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Traumaplasty Debates: Lower Extremity Fracture Management in Older Adults- Hip Replacement is Preferable

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Southwest Orthopadic Group, Houston, Texas

1980

2000

3 Scenarios

- THA after a failed conservatively treated acetabular fracture
- THA after a failed operatively treated acetabulum
- THA as the treatment for a acetabular fracture

Geriatric Acetabular Surgery: Letournel's Contraindications Then and Now – Data From the German Pelvic Registry

Pohleman et al, JOT 2019 Feb

Findings

- Letournel's initial 129 pts 30 years ago – no patients over 60 yo
- Registry 50% > than 60 yo

Peri-prosthetic Epidemic??

- Increasing incidence
  - Prevalence arthroplasty
  - "Graying of America"
  - Increased lifespan
  - #1 rising diagnosis = peri-prosthetic femur fracture (OTA, 2003)

Tannast et al 2012

- 50% of THA occur in 1st 1.5 years
- 79% THA at 20 years (86% to 52%)
- Nomogram? Location of injury?

Weber JBJS 1998

- 66 THA s/p orif of the acetabulum with post traumatic arthrosis
- 10 year survival 78% overall, 87% acetabulum and 84% femoral many (most femoral and acetabular components cemented)
- ? Younger patients greater aseptic loosening

Mears JBJS 2002

- Primary THA after reduction of acetabular fracture – 79% excellent or good results

Mears JBJS 2002

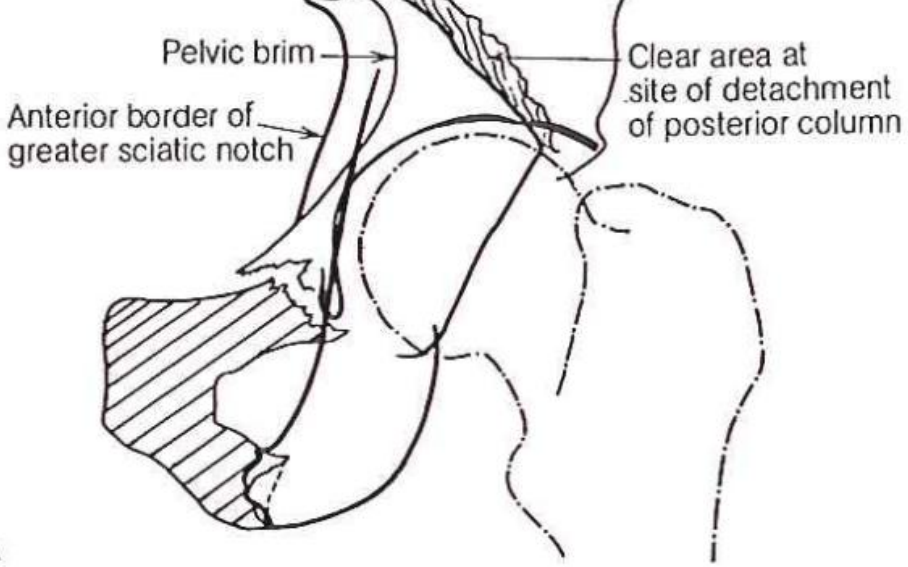
- Indications – osteopenia, intra-articular comminution, full-thickness abrasive loss of cartilage, impaction of the femoral head, impaction of the acetabulum involving >40% of the joint including the weight-bearing region

Zha G-C et al 2013

- Comminuted posterior wall fractures (more than 3 pieces) and femoral head injures had the worst results

Anglen 2003 JOT

- 2/3 of the failures in patients with acetabular fractures >60yo had the medial dome impaction “gull sign”



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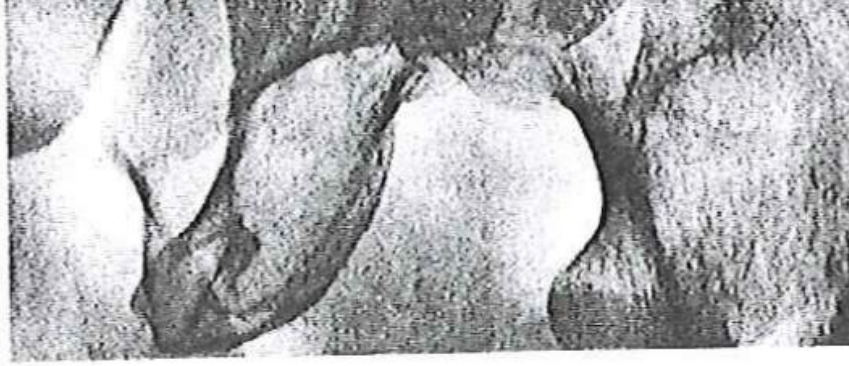

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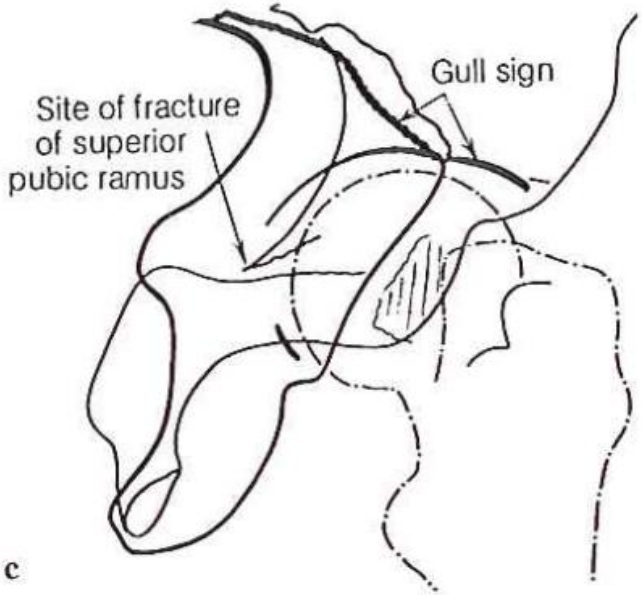


c

Fig. 6.9A–C. Extended fracture of the posterior column. **A** Antero-posterior radiograph, **a** diagram, **B** obturator oblique radiograph, **C** iliac-oblique radiograph, **c** diagram. In this case there is an associated fracture of the superior pubic ramus which could cause difficulty in interpretation; with the fracture of the inferior ramus, an essential component of the posterior column fracture, it resembles a vertical fracture through the obturator ring

Beaule et al JOT 2004

- 10 cases with >50% of acetabular roof involvement (all with anterior wall/column and two with posterior hemitransverse)

Beaule et al JOT 2004

- Anterior approach with fixation of the acetabular fracture followed by THA
- Minimum 2 year follow up - 1 case of anterior dislocation treated by a spica cast and 1 case of Brooker II HO

Tidermark et al JOT 2003

- 10 cases with osteoporosis, >55 yo, >1 cm in weightbearing dome and or protrusion >1 cm excluding both columns

Tidermark et al JOT 2003

- "No attempts were made to reduce the fracture fragments… four cases stability was enhanced with separate 3.5mm screws"
- Antiprotrusion Cage with 1 dislocation

JBJS Sept 2003

Internal Fixation Compared with Arthroplasty for Displaced Fractures of the Femoral Neck

- Meta-analysis of 14 randomized trials, age>65
- Trend towards increased mortality with arthroplasty (not statistically sign.)
- Arthroplasty reduced risk of revision by 77%
- No difference in pain and function
- Decreased risk of infection with IF
- Decreased blood loss and OR time with IF

JBJS 2003

- For every 100 patients treated with arthroplasty instead of IF:
  - 17 revisions avoided
  - 1 hip dislocation
  - 4 additional wound infections
  - Mortality risk reduction is unclear

ArthroplastyVersus Open Reduction Internal Fixation for Posterior Wall Aetabular Fractures in Middle-aged Patients

- Templeman et al, Feb JOT 2019

Methods

- 45-65 yo posterior wall
- Matched controls 2:1 32 ORIF vs 16 THA
- Marginal impaction, >3 fragments, osteoarthritis (narrowing, cysts, osteophytes)

Findings

- Similar Oxford Hip Score 44 vs 40 THA vs ORIF
- ORIF 37% conversion to THA (8%-24%)
- THA 13% revision rate (4x ↑ in loosening of cup over OA)
- Better Kaplan- Meier Survival with THA

Does Total Hip Arthroplasty Reduce the Risk of Secondary Surgery Following the Treatment of Displaced Acetabular Fracture in the Elderly Compared to ORIF

Vrahas et al

Findings

- 30% reoperation rate with ORIF
- 14% THA
- SF – 36 – 39 vs 48

Helfet, 1992 JBJS

"Stabilization of Acetabular Fractures in Elderly Patients"

Helfet (cont.)

- 18 patients (> 60 yo) average age 67
- 16/18 complex acetabular fractures
- 13 patients II, 5 patients KL

Helfet (cont.)

- 2 column fractures
- 7 anterior column posterior hemitransverse
- 5 both column
- 4 transverse posterior wall

Helfet (cont.)

- 17/18 follow-up > 2 years
- 1/17 failed – 1/17 poor
- 4/18 gap 3 mm with concentric reduction
- 1 loss of reduction
- 83% success (76% Judet JBJS 1964)

Helfet Unpublished Data

- 45 patients > 50 yo
- 3/45 THA 1°
- 11/45 THA after ORIF

Helfet (cont.)

- 51% complications (foot drop, intraarticular hardware loss of reduction, hernia, wound problems)
- Recommend THA only when femoral head damage (23% THA after ORIF)

Helfet (cont.)

- Recommended against extensive approaches due to HO and infection
- Preop indication - walker

Preop Assessment

- Independent walker
- Medical clearance
- Displacement > 3 mm in the 45° roof or subluxation of femoral head

Preop (cont.)

- Osteopenia
- Mentally able to cooperate with postoperative course

- “Osteopenia of the innominate bone. In our opinion, osteopenia is the most important contra-indication to operative treatment. Unfortunately it is difficult to detect or measure and it is not directly linked to age. Nevertheless, each time we have found an osteopenic bone the operation was extremely troublesome, as the forceps could not hold the bone without ad ding more fragments and the screws never got a good purchase. We have never achieved either a satisfactory reduction or a reliable fixation in these cases, and they are among our failures. “
- Letournel pg 348

Difficulties with ORIF

- Exposure more difficult with potentially increased complications
- Osteopenic bone holding fixation
- Anesthesia related risks

Difficulties with 1° Total hip Arthroplasty

- Requires same open reduction internal fixation
- Prolonged and technically difficult procedure
- Potential good results with ORIF only (i.e. which ones are going to fail?)

1° THA

- Femoral head damage
- Comminution of the quadrilateral plate
- Impaction of dome
- Previous osteoarthritis

