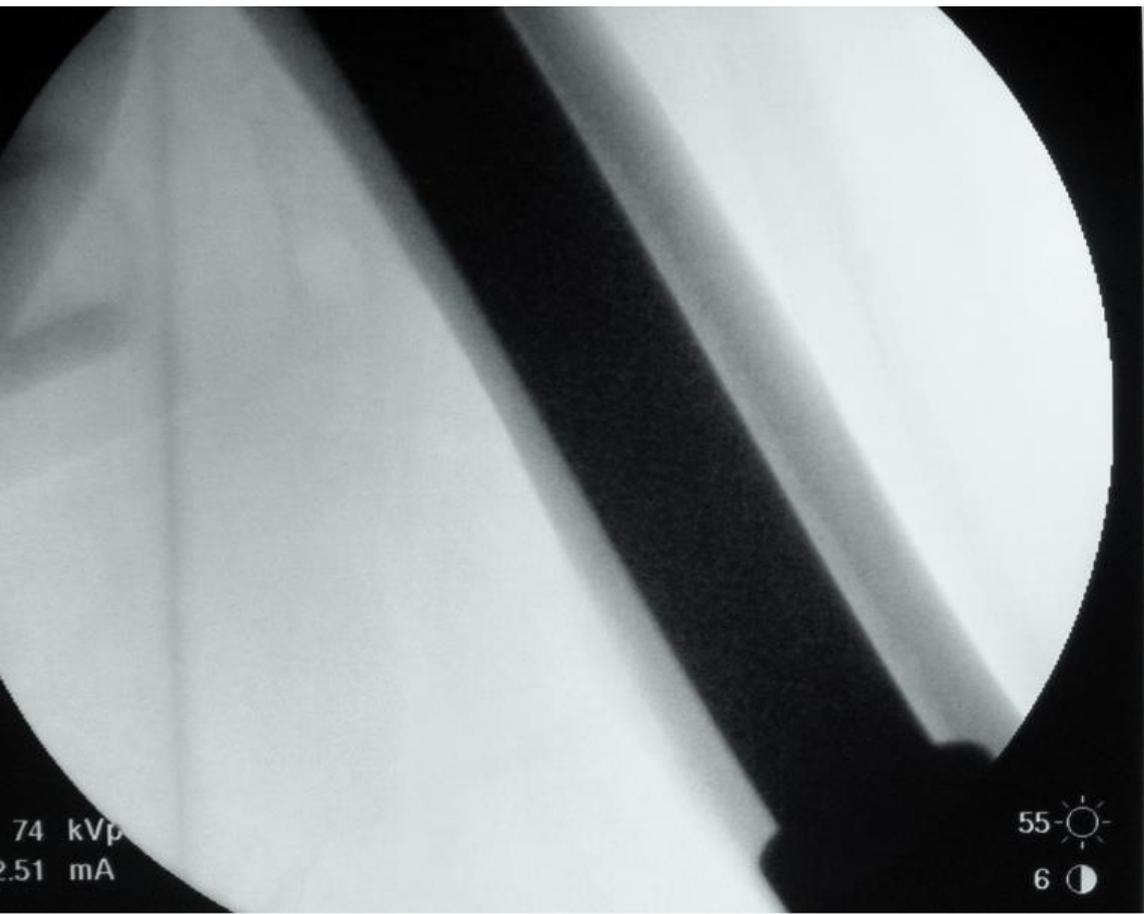
# Steps for Troch Entry

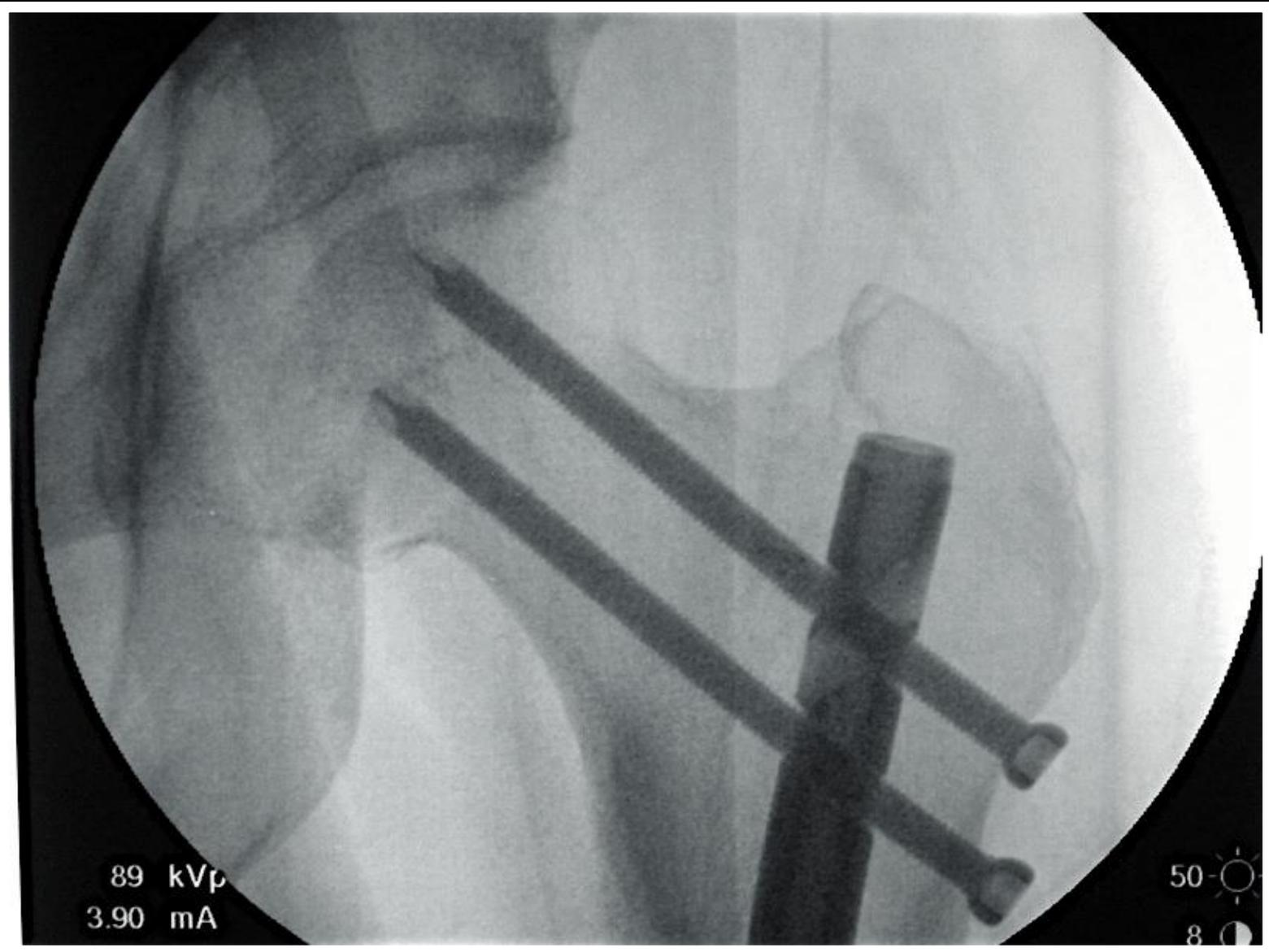




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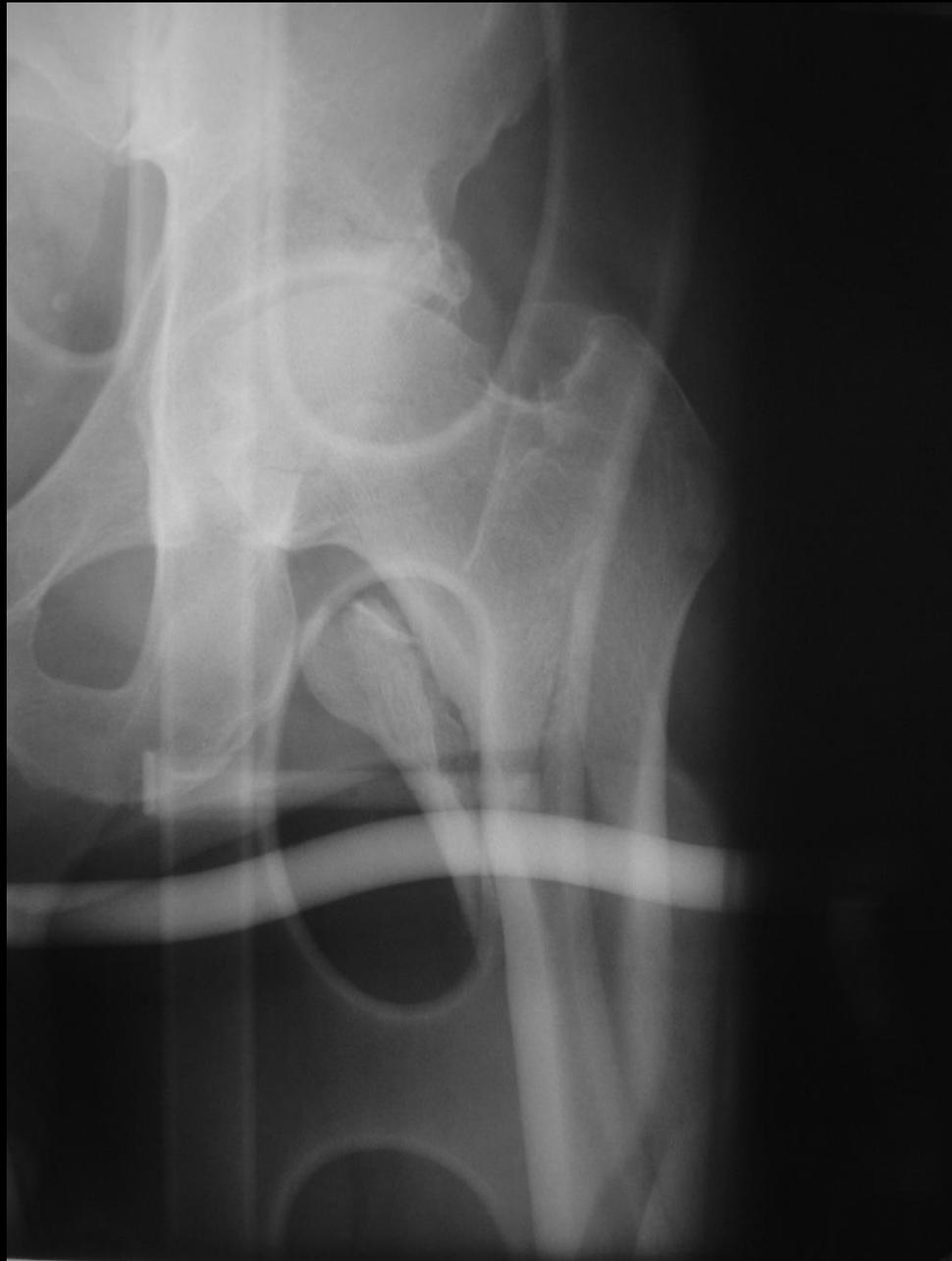
89 kVp  
3.90 mA

