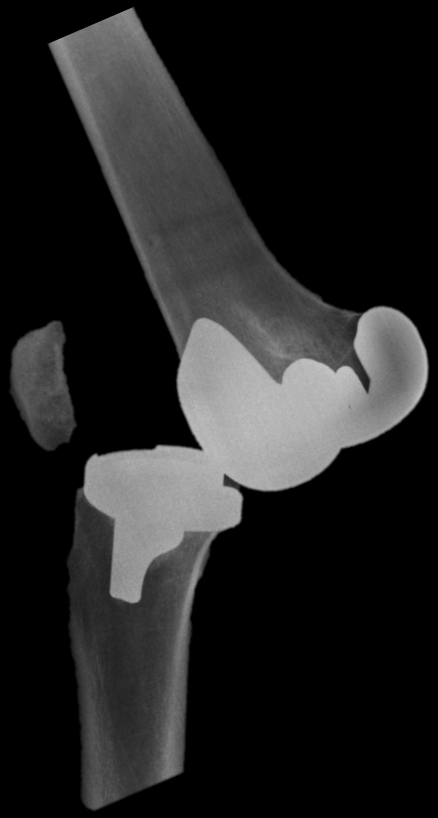
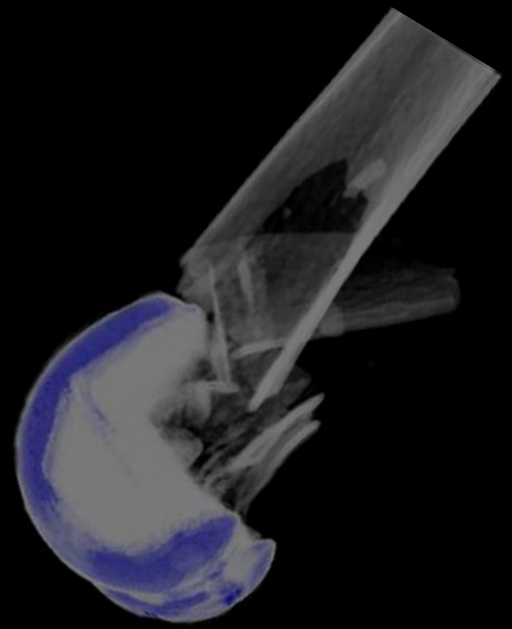


Arthroplasty Complications Presenting to the ER



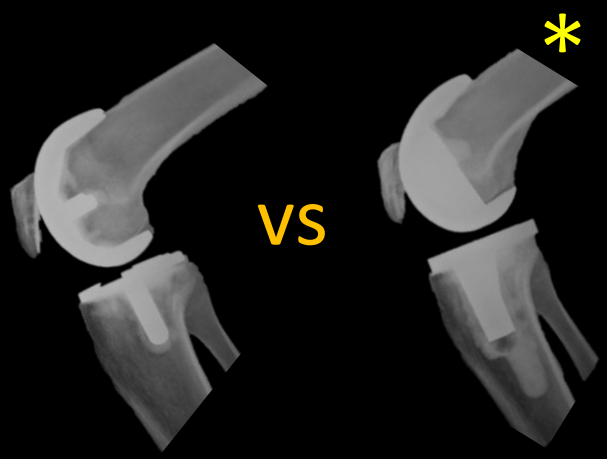
Susanna C. Spence, MD, FASER

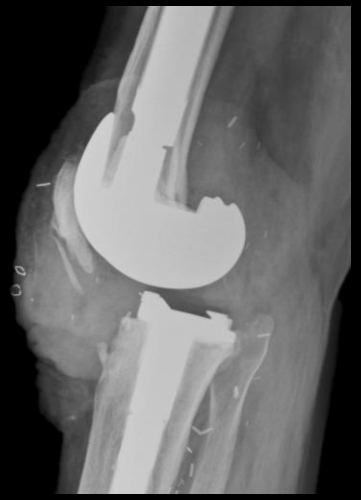
Professor

UT McGovern Medical School Houston

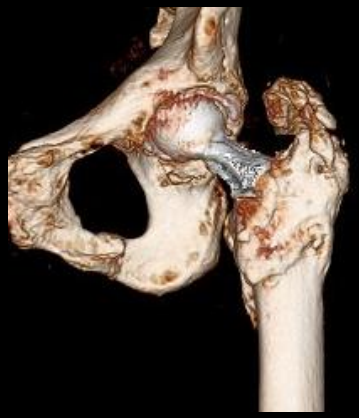
UTHealth
McGovern Medical School
The University of Texas Health Science Center at Houston