86 Year Old Female

Displaced Femoral Neck Fracture

-minimal ambulator


R
DTA

54 YEAR OLD FEMALE

4 YEARS S/P CLOSED REDUCTION / INTERNAL FIXATION OF FEMORAL NECK FRACTURE


L

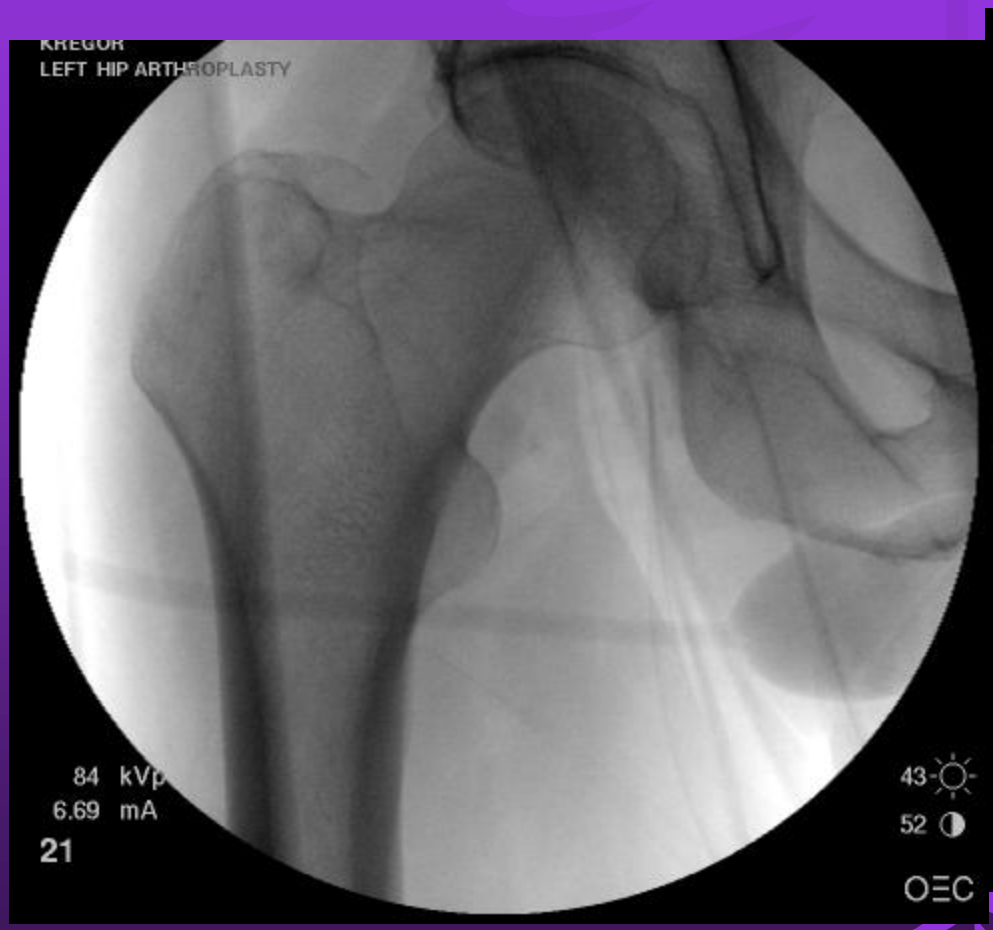

R
R


R
SW
PORT

58 YEAR OLD MALE

5 MOS S/P FIXATION OF FEMORAL NECK FRACTURE

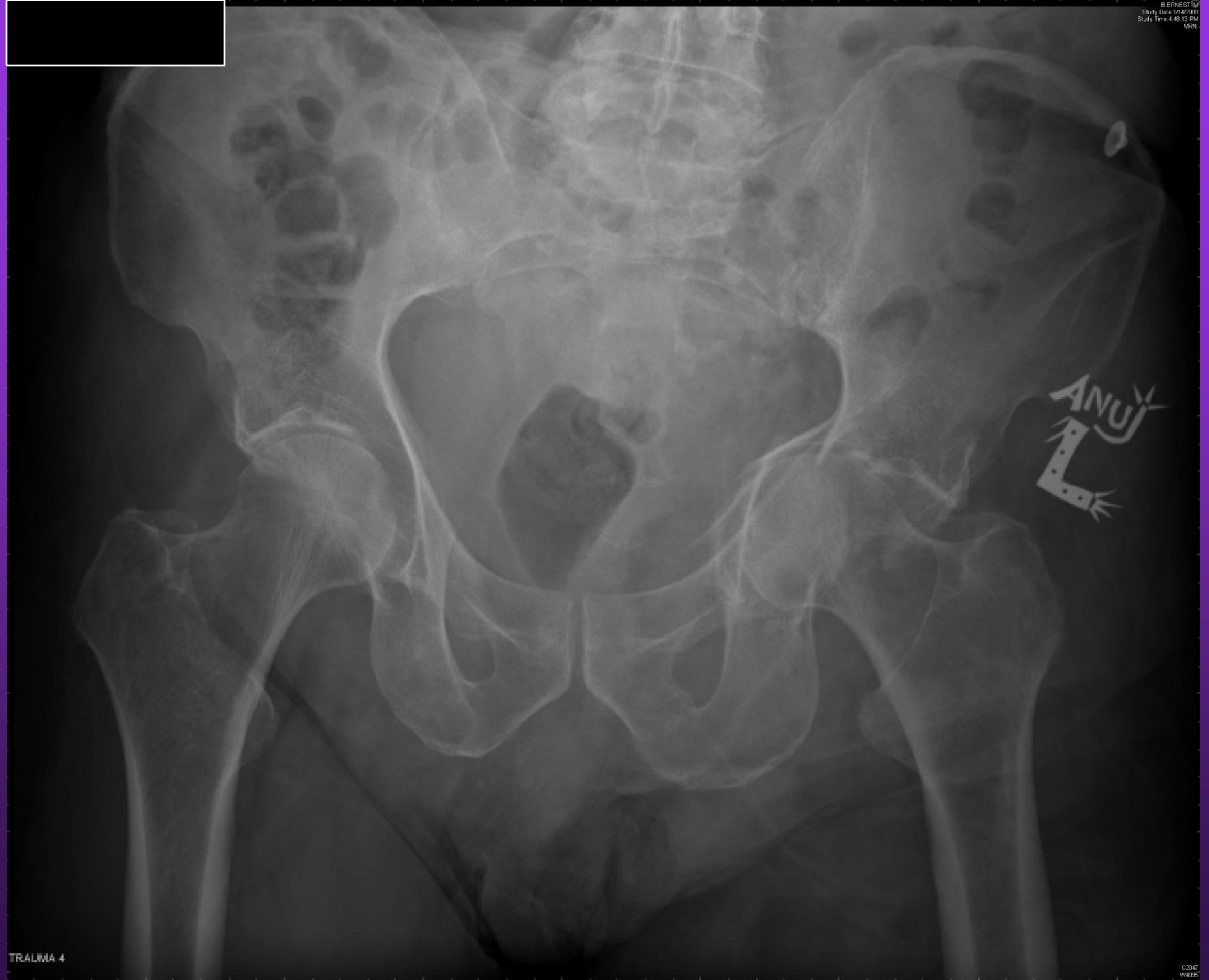

KREGOR
LEFT HIP ARTHROPLASTY
73 kVp
3.08 mA
9
70
32
OEC


KREGOR
LEFT HIP ARTHROPLASTY
84 kVp
6.69 mA
21
43
52
OEC


KREGOR
LEFT HIP ARTHROPLASTY
69 kVp
5.24 mA
29
73
33
OEC

EB

- 72 yo with “T” type acetabulum with central dome impaction
- Poorly reduced with post op subluxation
- Anterior THA using the femoral head as medial bone graft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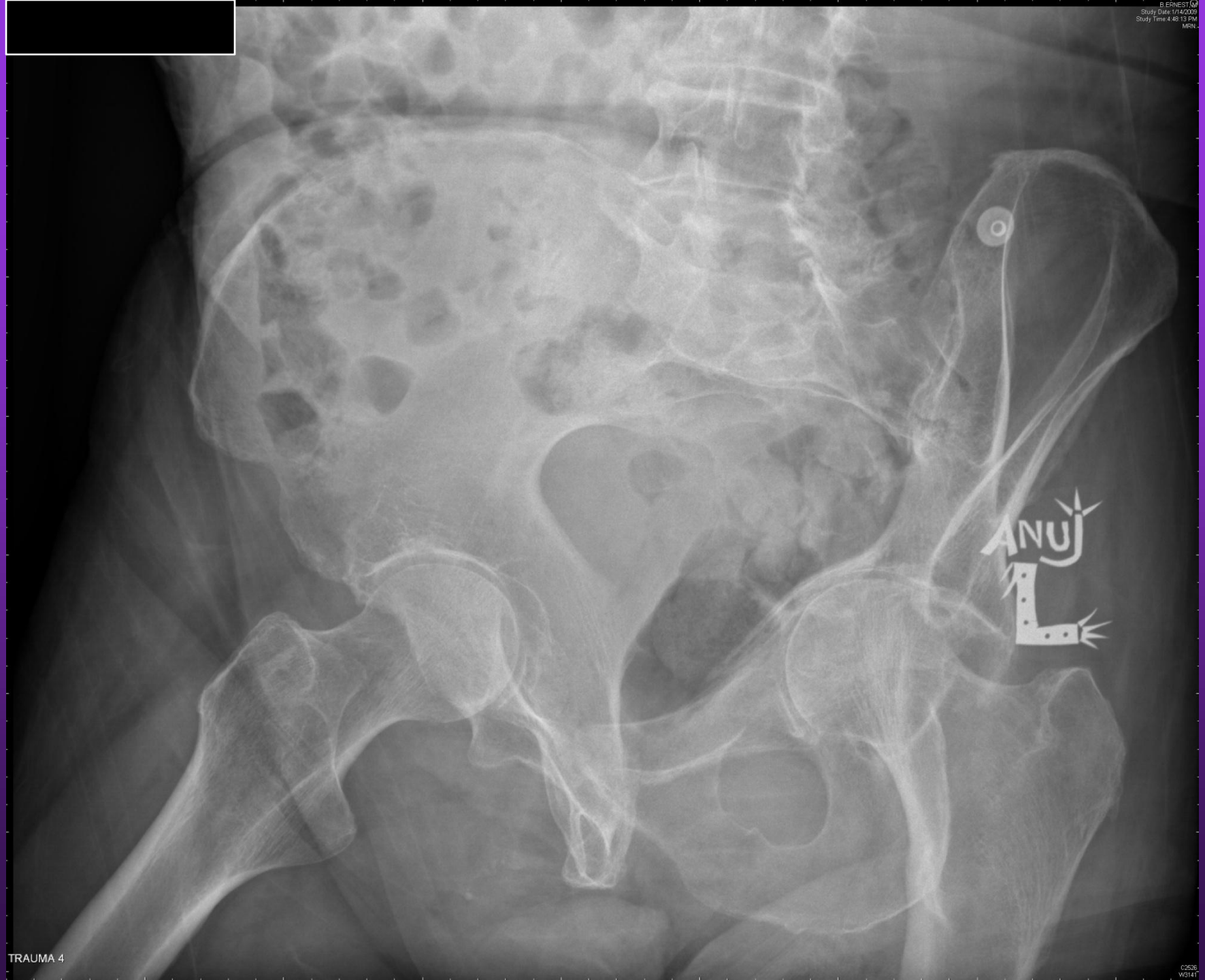
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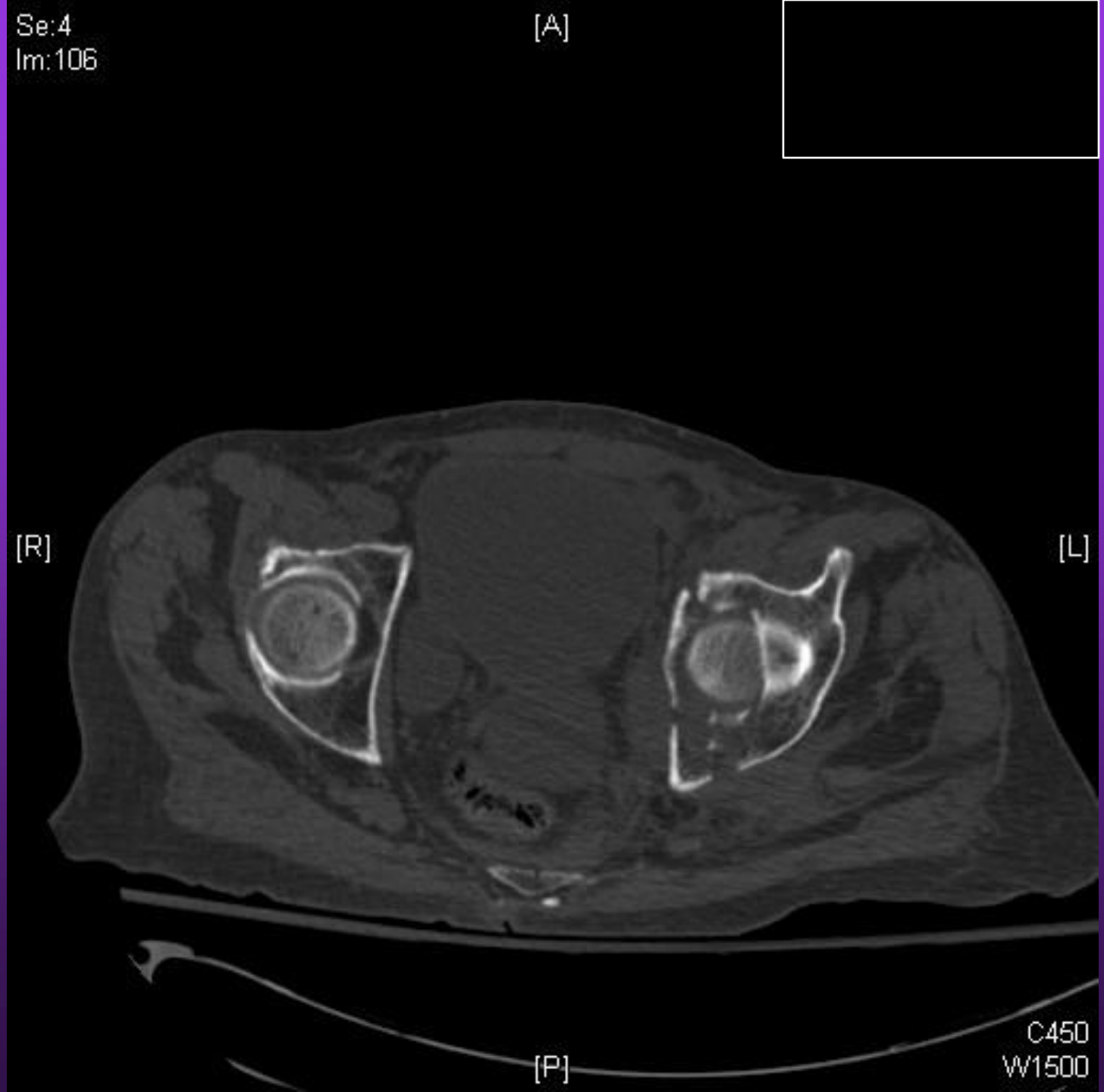
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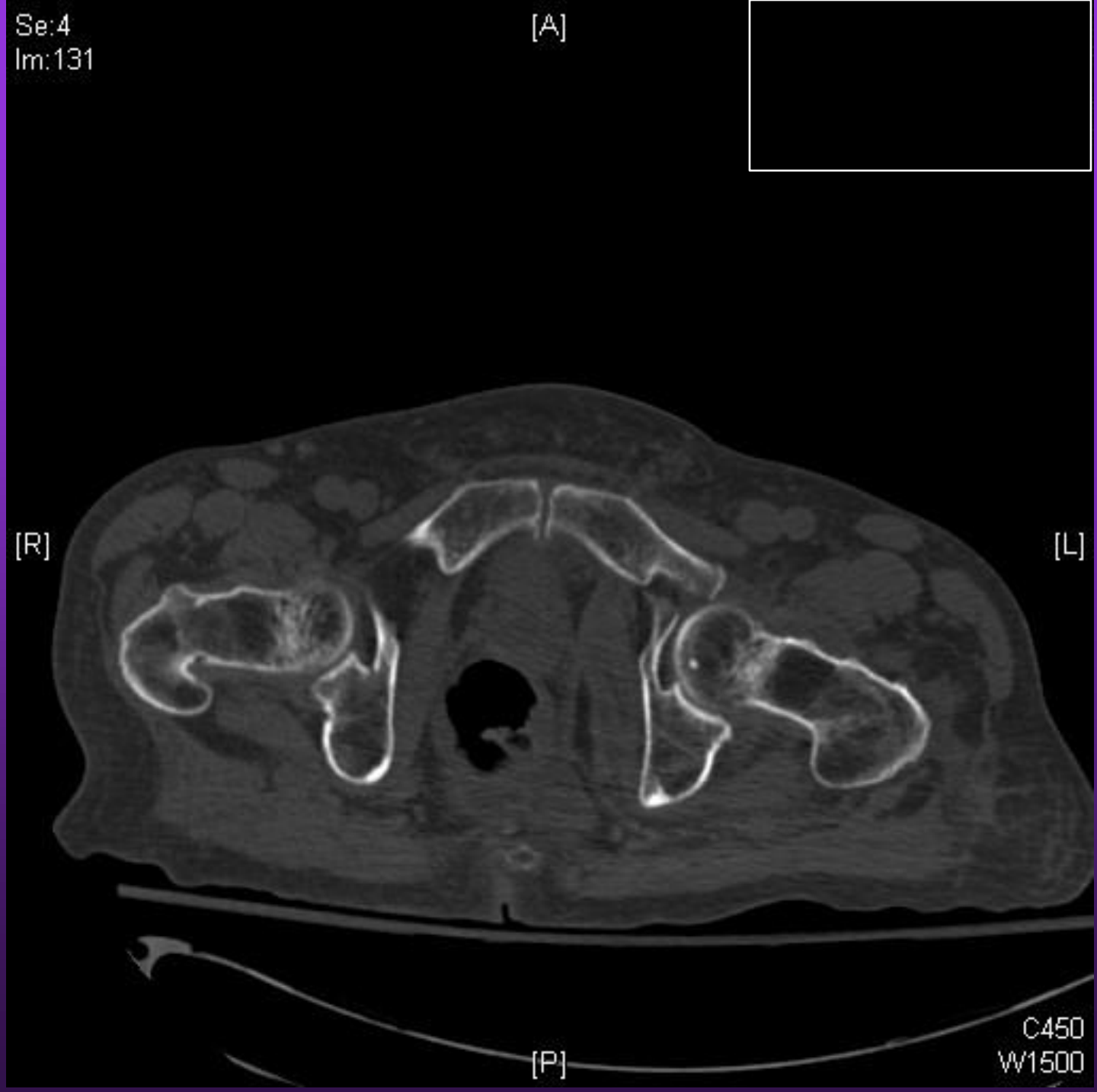
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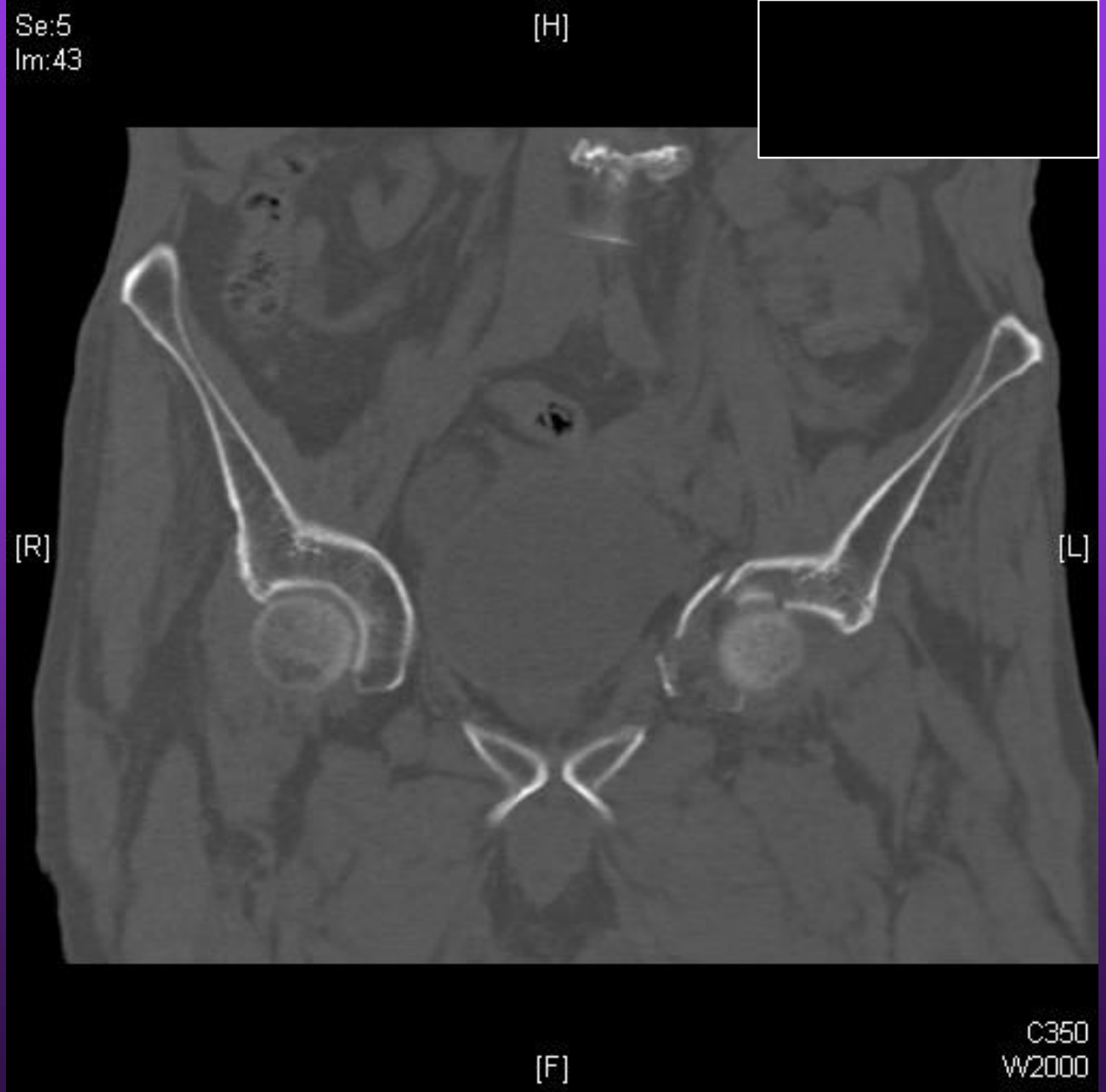
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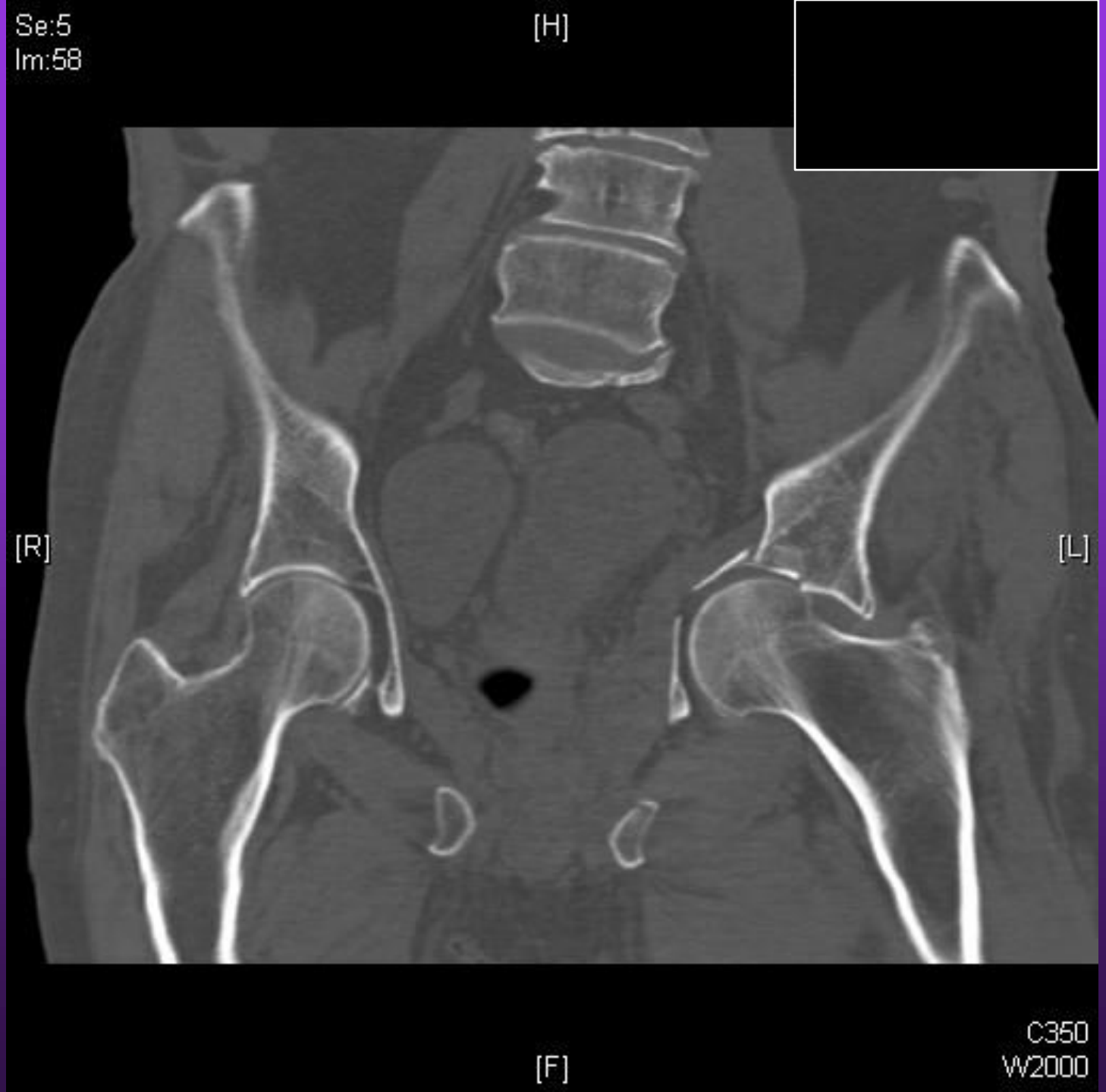
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R
2 2