50  
8





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paediatric Trauma Institute

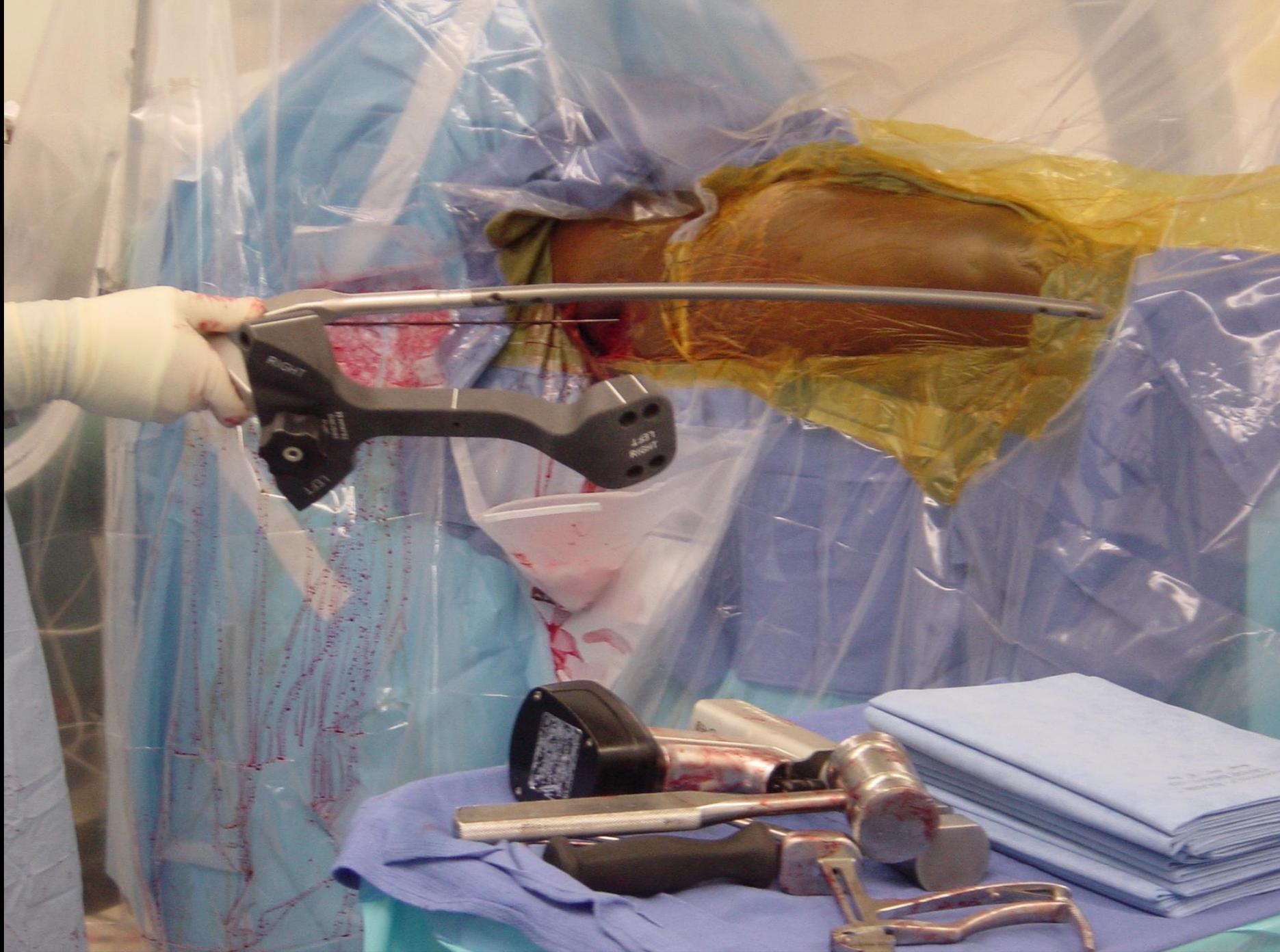
UCSF + SAN FRANCISCO GENERAL HOSPITAL

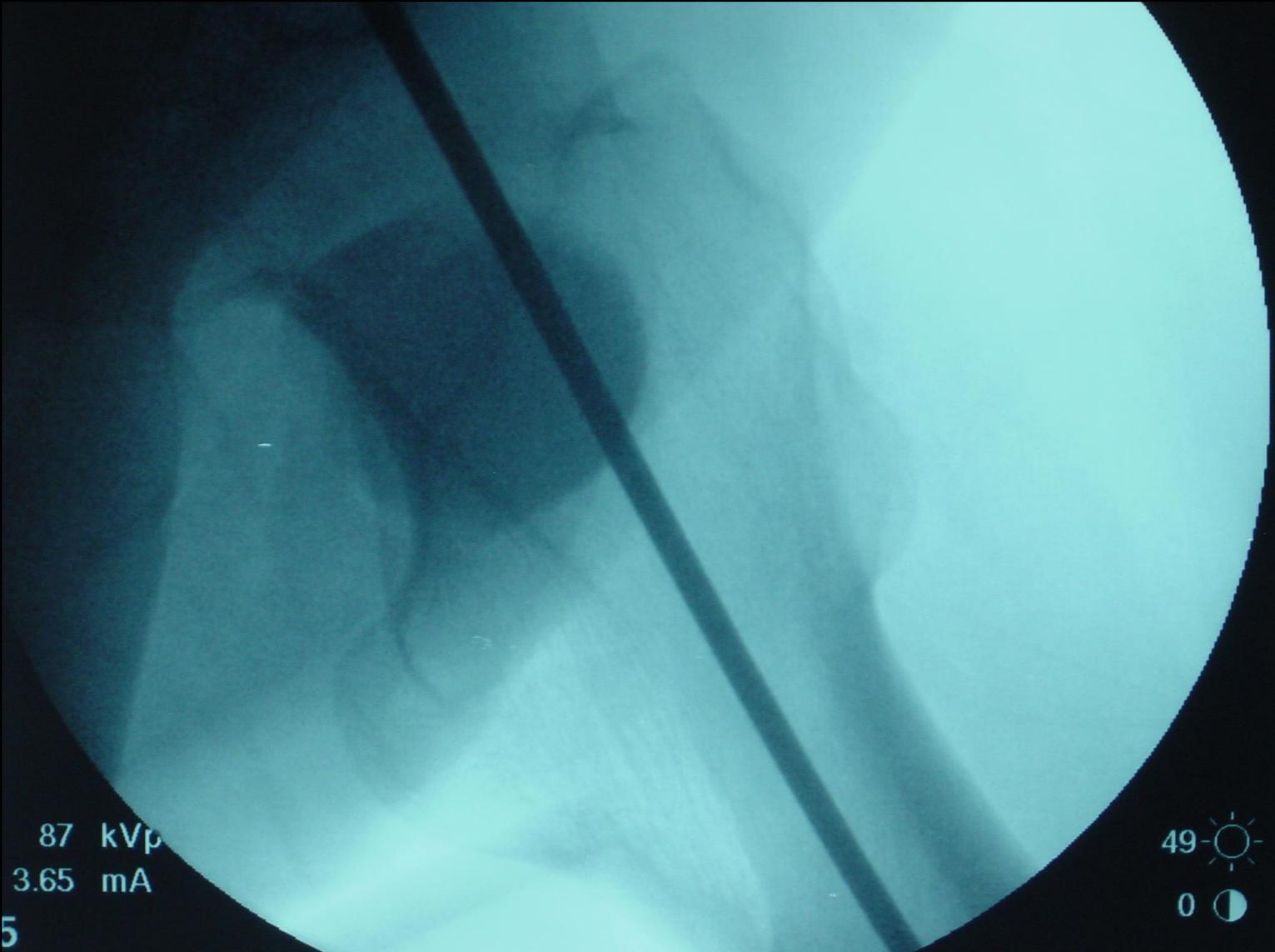