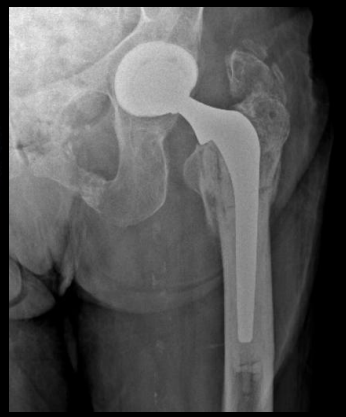
Objectives



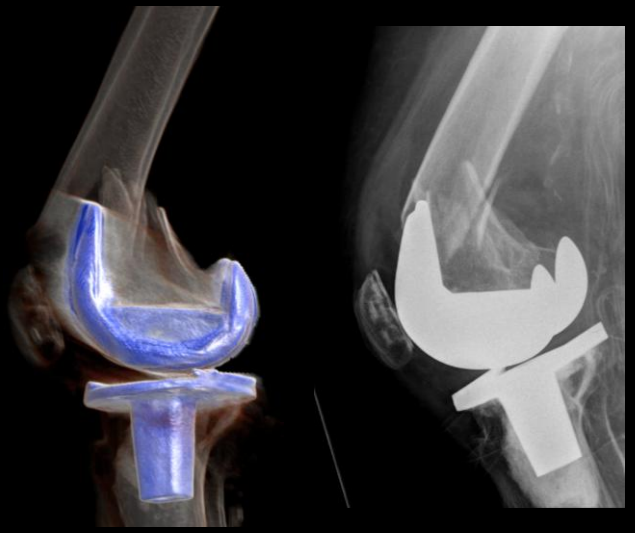


45



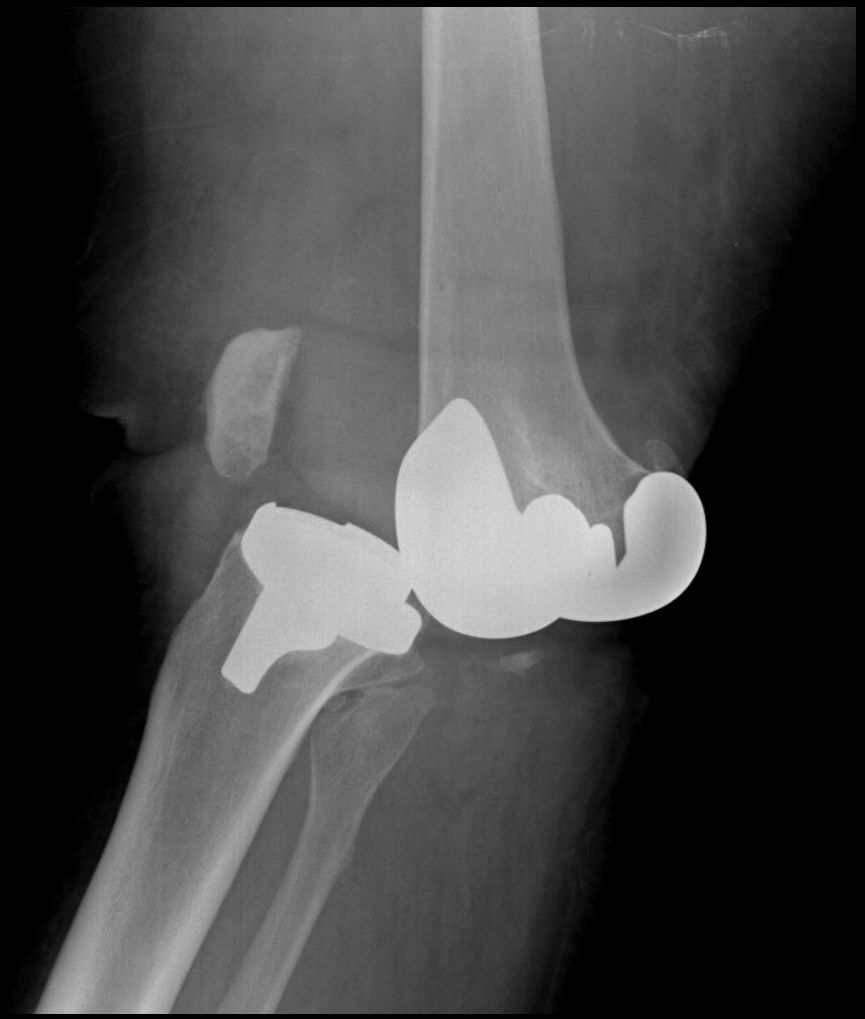