R
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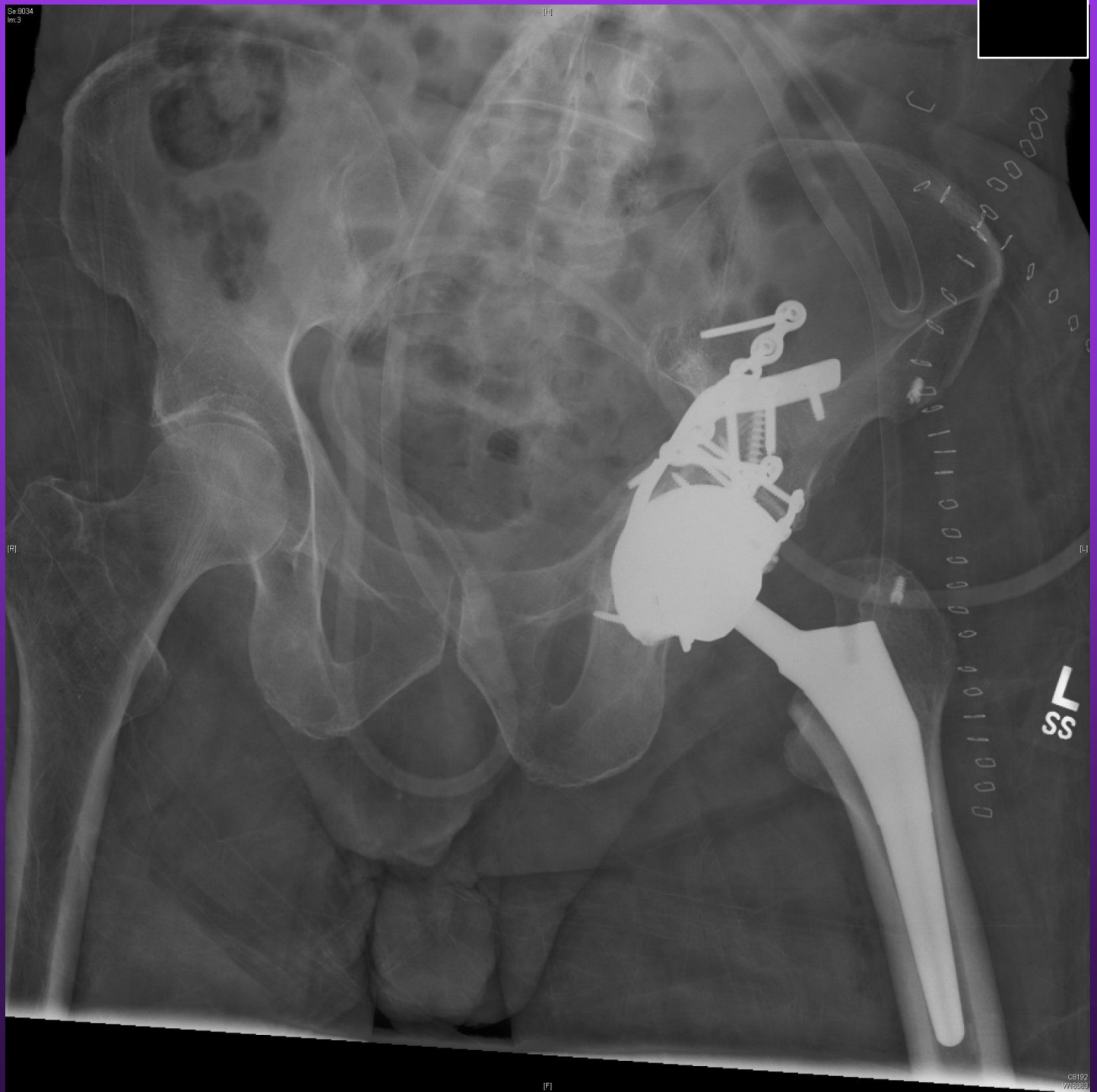
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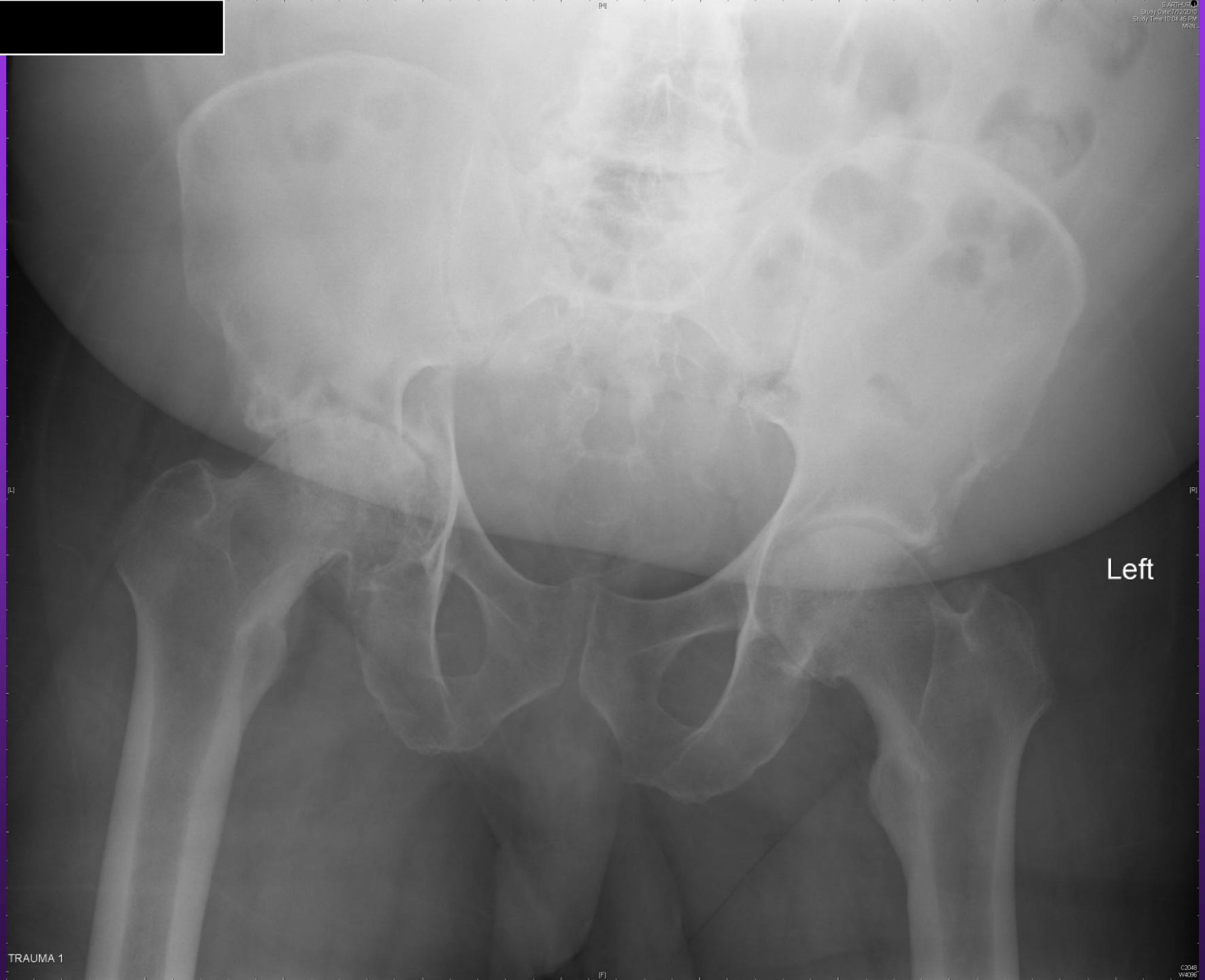
AS

- 62 yo with “T” type acetabulum preop MI and preexisting OA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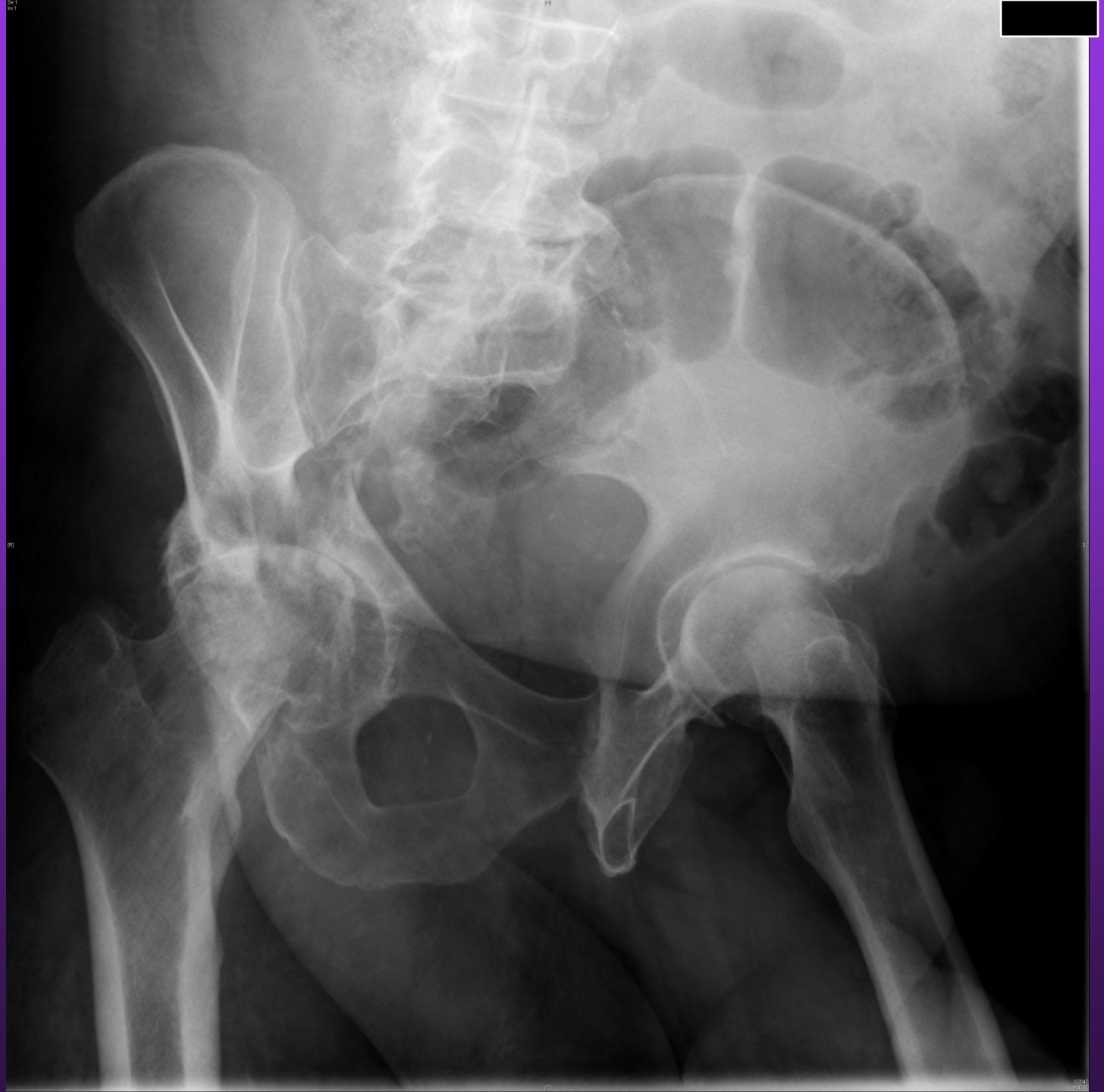