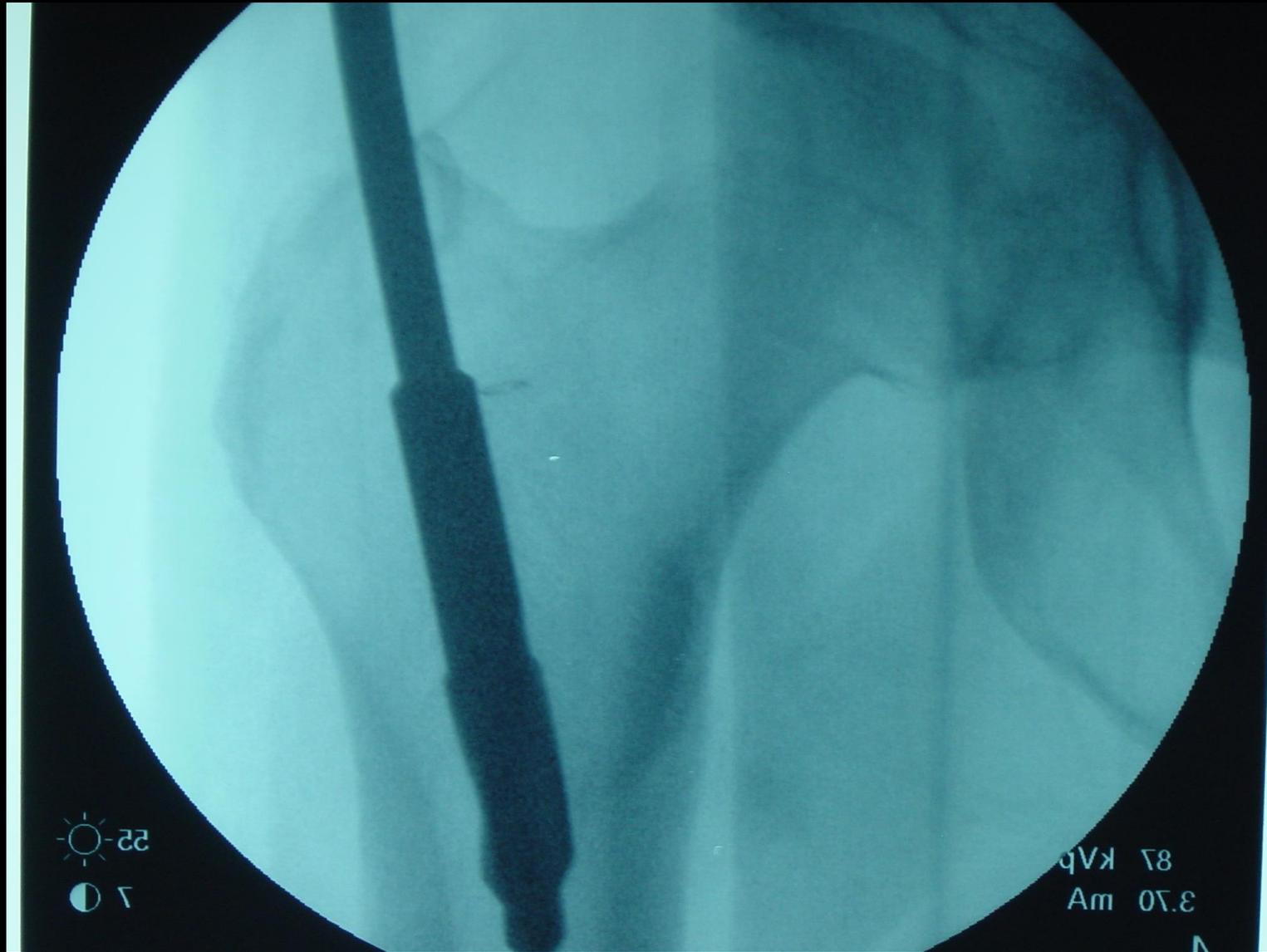




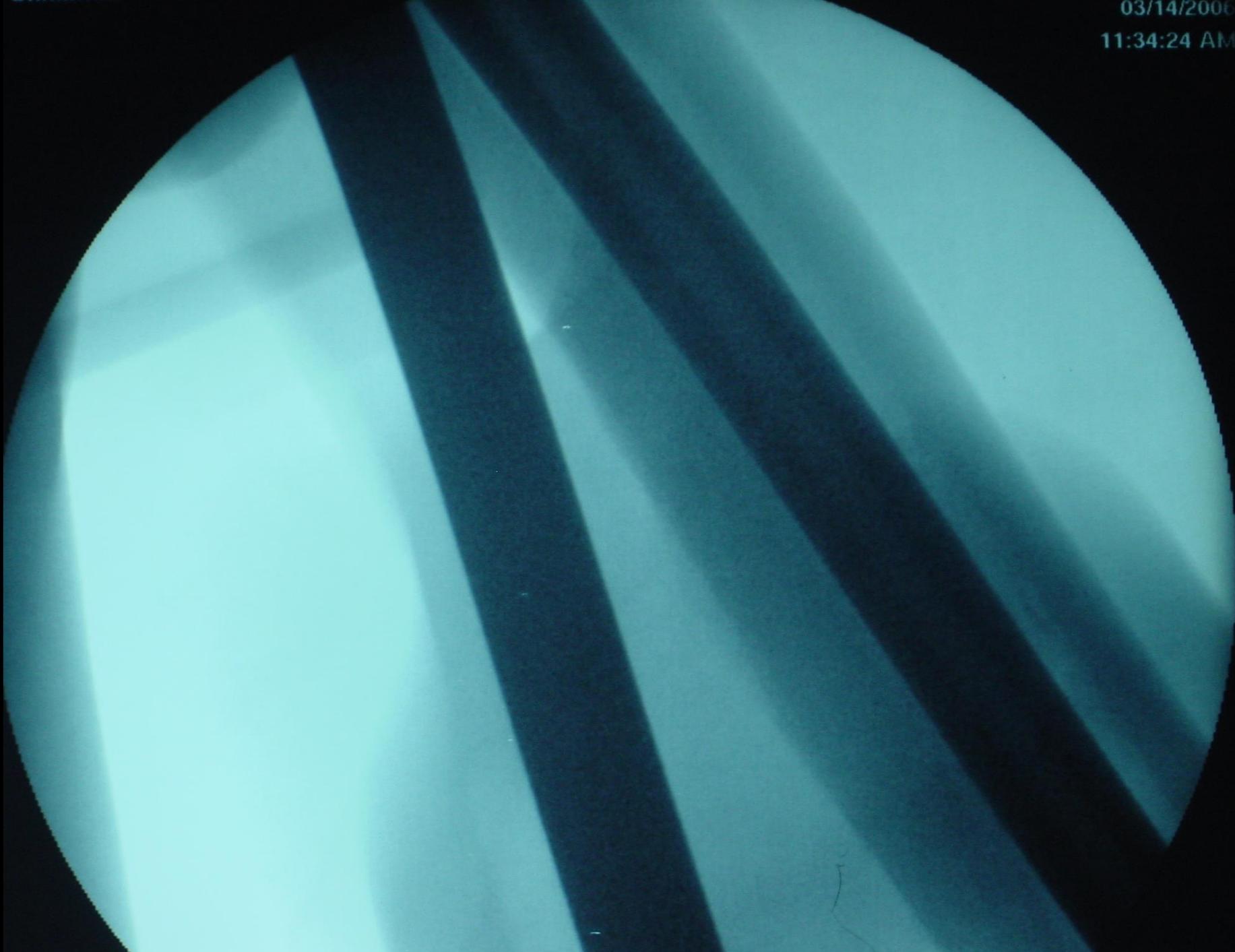


87 kVp  
3.65 mA  
5

49   
0 

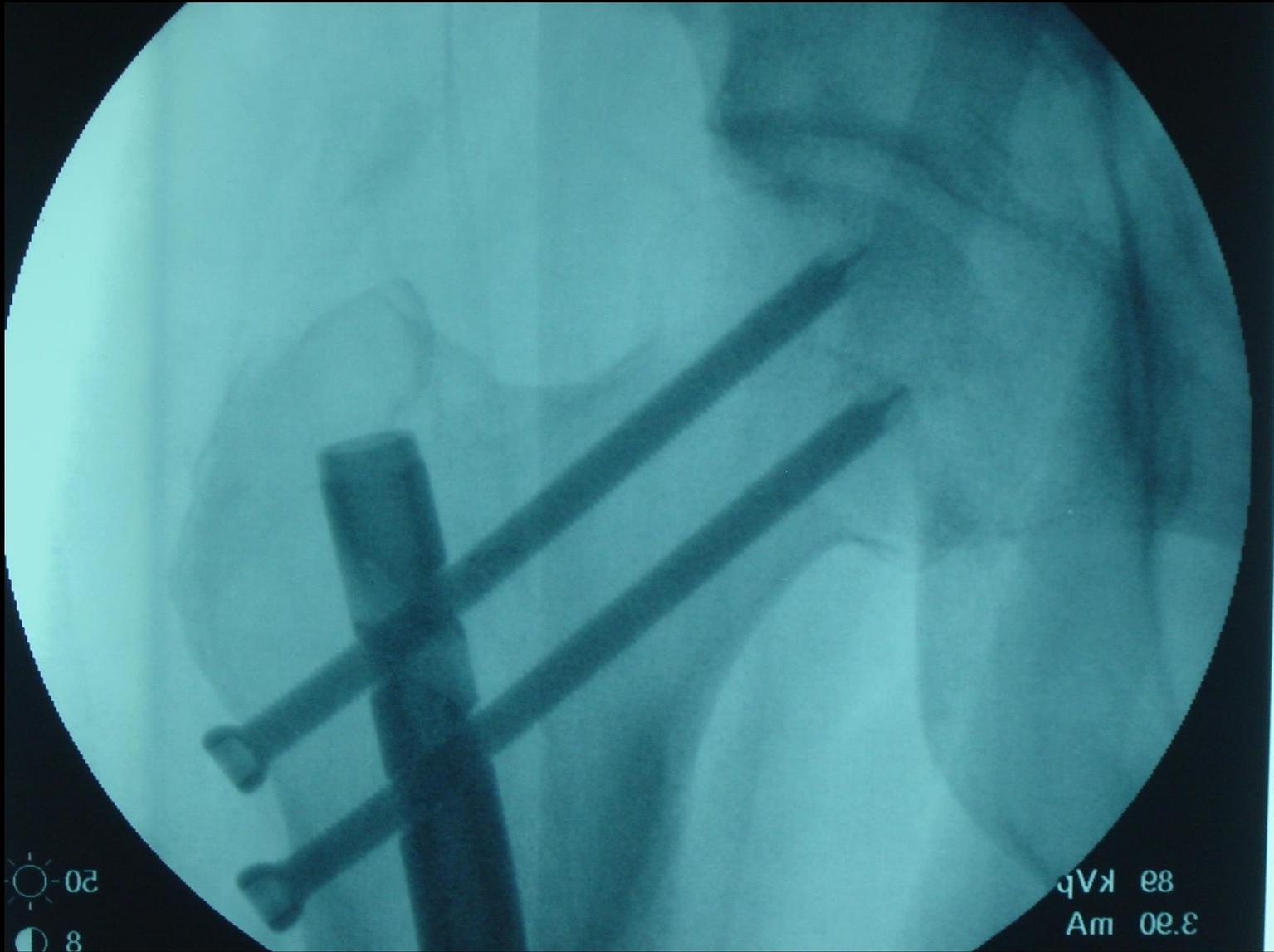


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74 kVp  
51 mA