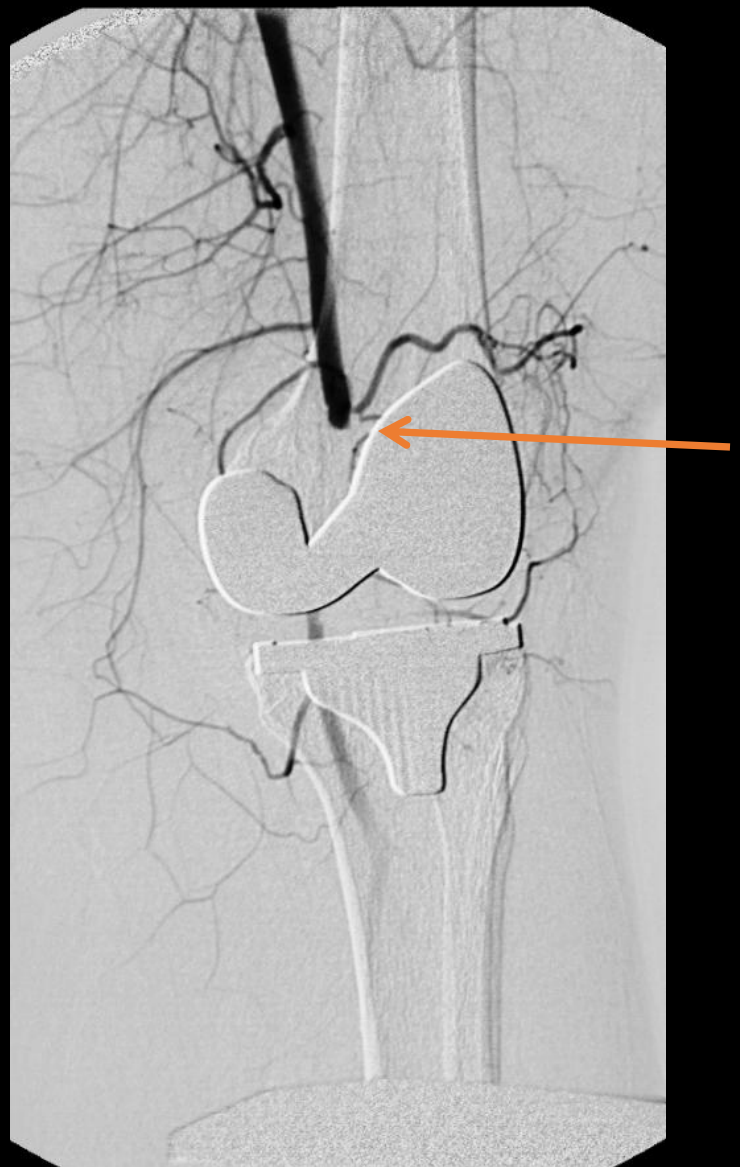
Unified

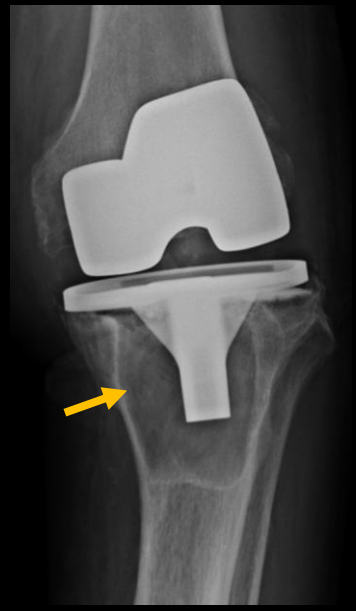


Arthroplasty complications presenting to the ER?