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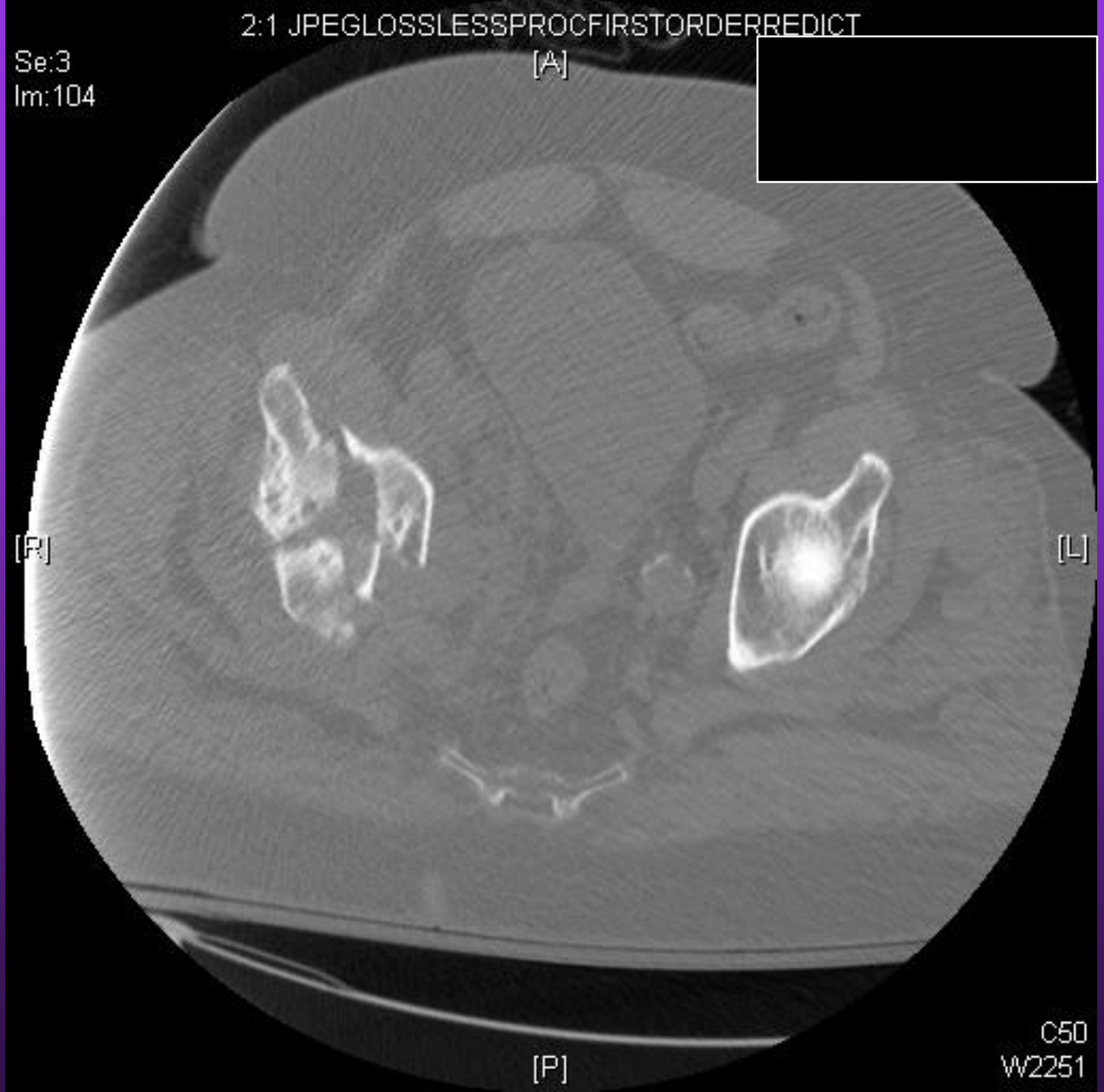
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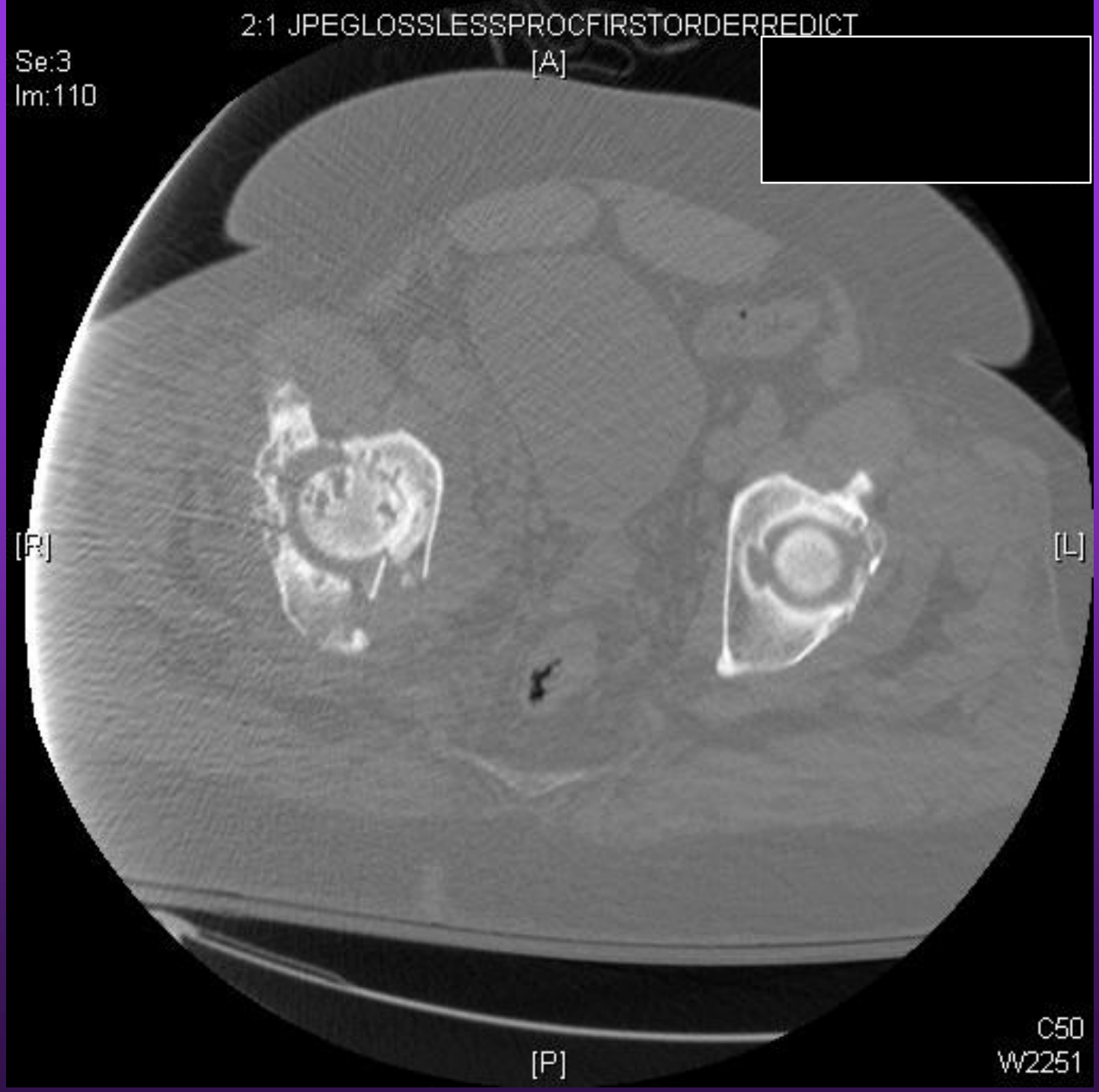
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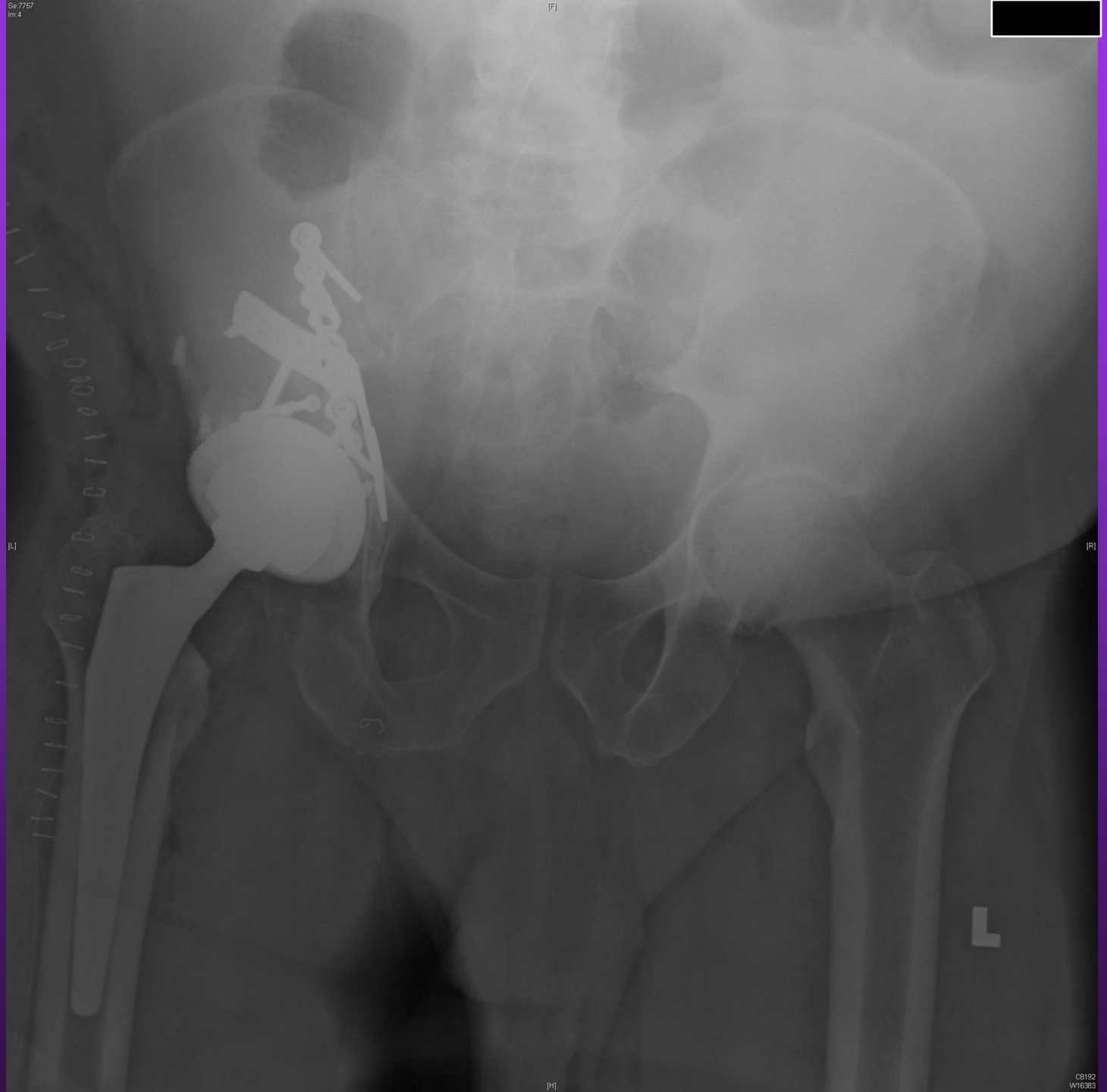
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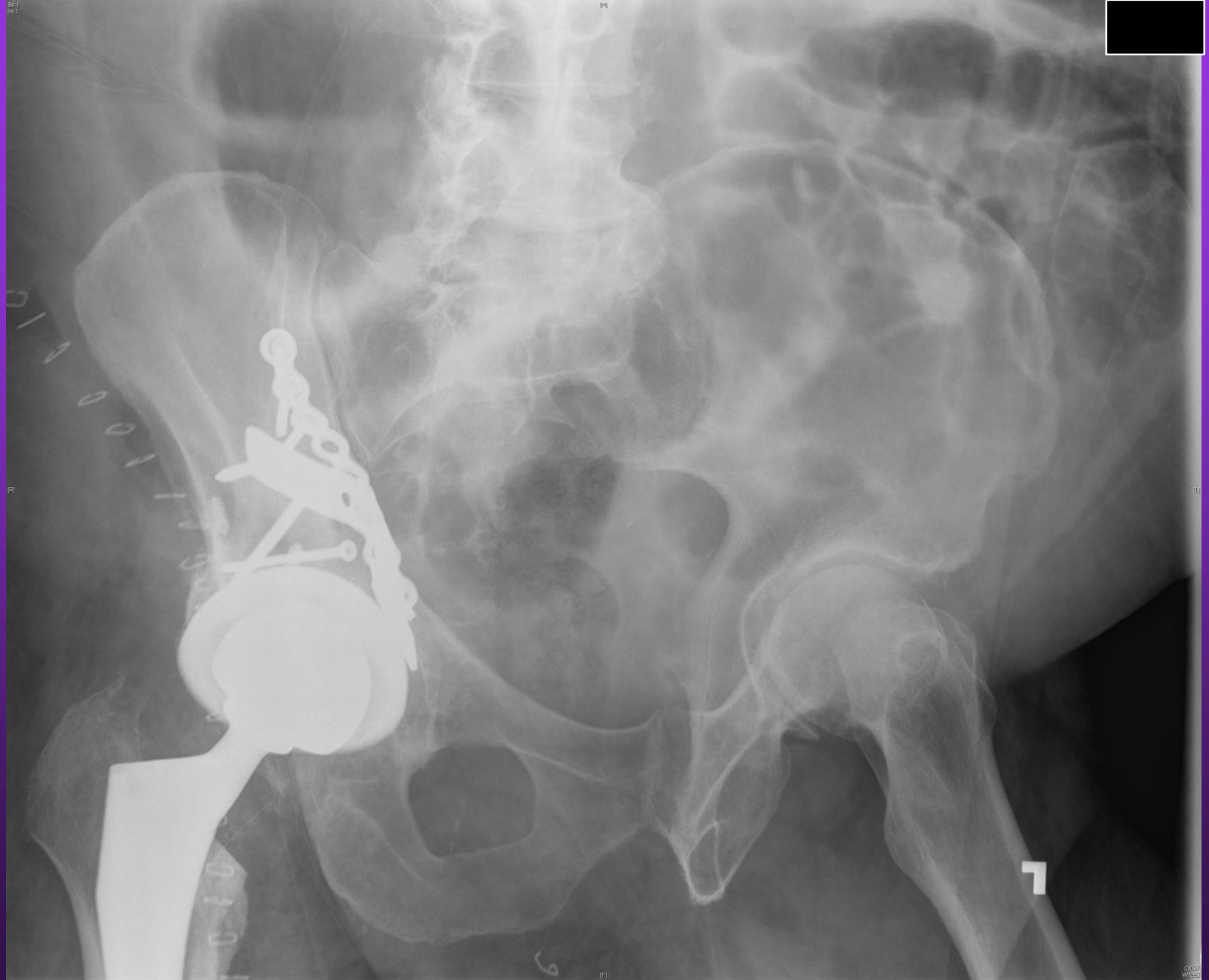