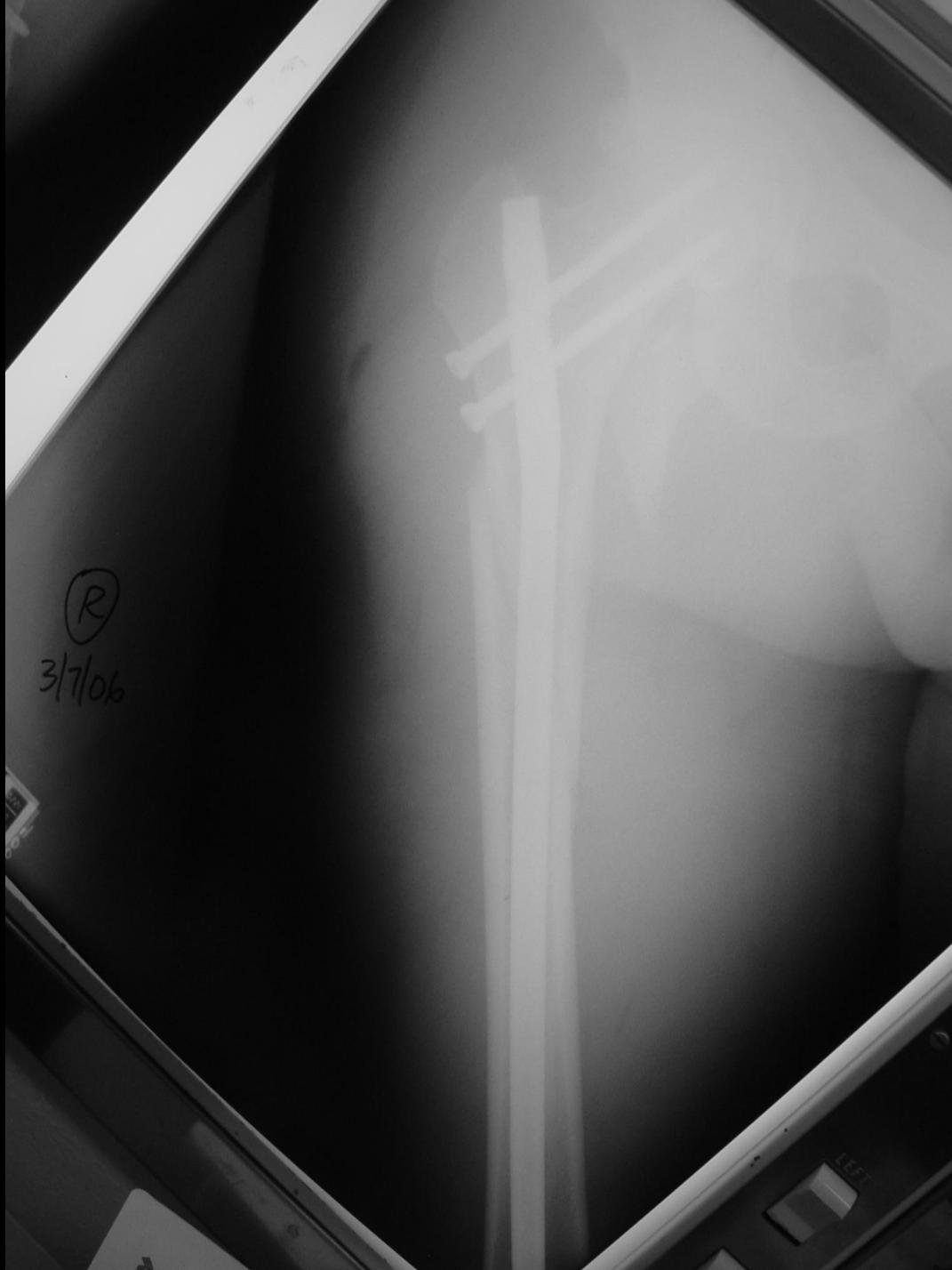
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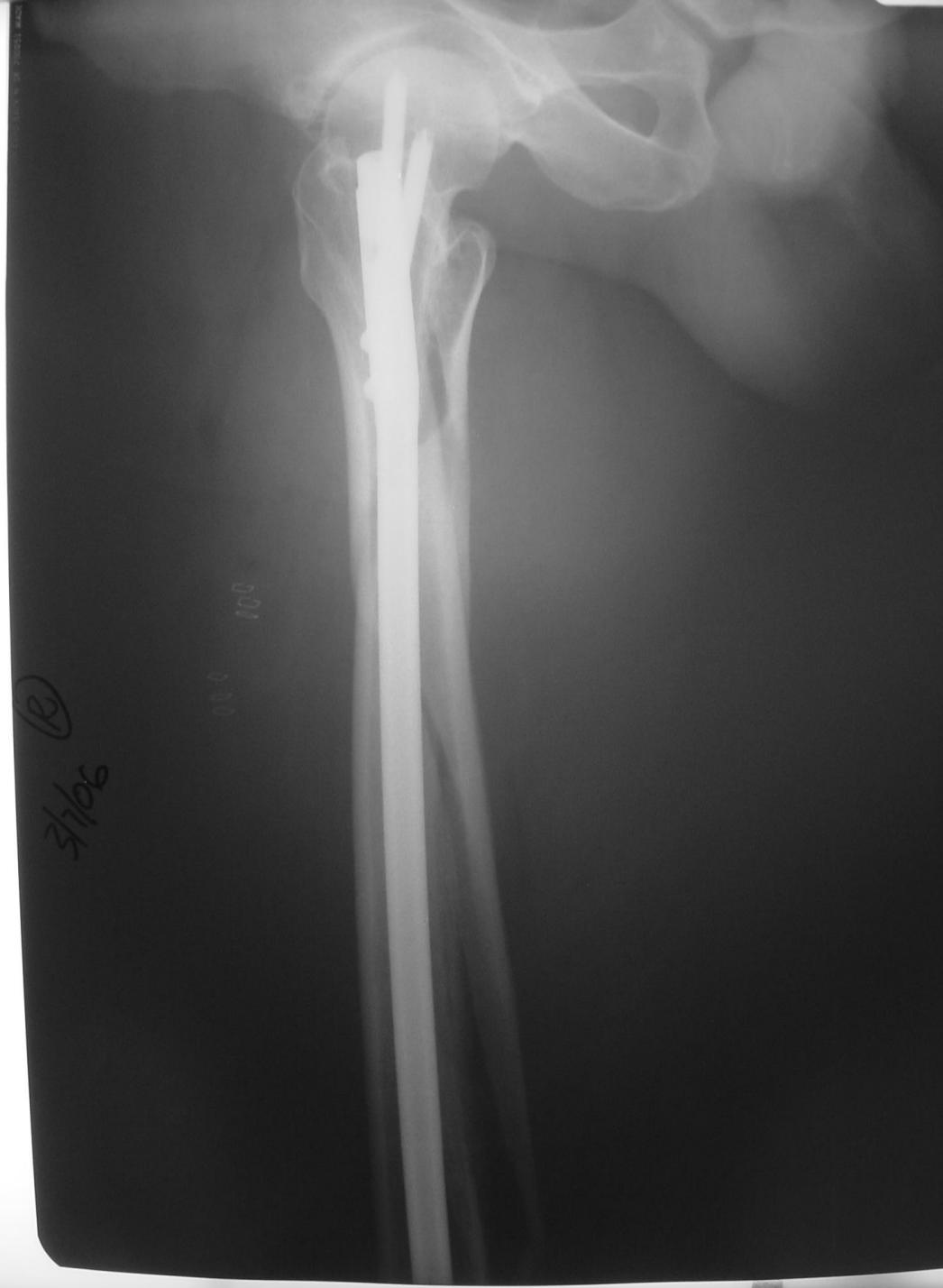




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DUPONT ULTRA-VISION™ DETAB PH 400040 MADE IN USA