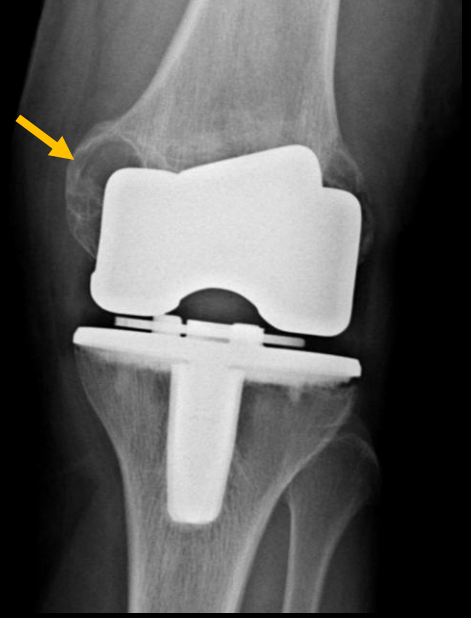
Of course there are the usual suspects



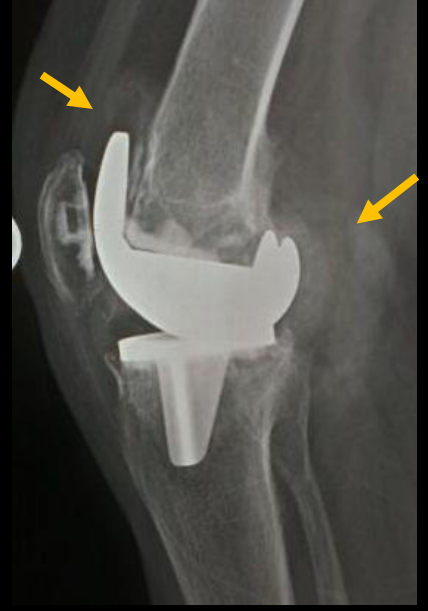




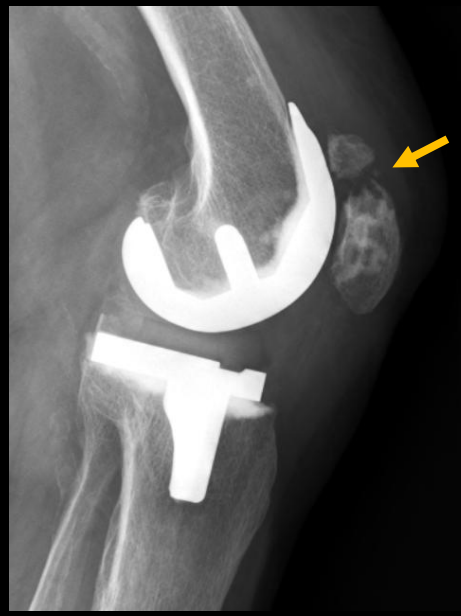
Tibial lucency



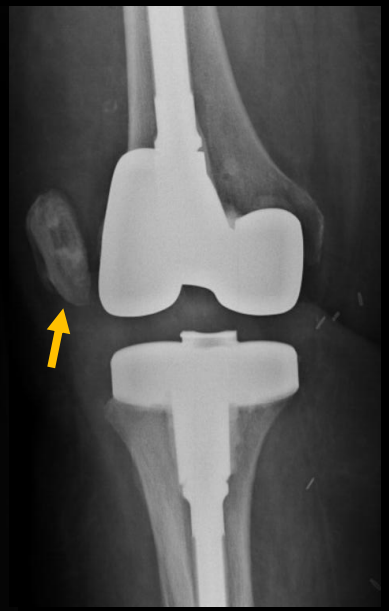
Femoral lucency