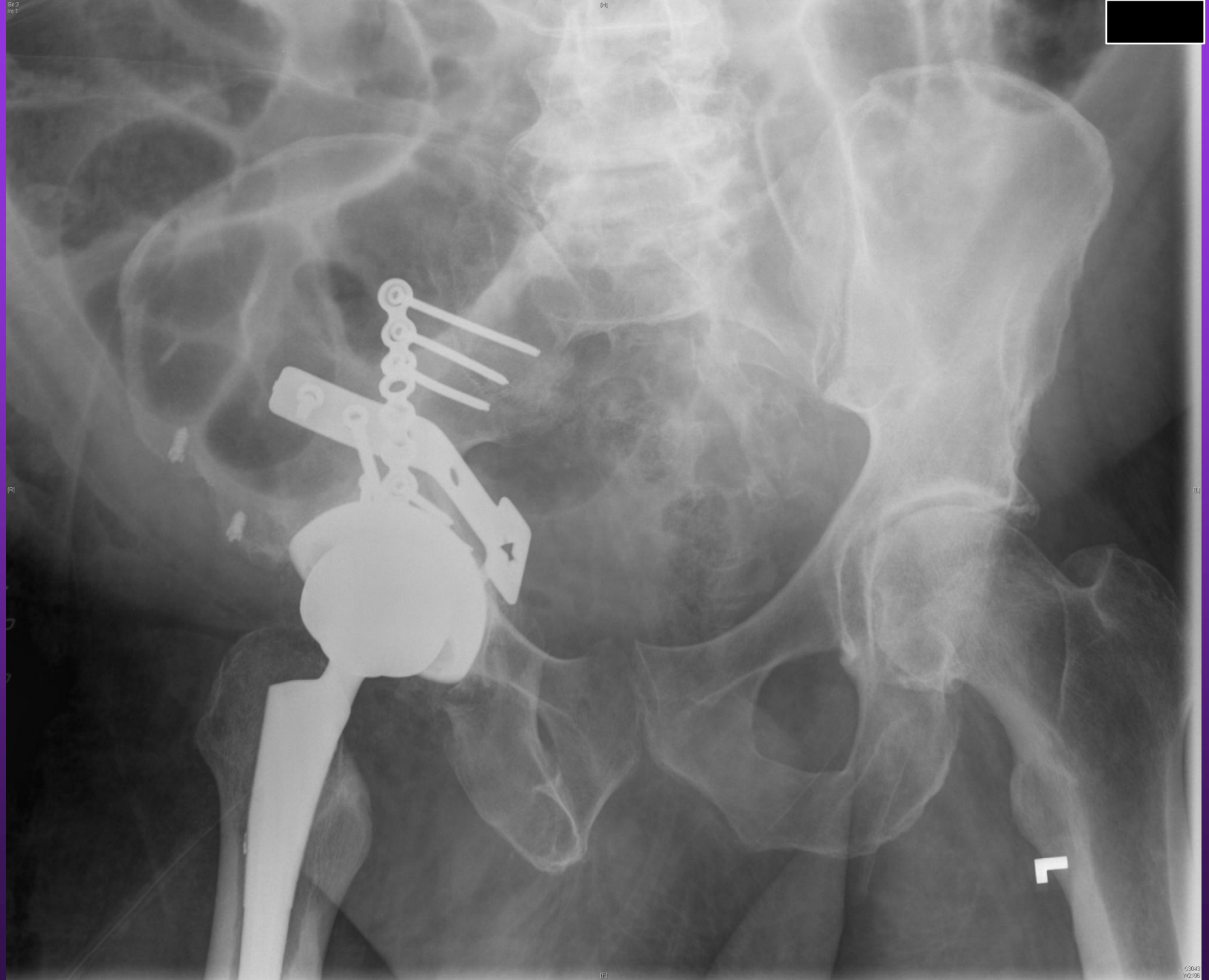


R
63/27

HM

- 35 yo previous MVA and a R THA after a failed femoral neck and bilateral pelvic injuries (previous IS screws)
- New MVA with a L disal femur and acetabulum fracture and R pelvis injury


M697 MALE
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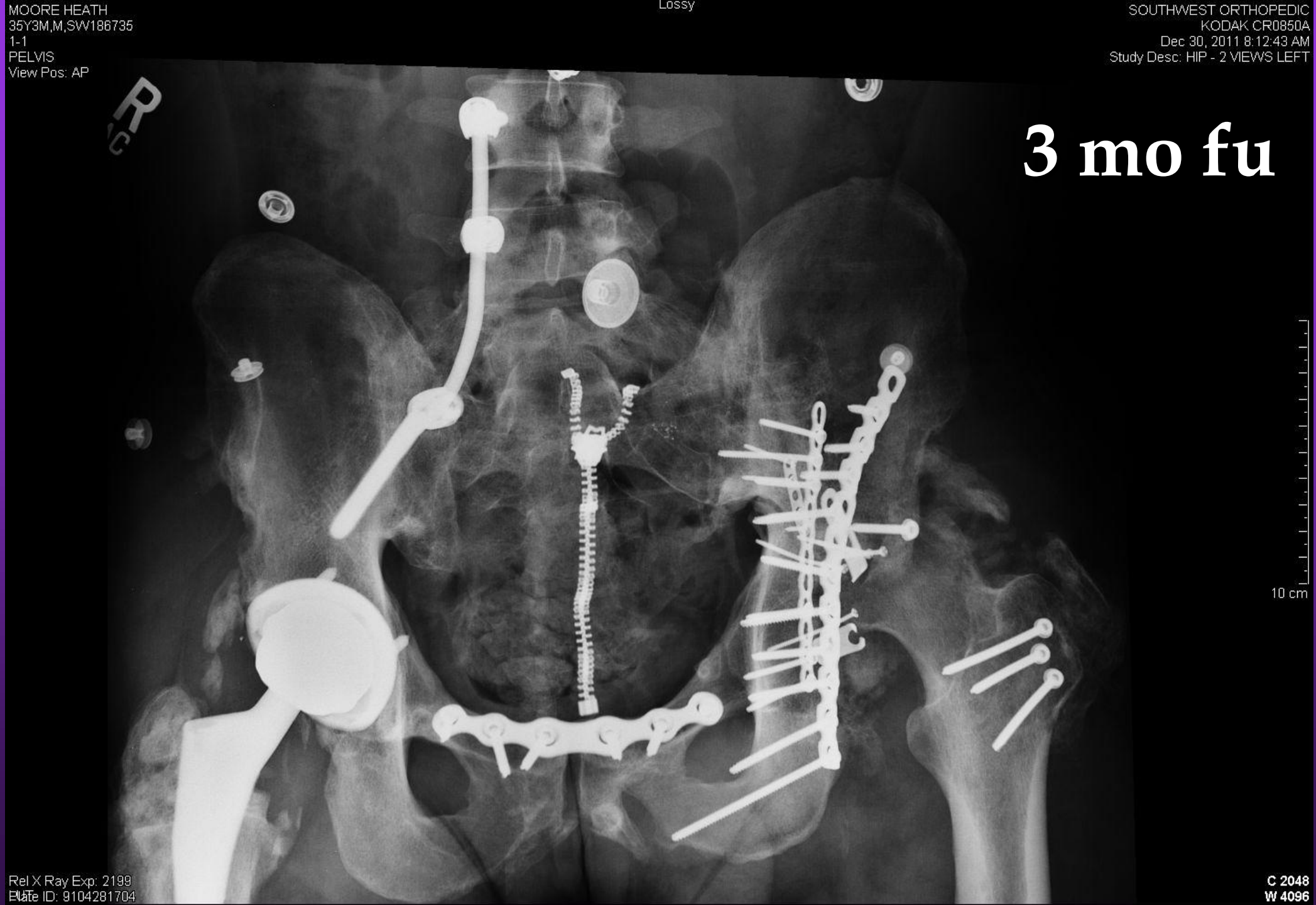
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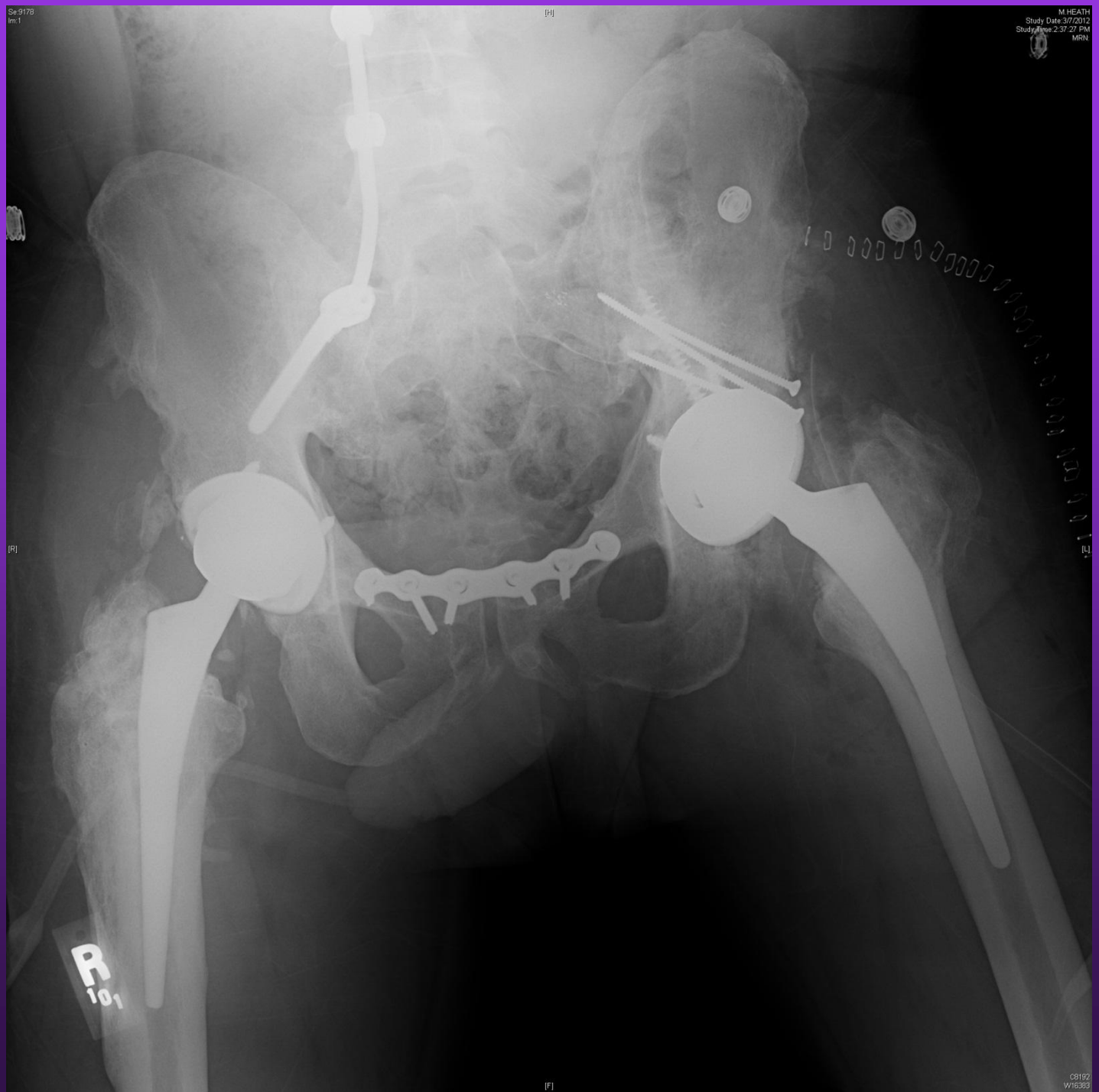
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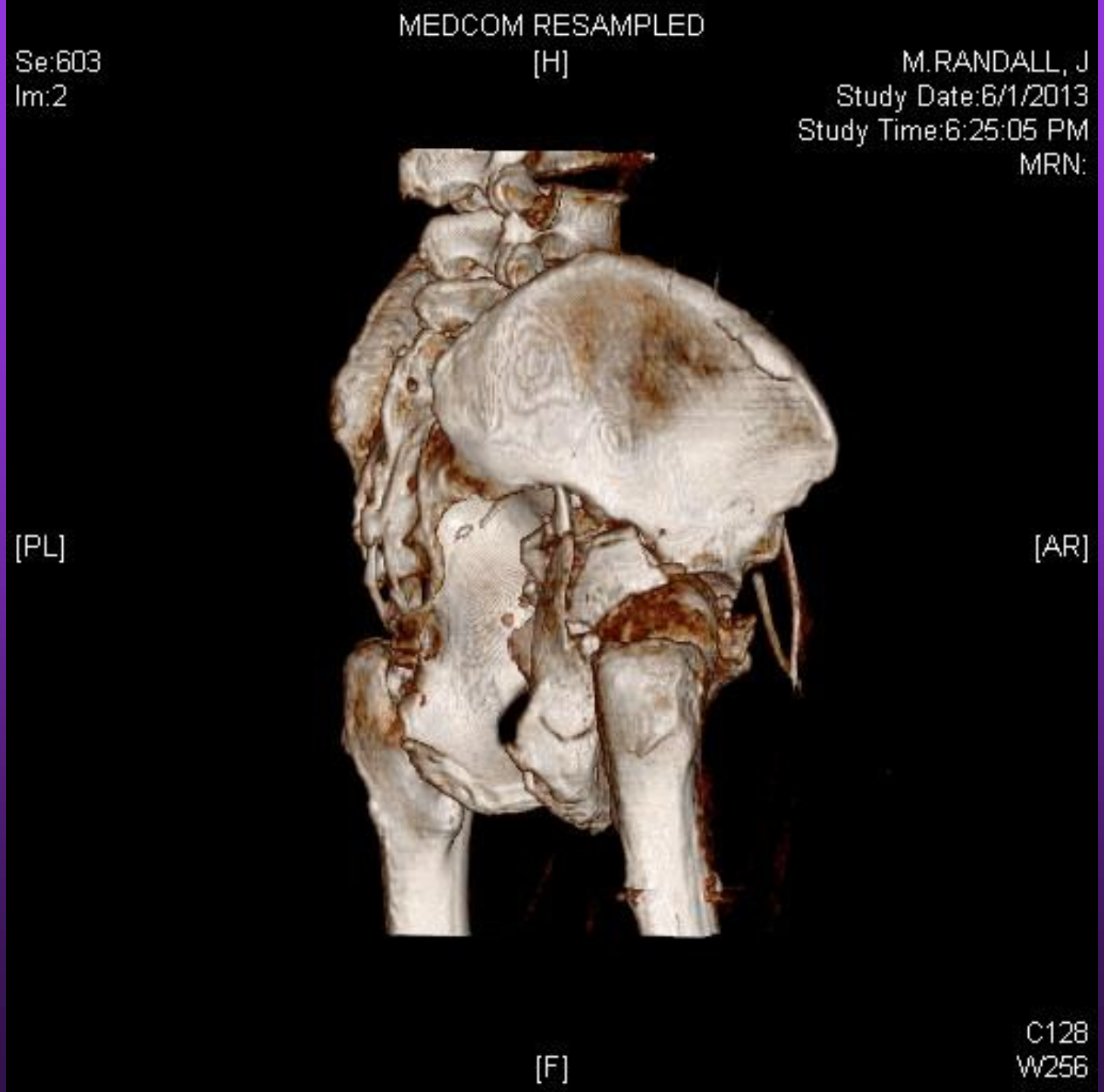
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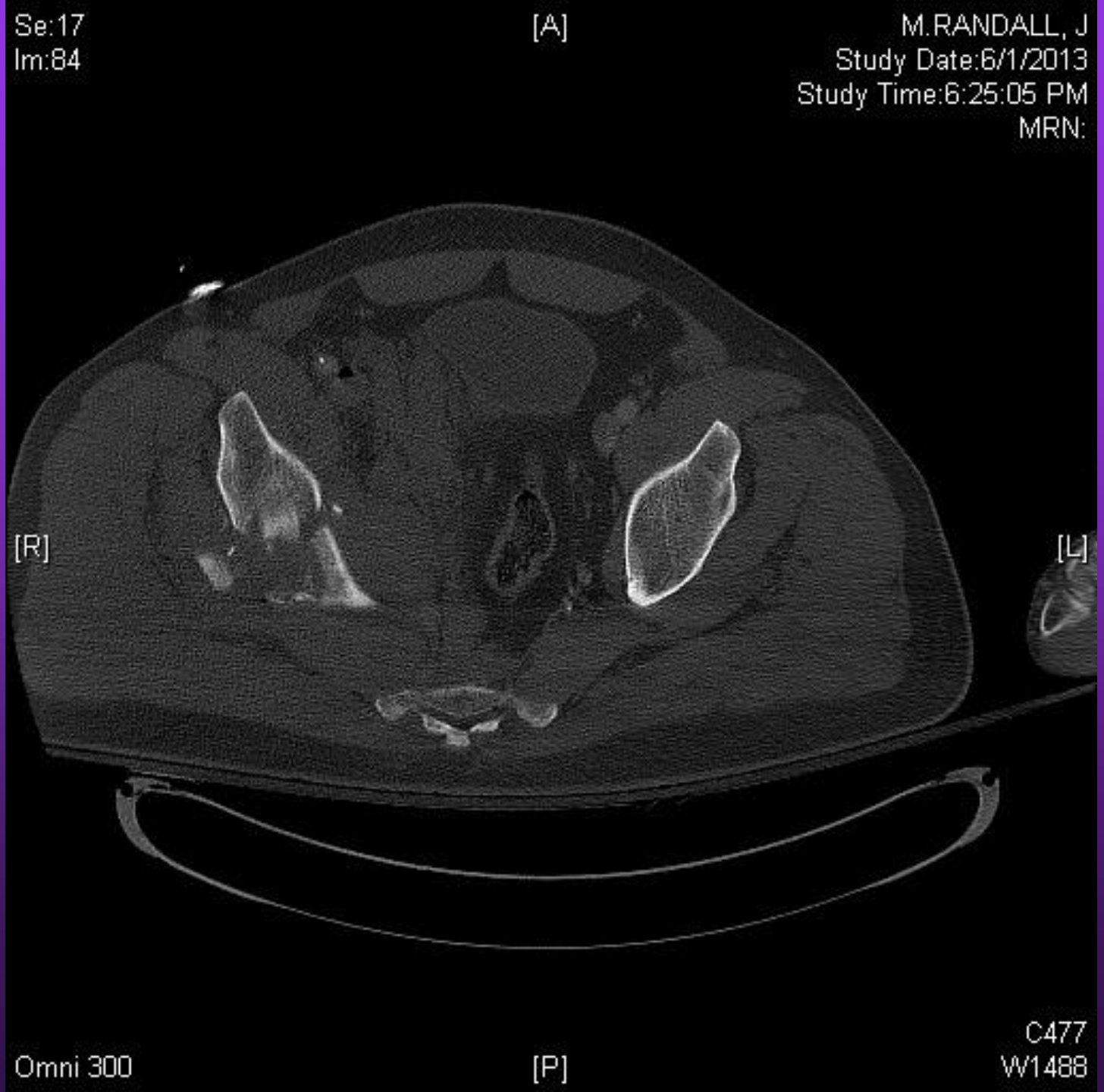
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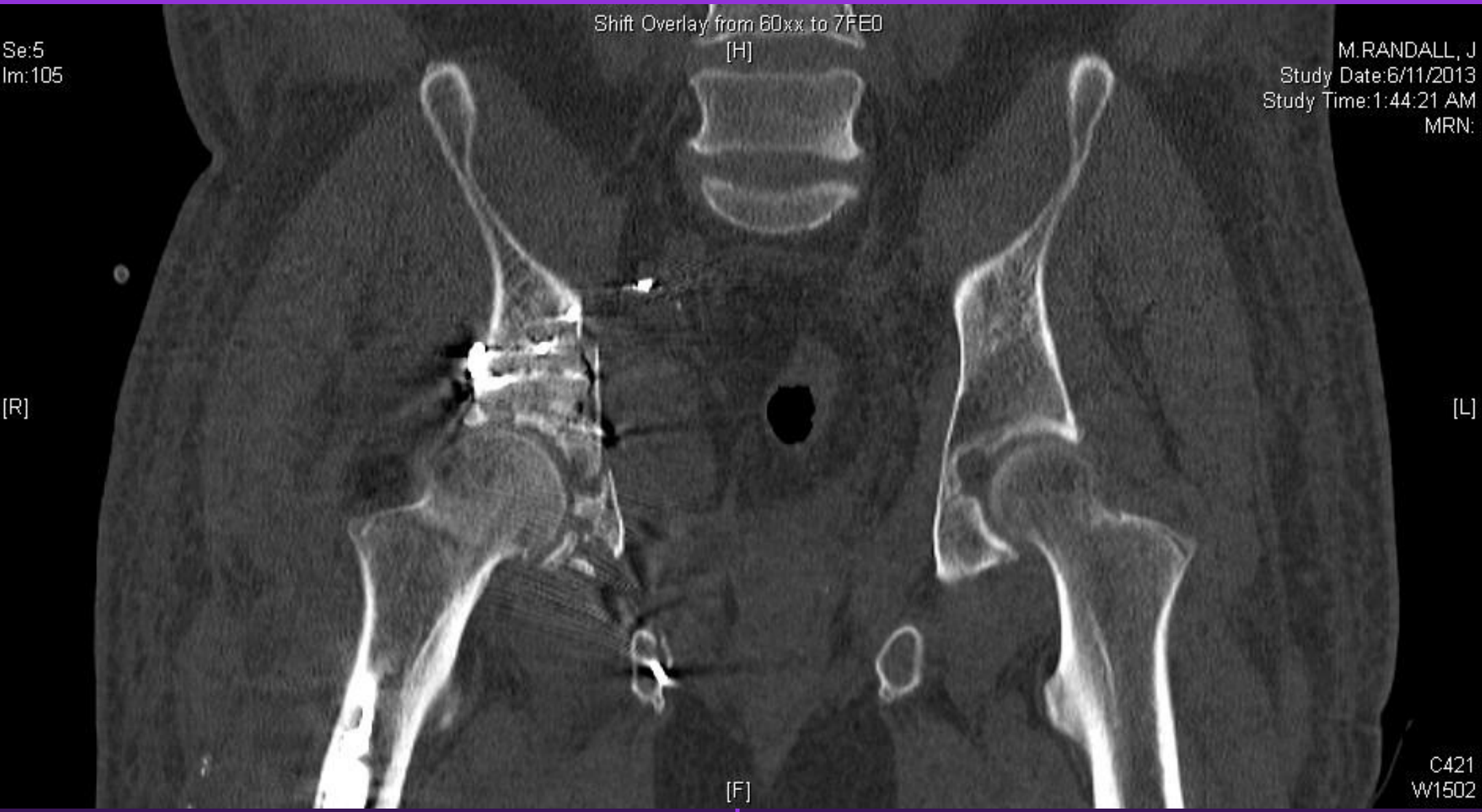
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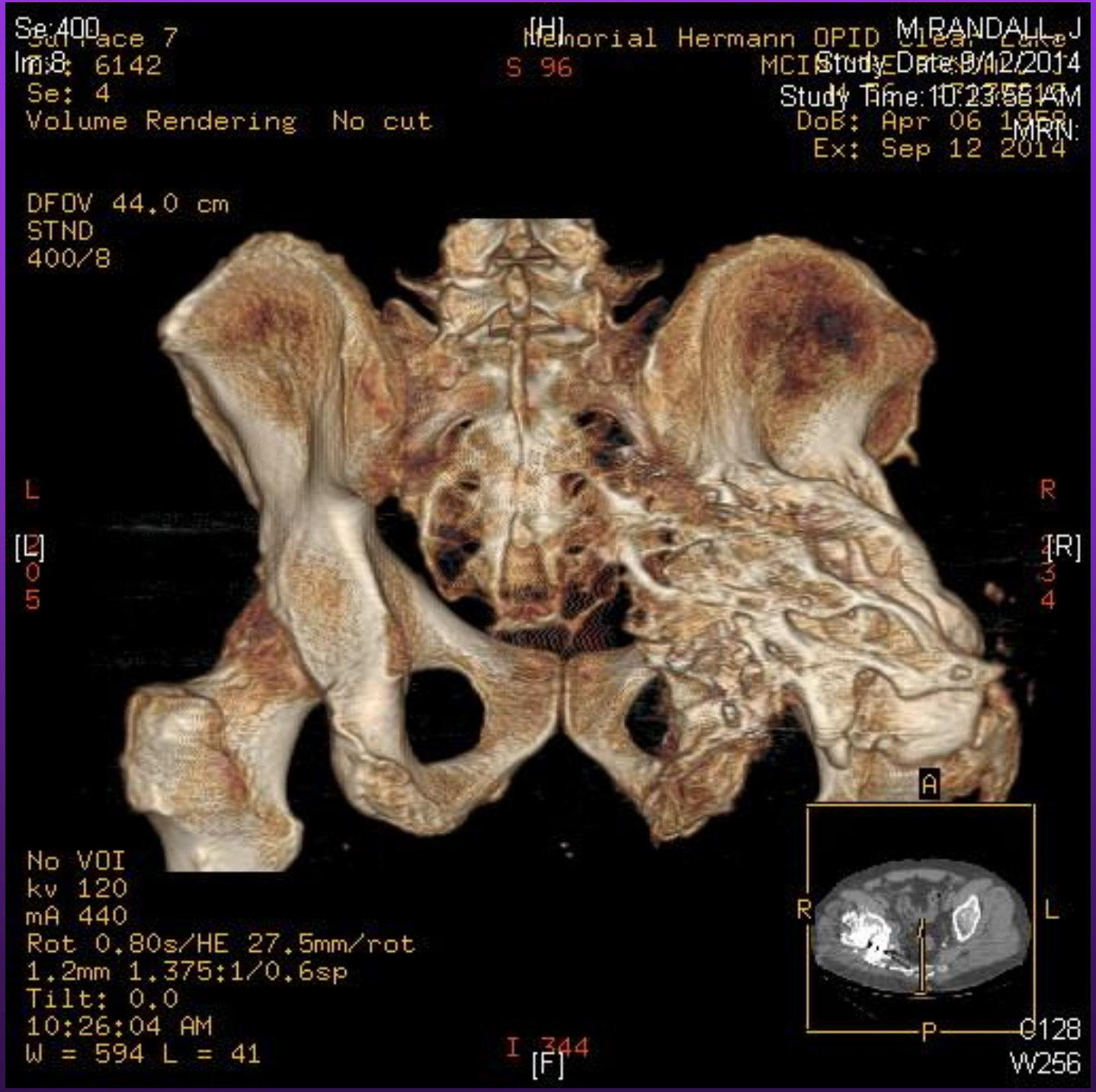
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Rot 0.80s/HE 27.5mm/rot
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I 344
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W256