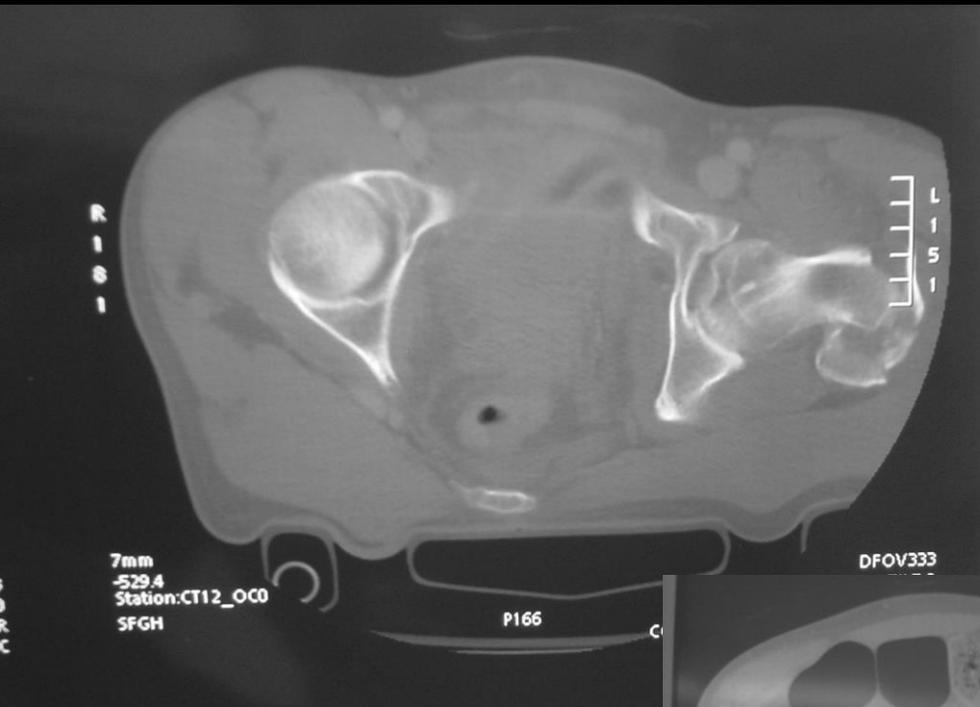
DUPONT ULTRA-VISION™ DETAB PH 400040 MADE IN USA