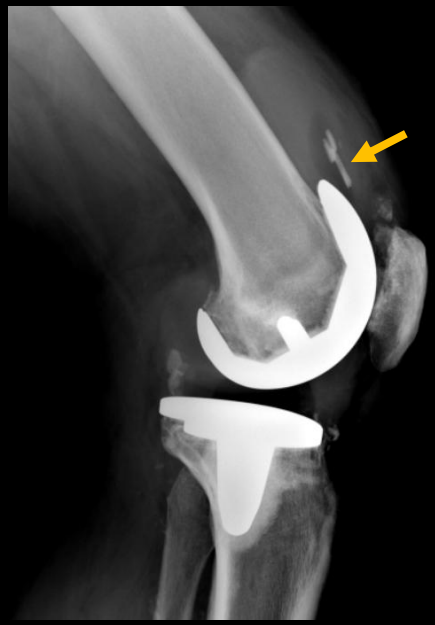
Metallosis w dense effusion



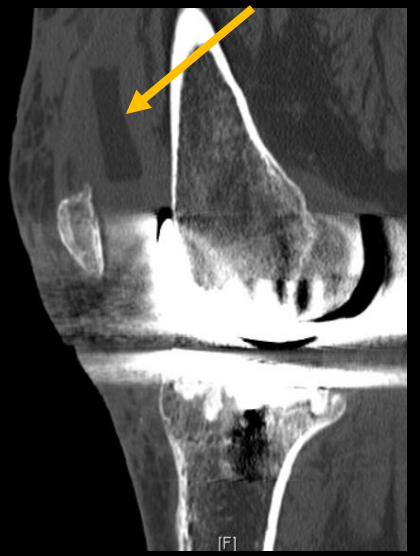
Patellar fracture



Patellar dislocation



Dislocated patellar button

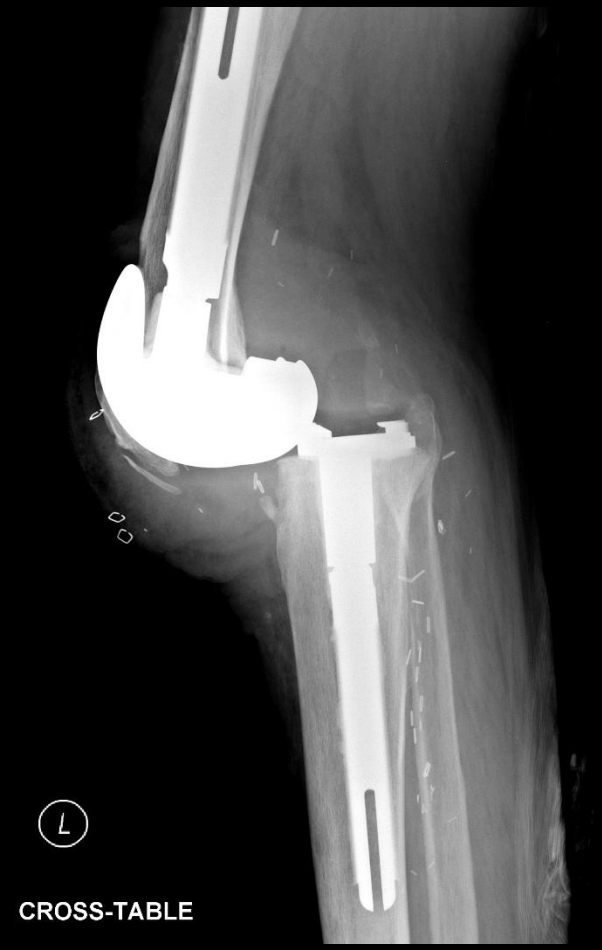


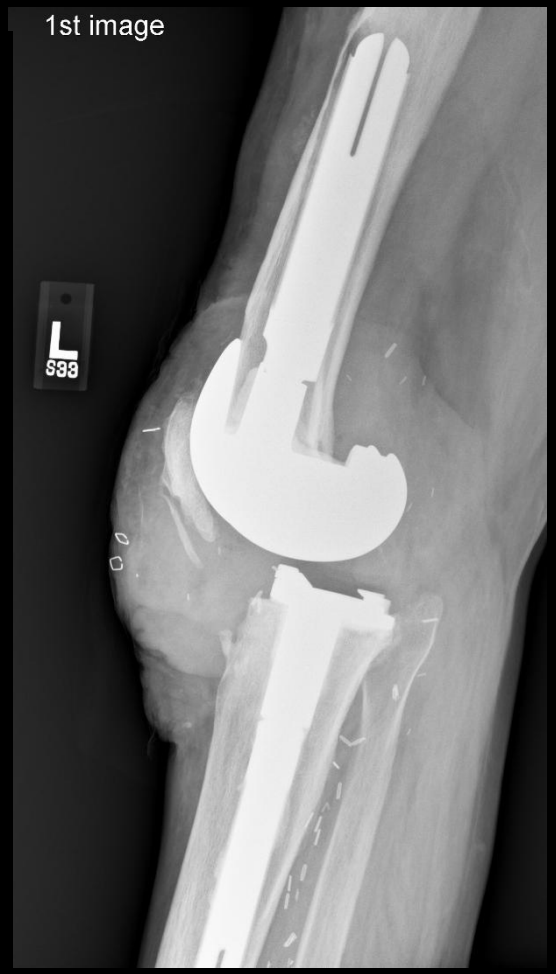