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‹1-3›
28% Pixel
R
10 cm

JP

- 69yo with significant pain with ambulation but constant pain
- Elevated ESR and Crp
- No thigh pain
- Pain in groin with flexion
- Aspiration +alpha defensin, -culture

JP


PECK,JOHANNA
68Y,SM,F,SW142484
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Study Desc: HIP - 3 VIEW,LEFT
Series Desc: AP
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DICKSON
[11/21/2014 11:38:29 AM]
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Rel X Ray Exp: 2159
C 2048
W 4096

Principles

- Rule out infection (esr, crp, wbc, alpha defensin, synovial elastase, pcr, etc)
- Stem stable – Hx, PE, CT

Infection Protocol

- 6 weeks iv abx
- WBC, ESR, Crp at 6 weeks and 7 weeks (see them decrease or stay the same)
- 7 weeks aspiration for cx and alpha defensin
- 8 weeks either revision or repeat debridement (record 5 debridements before implant)

Aspiration

- Indications – previous infection, elevated inflammatory markers, suspected infection, distinguish between hip joint and extrinsic causes
- Problems – sampling error (culture <1% of bacteria and only 50% successful in face of infection), on antibiotics already (wait 1-2 weeks)

Aspiration

- Alpha defensin – protein produced by body in the face of infection independent of antibiotics or prosthesis
  - 96% accurate
  - False negative
  - Sent to outside lab

Options

- One stage
- Two stage
- Partial resection

Principles of Debridement

- Tumor surgery
- All devitalized tissue removed
  –includes skin, muscle, and bone
- Reprep and drape

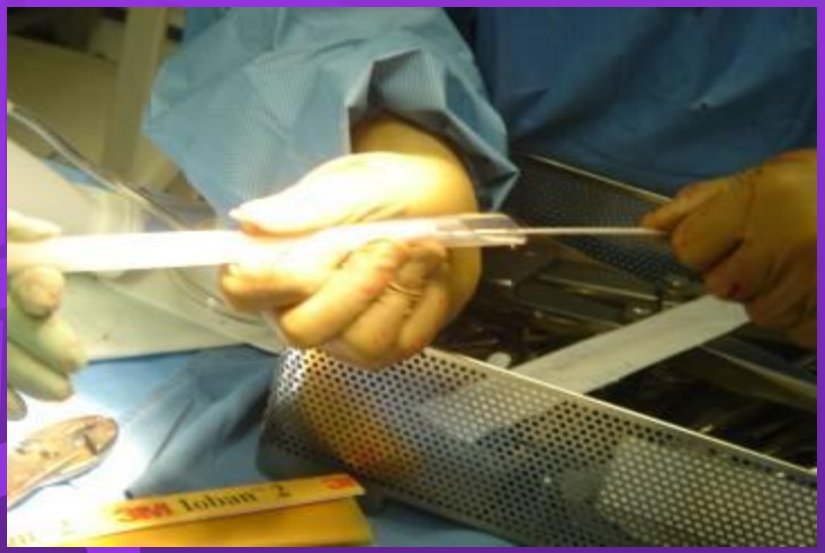
Preop

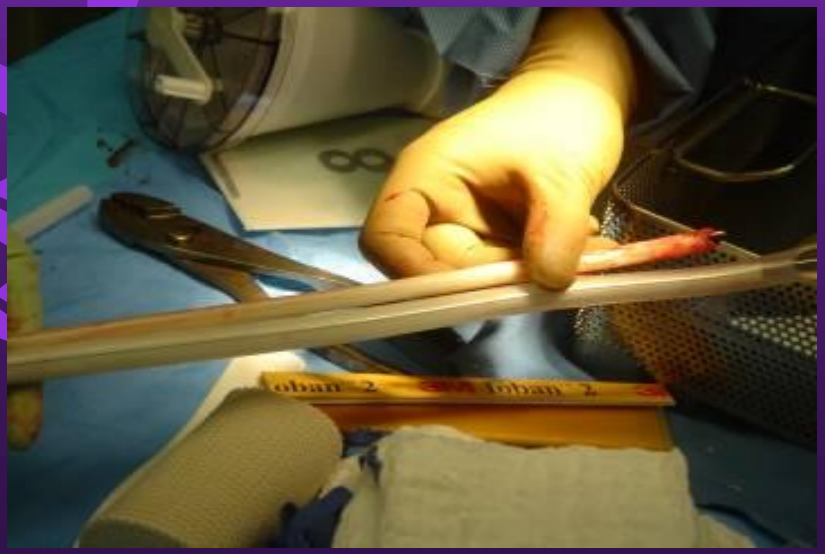
- Prevent infection – obesity, metabolic disease, remote infection, prolonged hospitalization, steroids, diabetes (Hgb A1c – cardioprotective), immunosuppressed (HIV, rheumatoid arthritis …etc), age, transplant
- Jehovah Witnesses – cell saver, txa, aquamantyss

Preop

- Antibiotics and antifungal, 36 gauge chest tube, mineral oil, guide rod
  - Tobramycin cement with additional 3 vials (1 gr each) and 3 vials of vancomycin and if open for a while or positive cultures 3 vials (500mg) of amphotericin all per bag
- Heat stable antibiotic specific for cx
- Hemovac, incisional vac