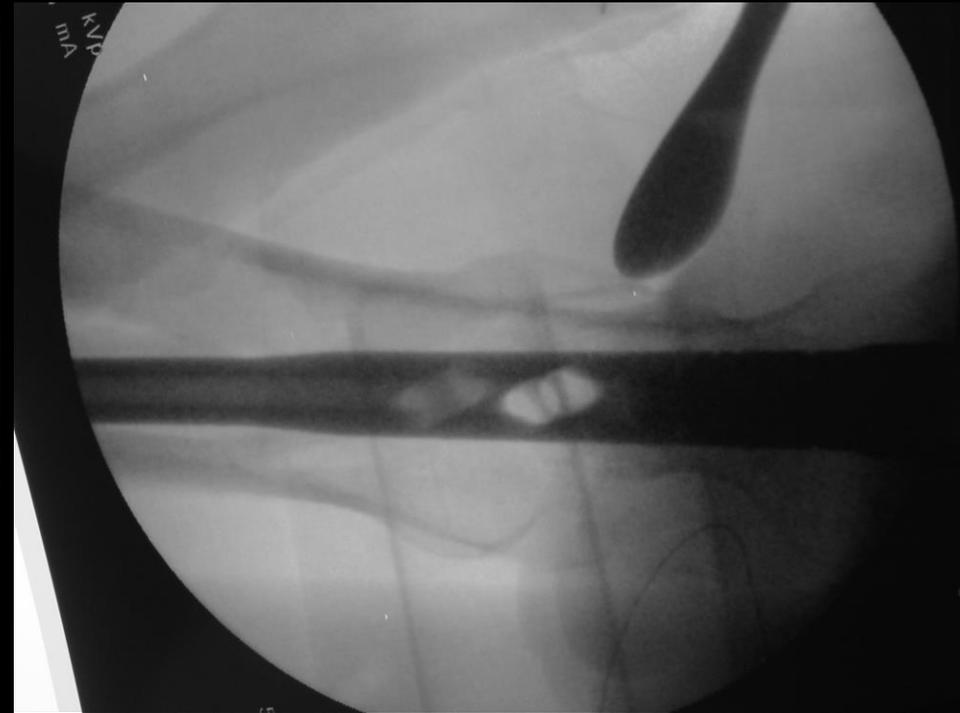
# Short Segment Femur Fracture

## 54 yo male jumper 30ft

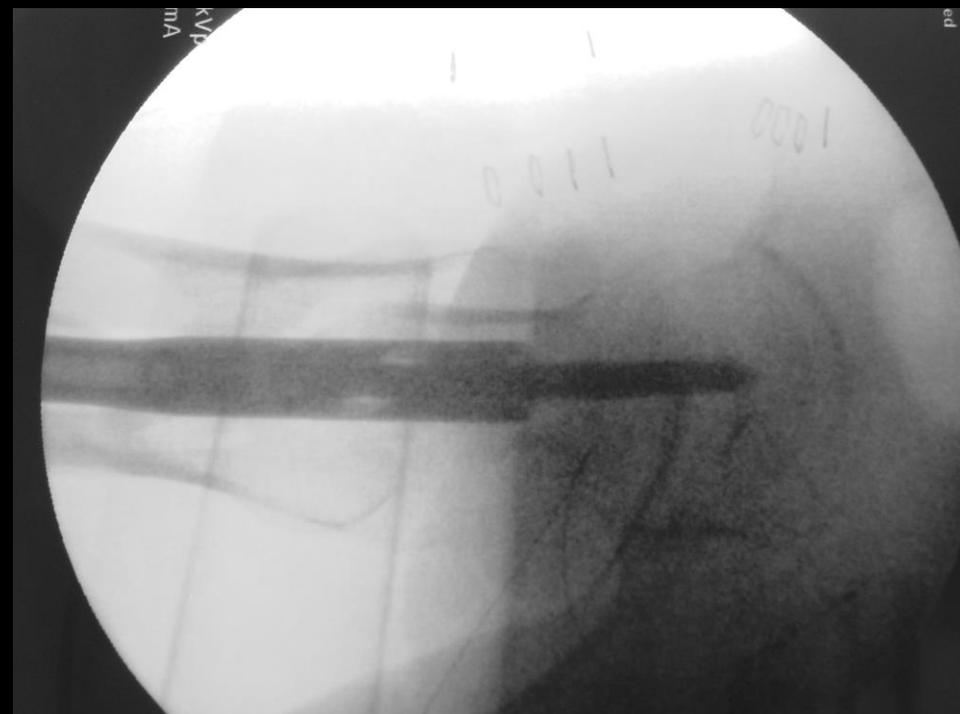


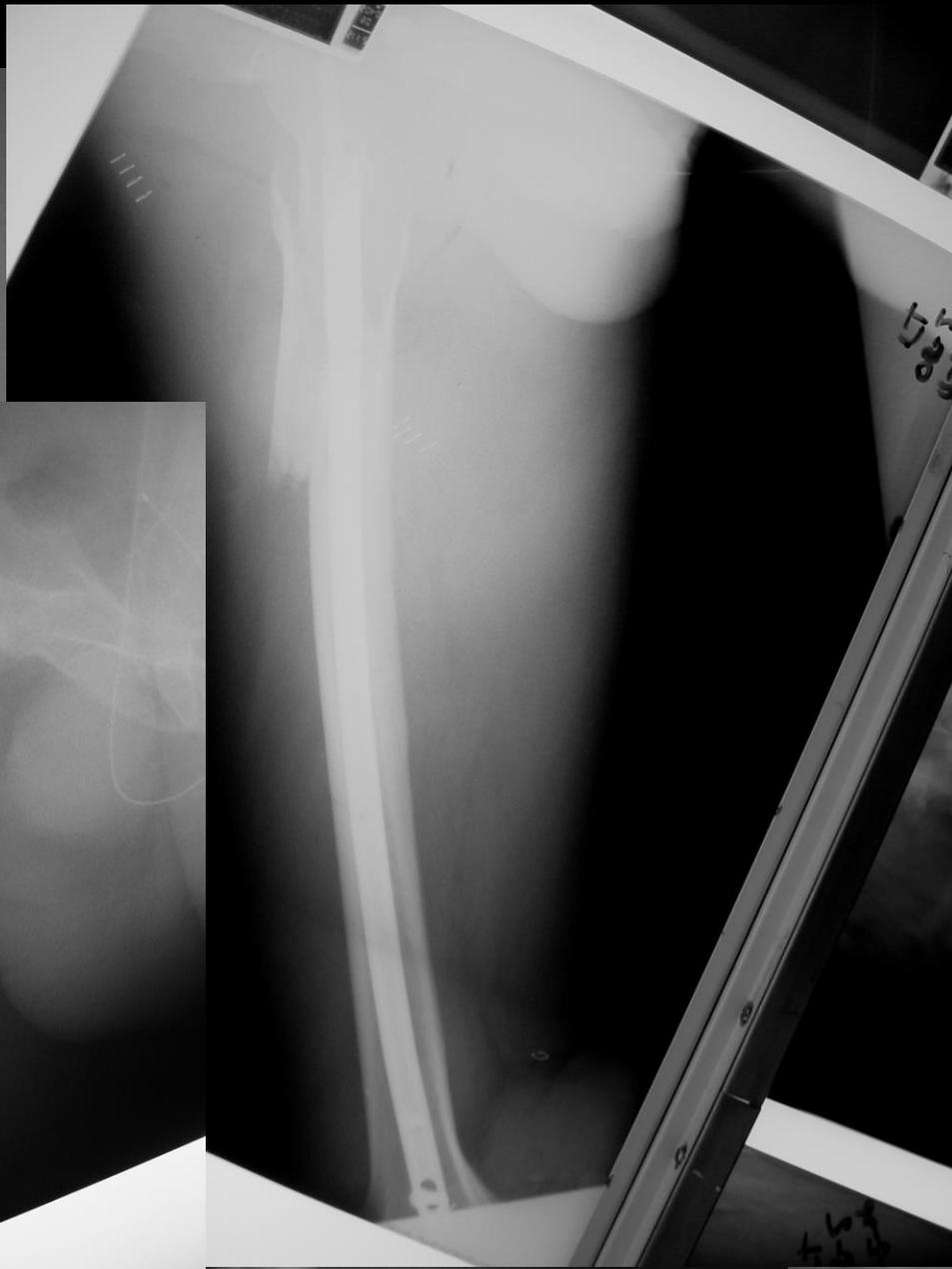