Dislocated liner

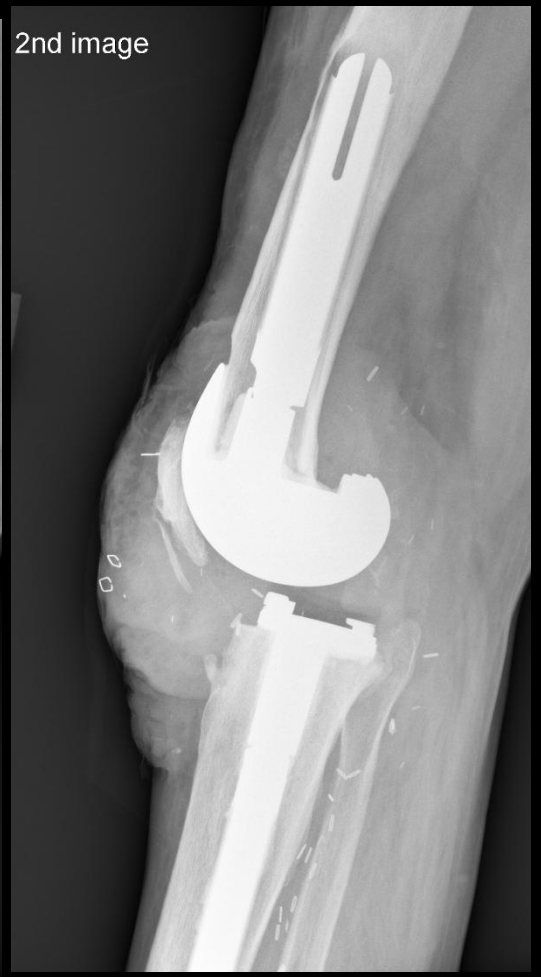
But maybe…something you might not hear about elsewhere?

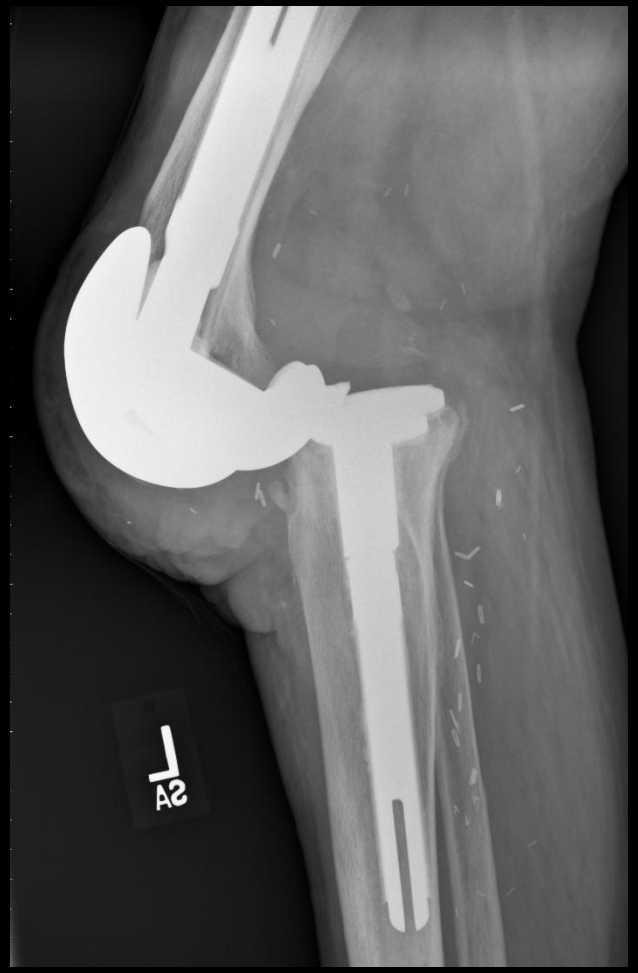
One type of total knee arthroplasty (TKA) can create a unique problem….