TECHNIQUE OF ABX ROD



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3/4
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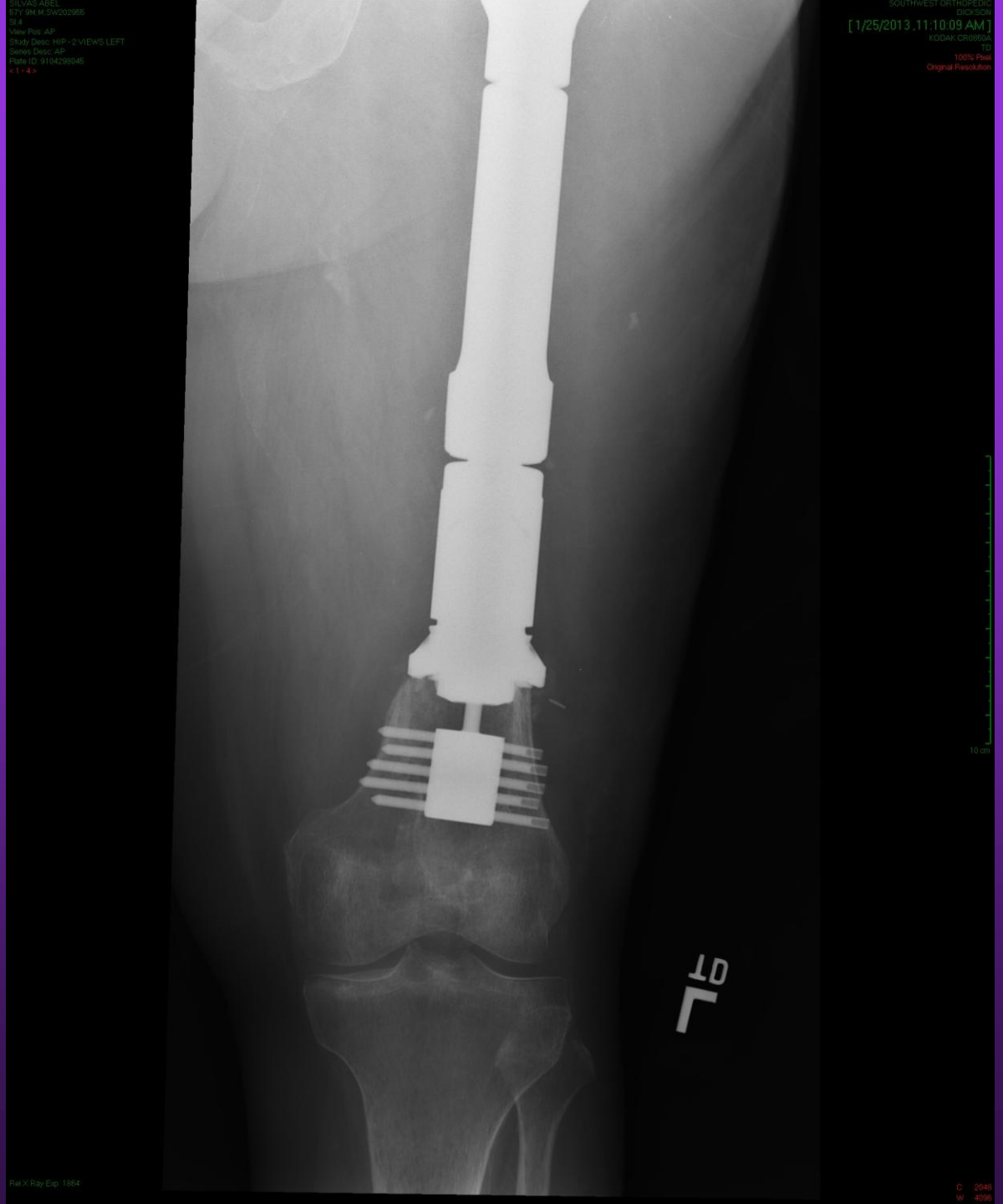
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57Y,9M,M,SW202965
3/4
View Pos: AP
Study Desc: HIP - 2 VIEWS LEFT
Series Desc: AP
Plate ID: 9104298045
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DICKSON
[1/25/2013 ,11:10:09 AM]
KODAK CR0950A
70
100% Real
Original Resolution
10 cm
LT
Rel X Ray Exp: 1864
C 2048
W 4096


SILVAS ABEL
57Y 9M M SW202965
SI:2
View Pos: LATERAL
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Series Desc: AP
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DICKSON
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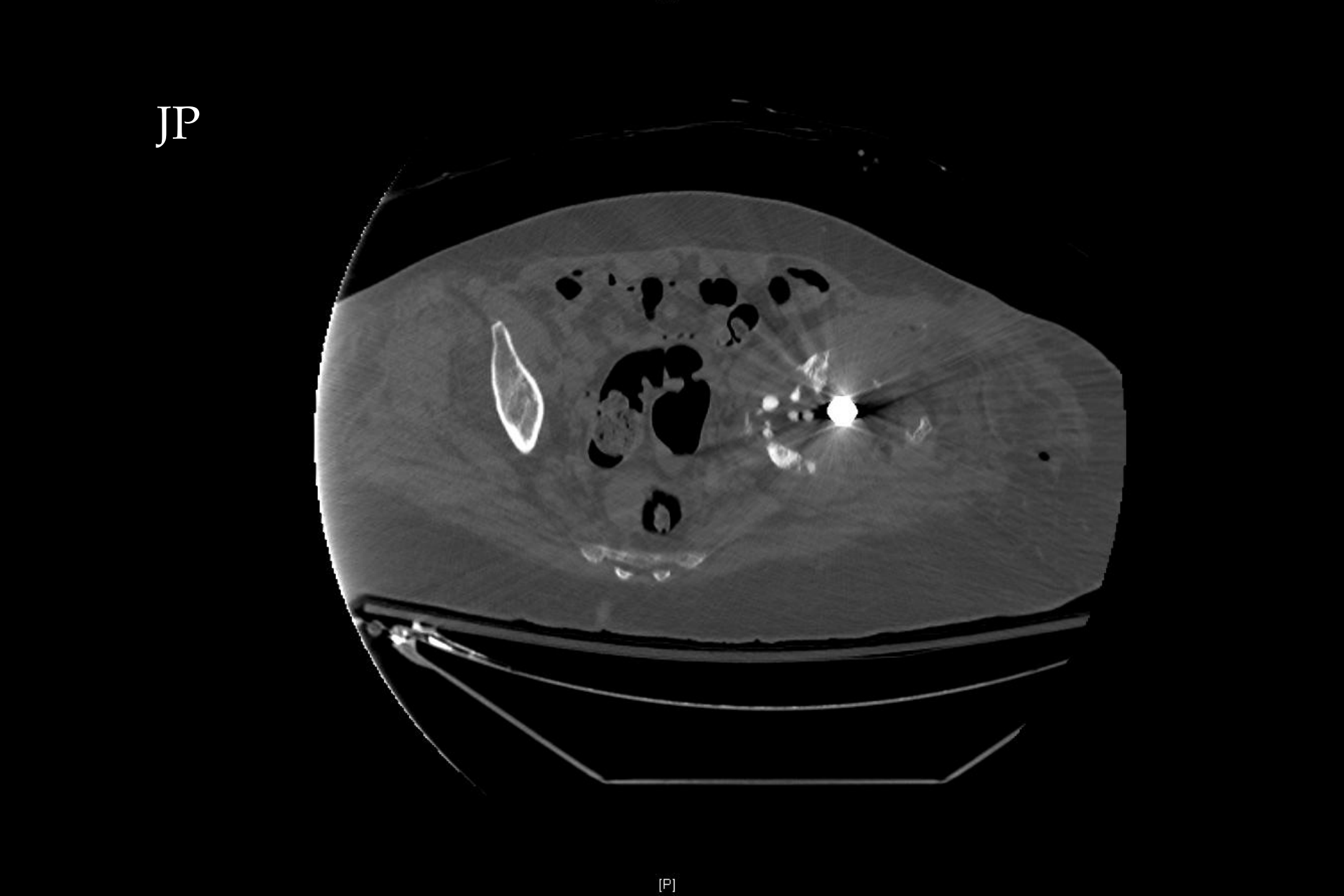
KODAK CR0950A
TD
100% Pixel
Original Resolution
L
10 cm
Rel X Ray Exp: 2306

CT scan

- Loosening – lack of spot welding
- Defects – contained vs how to contain
- Fractures – pelvic discontinuity


JP
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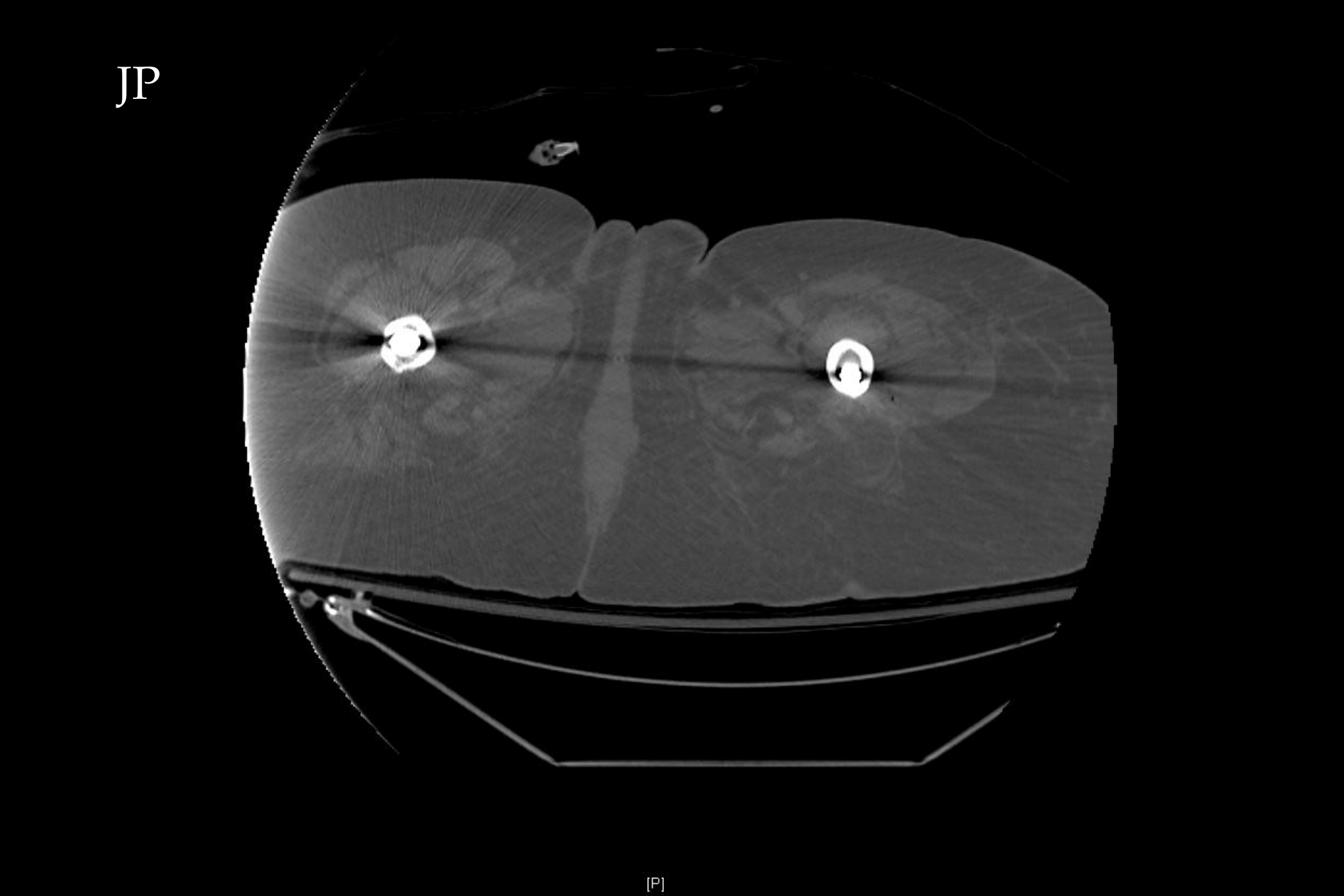
JP


JP
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Principles

- Stability of cup
  - Solid host bone – jumbo cup, oblong cup, cup cage cup construct
  - Contained defect vs need to create contained defect with mesh
  - Fracture or pelvic discontinuity that requires separate fixation

Principles

- Stable rim vs create a stable rim with tantalum augment
- Allograft reaming vs bulk – stable fixation and trabecular lines maintained
- Restore hip center but elevation does not increase joint reaction forces

Post op

- Bulk graft can take 8 months to incorporate
- Reamings for contained (both with and without augmentation) 3 months

JP


PECK JOHANNA
69Y 7M F SW142484
SI:1
View Pos: AP
Study Desc: HIP - 2 VIEWS LEFT
Series Desc: AP
Plate ID: 9104259236
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DICKSON
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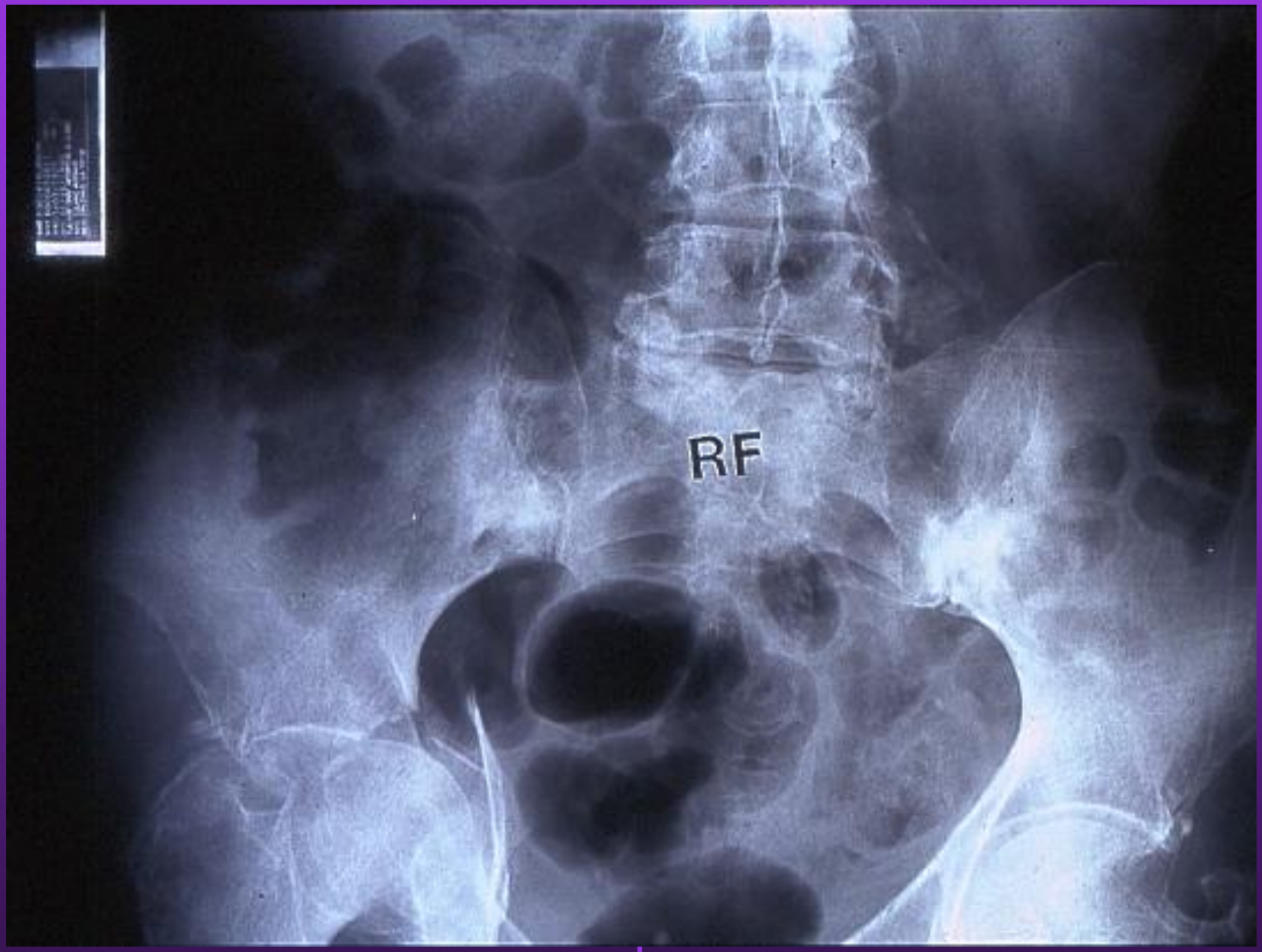
KODAK CR083.A
FF
100% Fidel
Original Resolution
L
RT
10 cm
Rel X Ray Exp: 2300
C 2048
W 4096