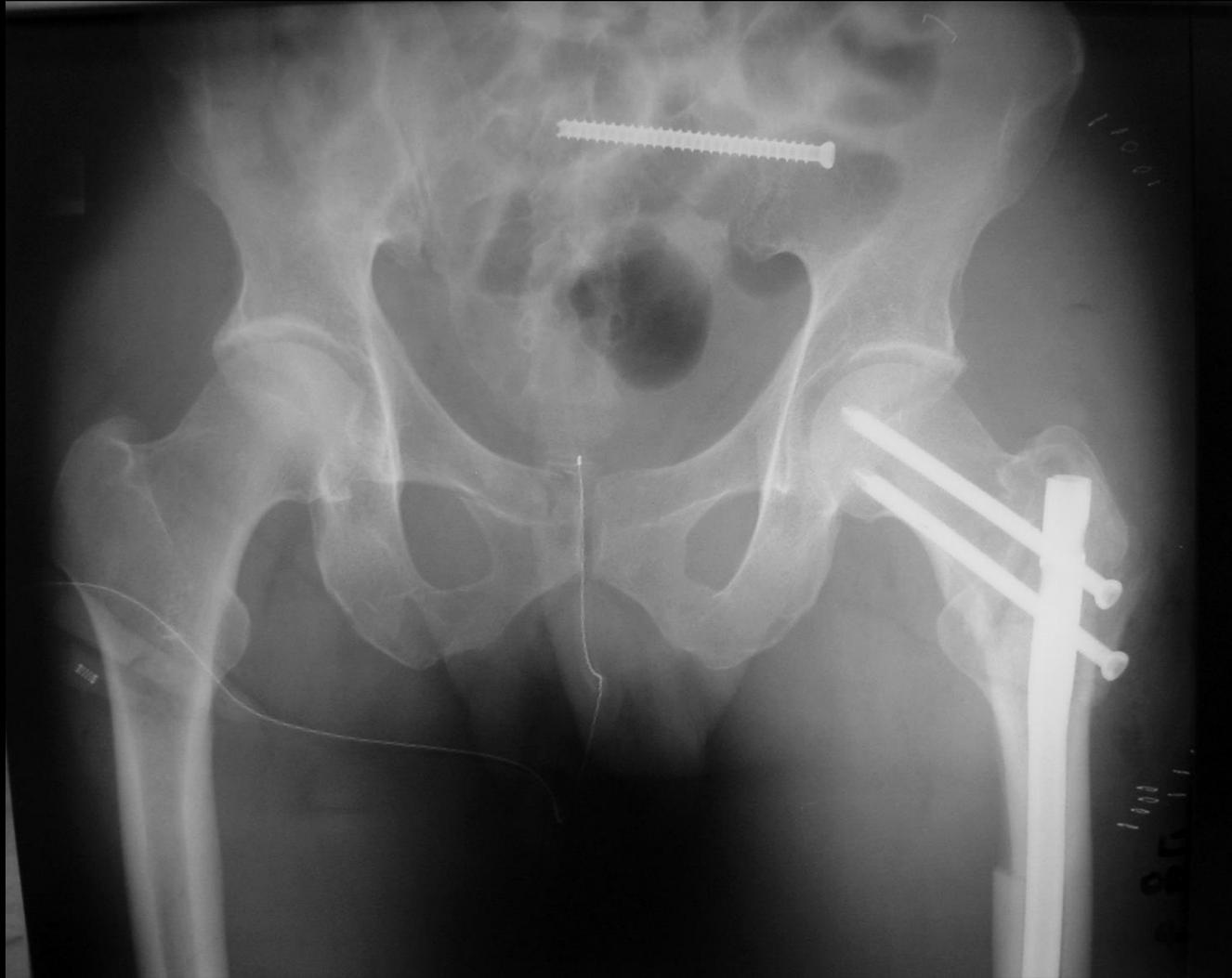
# TEN 38cm x 11 mm



# Two screws into head



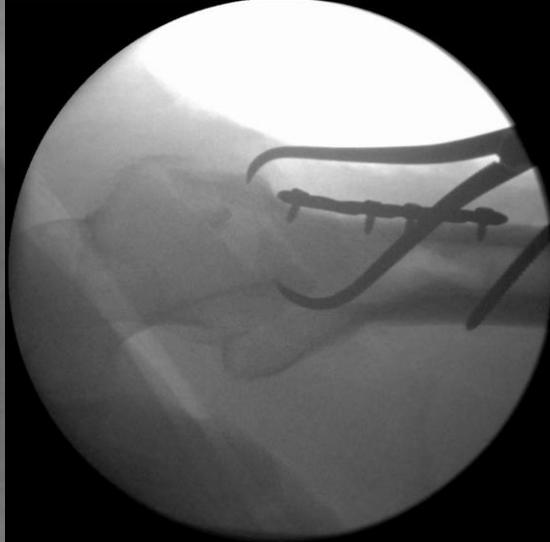
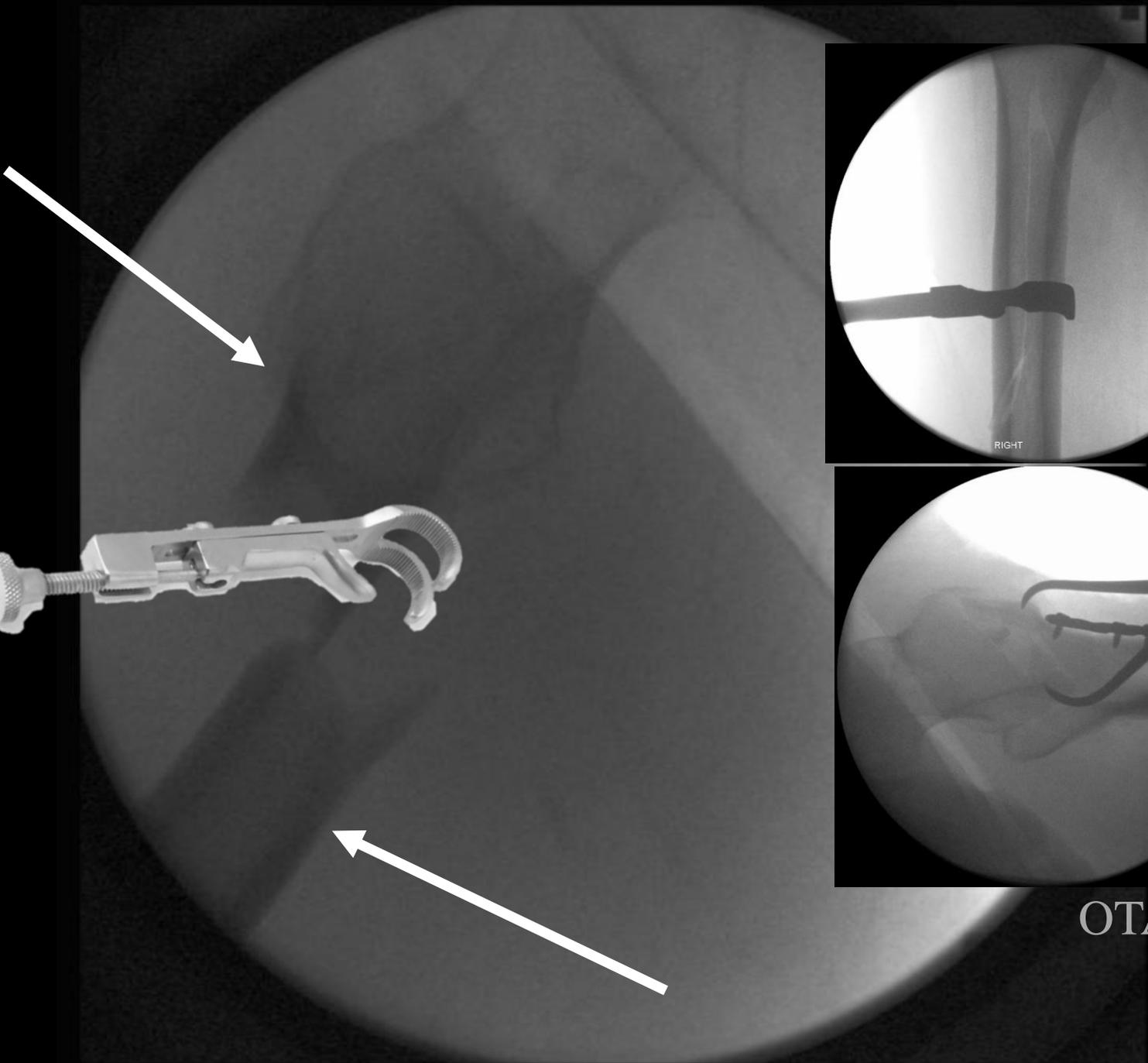