Goals of Lecture

- Indications for ORIF and 1° THA
  - Femoral head, dome impaction, pre existing OA (comminution, osteoporosis?)
- Technique
  - Anterior Smith-Petersen with stabilization of the acetabulum fracture prior to THA
  - Posterior KL – complicated PW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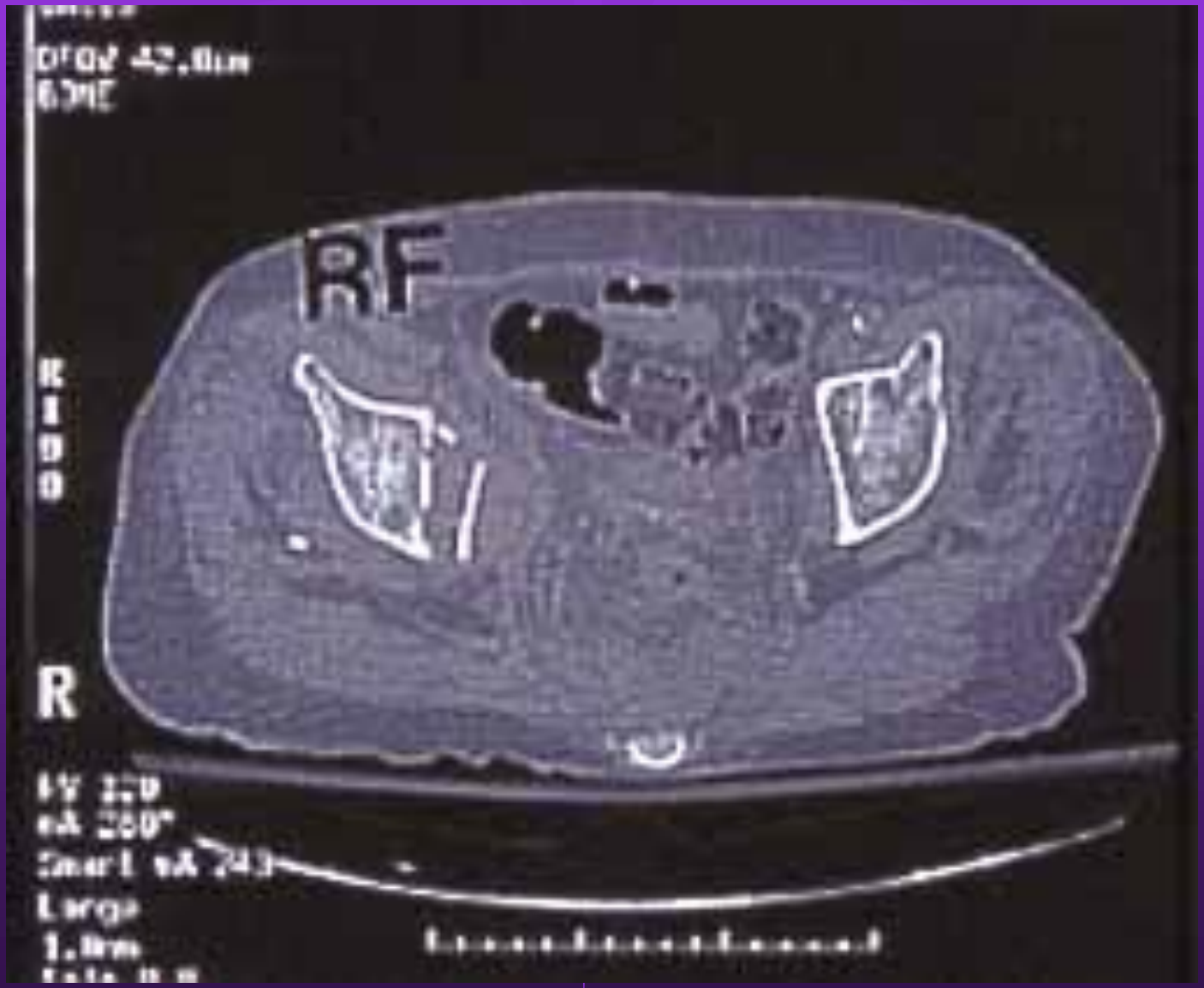
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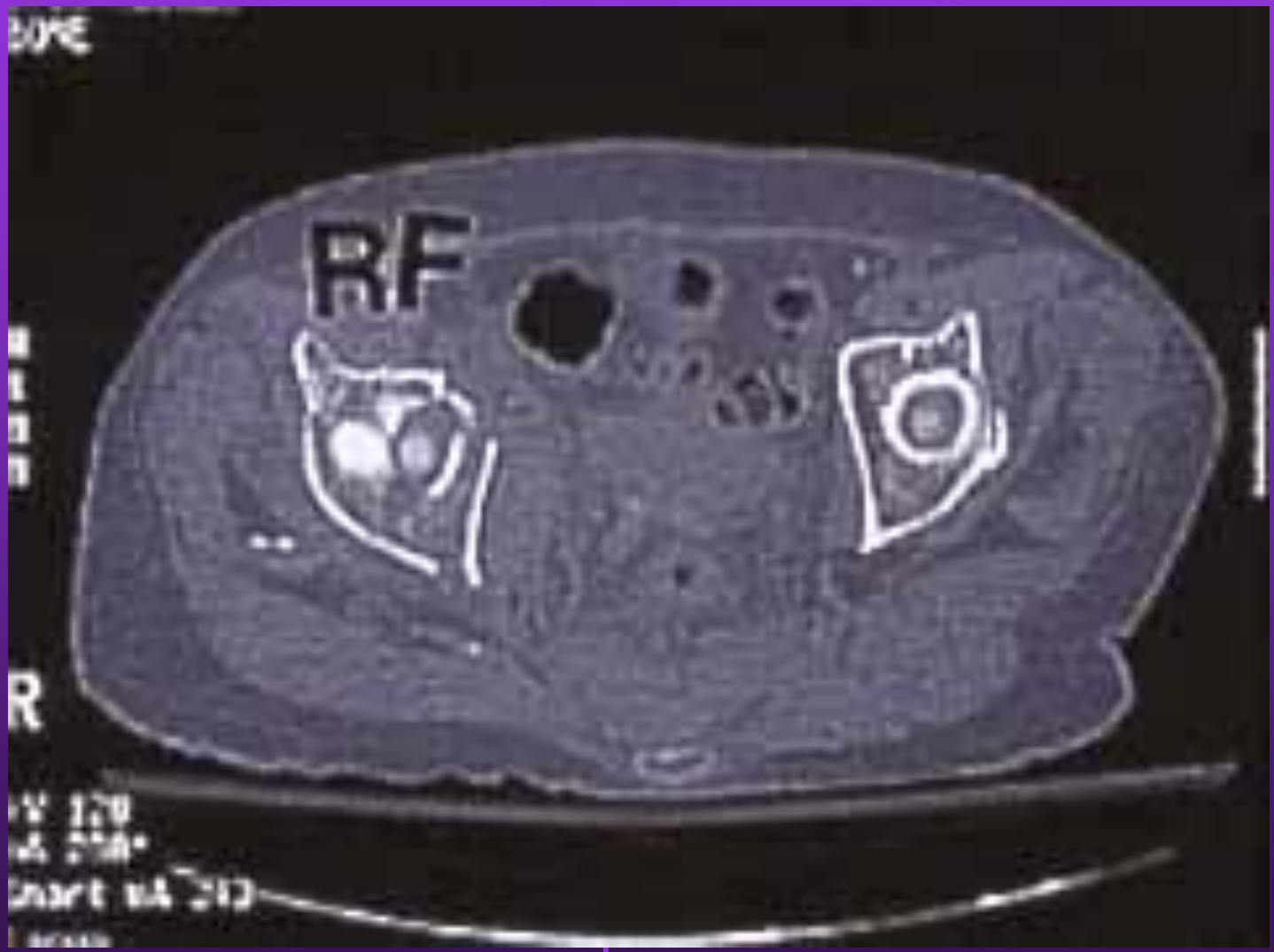
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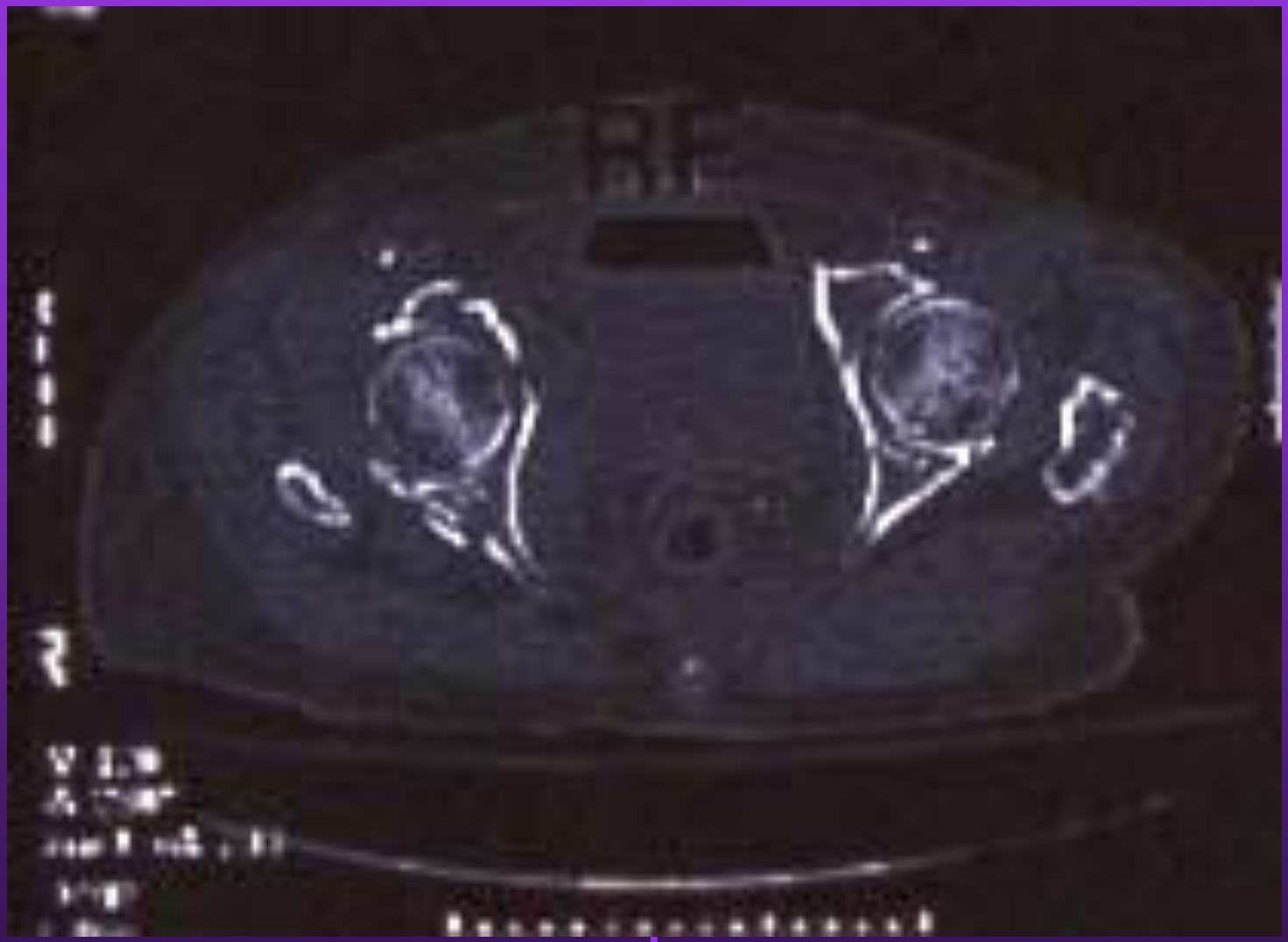


Anterior or Posterior Approach?

-Dependent on the type of fracture and what approach gives the easiest fixation (direction of the head migration)

-II and or IF – quadrilateral surface comminution

-KL – posterior wall

Posterior Approach

- KL for both fixation of acetabular fracture and THA (Femoral and dome impaction, OA) (Boraiah 2009)
- May do II to fix acetabular fracture but always KL for THA (?osteoporosis) (Herscovici 2010)


RF

Cement ?

Cemented

- More rigid initial fixation
- ? Less thigh pain
- Prolonged surgical time

Uncemented

- Less bone stock lost
- Easier revision
- Proven success, even in older patient
- Greater surgical speed

Cemented or Uncemented

Parker JM, Rajan D The Cochran Library (3):2001Parker

- Harper 1994
- Door 1986
- Sonne-Holme 1982
- Emery 1991

- 4 trials - 391 patients
- Cement decrease risk of loss of mobility
  - RR 0.60
  - 95% CI (0.44 - 0.82)
- Decreases pain at one year
  - RR 0.51
  - 95% CI (0.31 - 0.81)

Femoral Neck Fractures
Elderly

- THA
  - Indications
    - Active, >75 y.o.
    - Regional variability, expanding use
  - Results
    - Less pain, greater walking ability
    - Selection bias
    - Higher dislocation rate
      - Rogmark, JBJS(Br), 2002

THA vs Hemi

Squires et al. Injury 30: 345, 1999

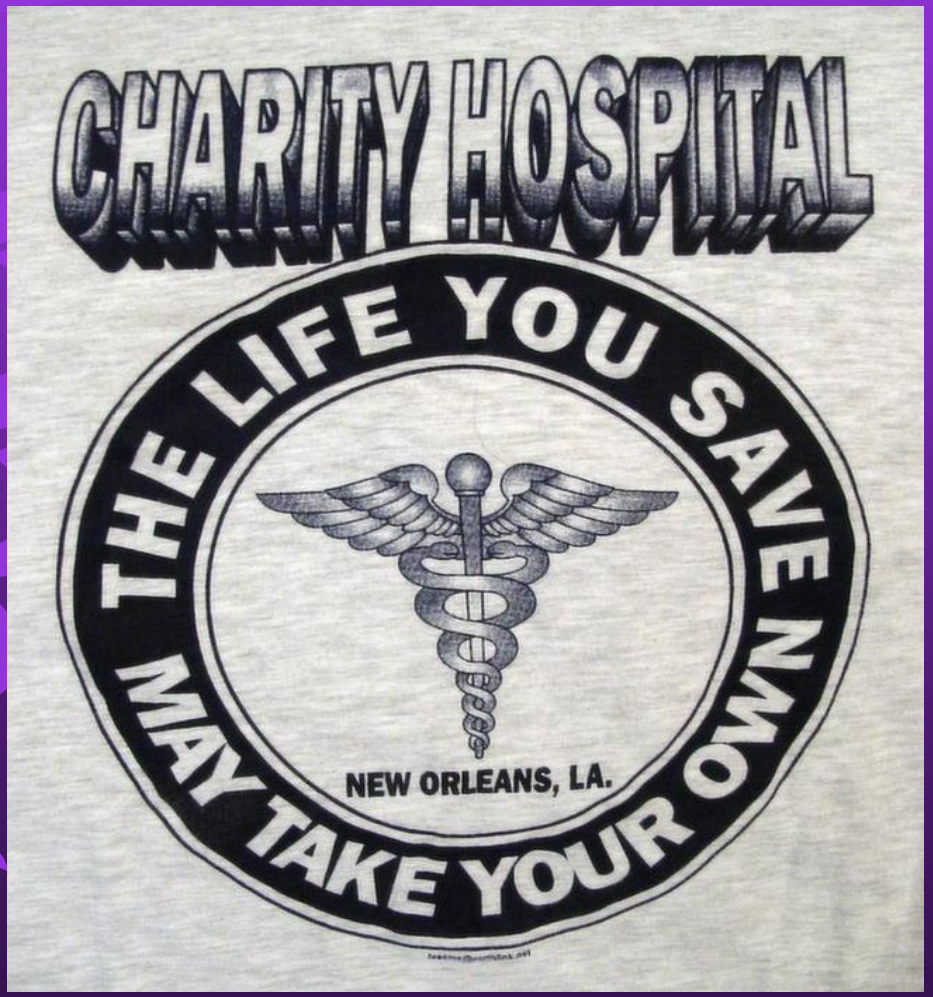
- Retrospective compared outcomes THA (32) and hemi (42) 4 yr follow-up
- 0% THA required revision vs 38% hemi
- THA 86% good or excellent results vs. 12% hemi
- 77% THA group walk mile vs. 27%

Summary

- 1º THA – Femoral head damage, dome impaction, pre existing osteoarthritis, (?severe osteoporosis) osteopenia biggest contraindication for Letournel in doing an ORIF, stable fixation of acetabular fracture

Thank You


Charity Hospital, New Orleans


CHARITY HOSPITAL
THE LIFE YOU SAVE MAY TAKE YOUR OWN
NEW ORLEANS, LA.