67 year old cyclist

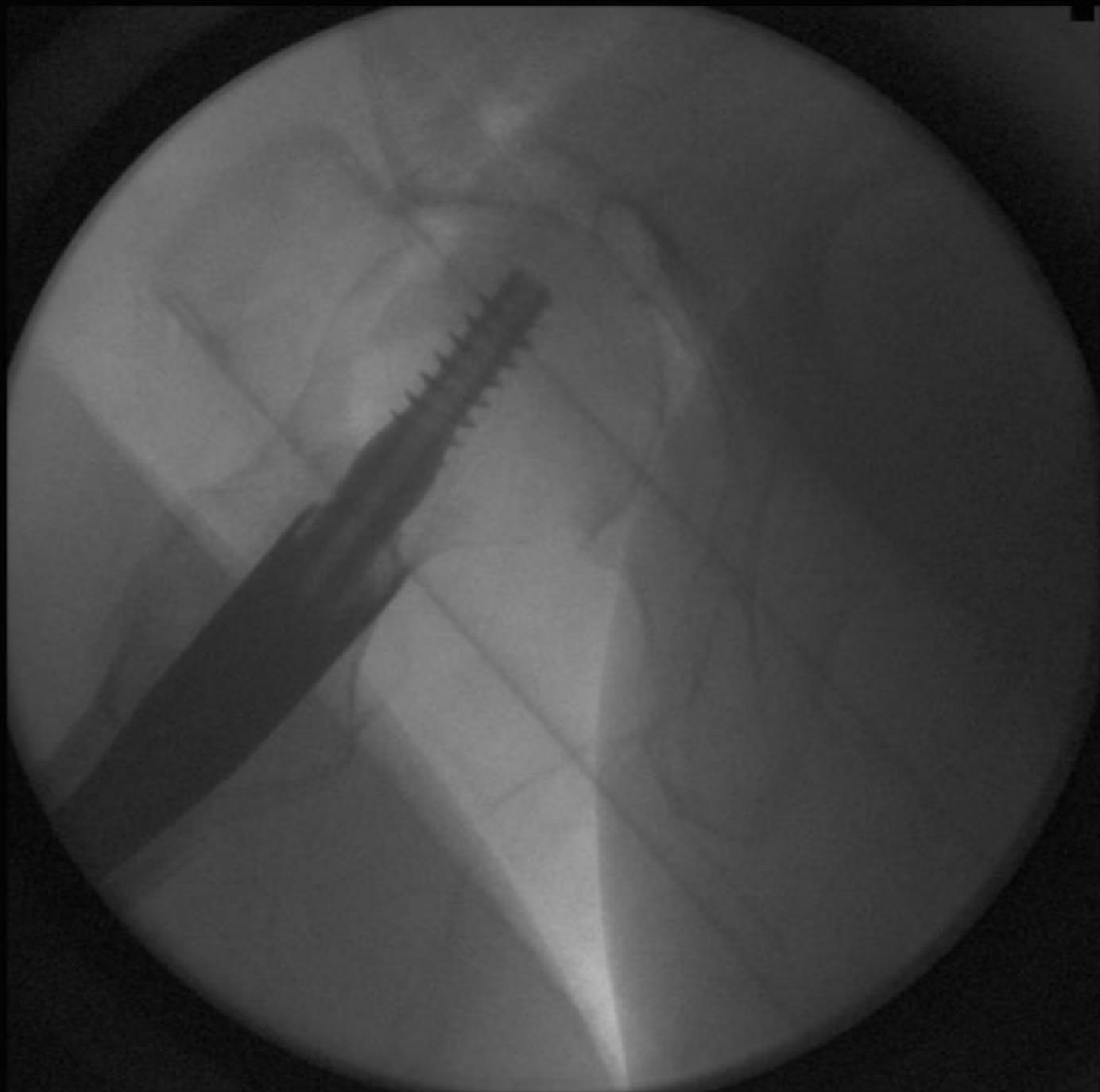




OTA Resident Lecture











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OR #4



Thank You