ER has been trying to reduce this knee for hours…









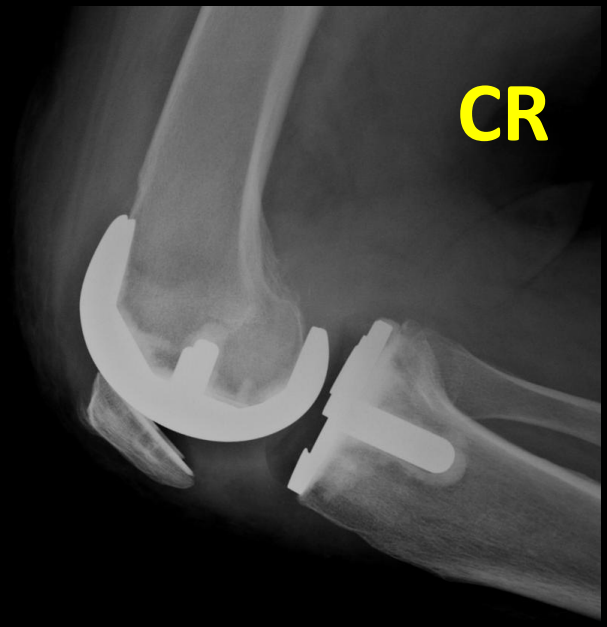
Why is this not working?

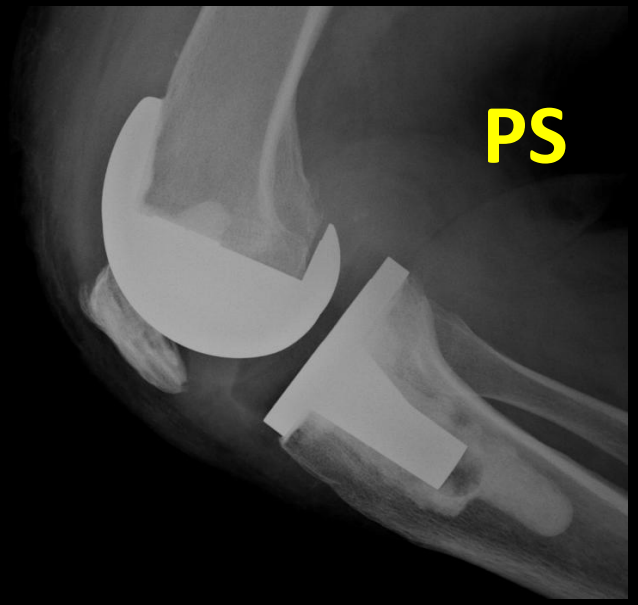
Total Knee Arthroplasty: Basic Design

- **Unconstrained**
  - Cruciate-retaining (CR)
  - Posterior stabilizing (PS)

- **Constrained**
  - Nonhinged
  - Hinged

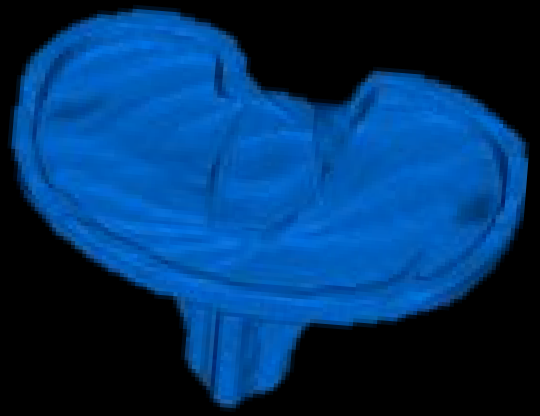
  - Fixed vs mobile bearing
  - Cemented or uncemented

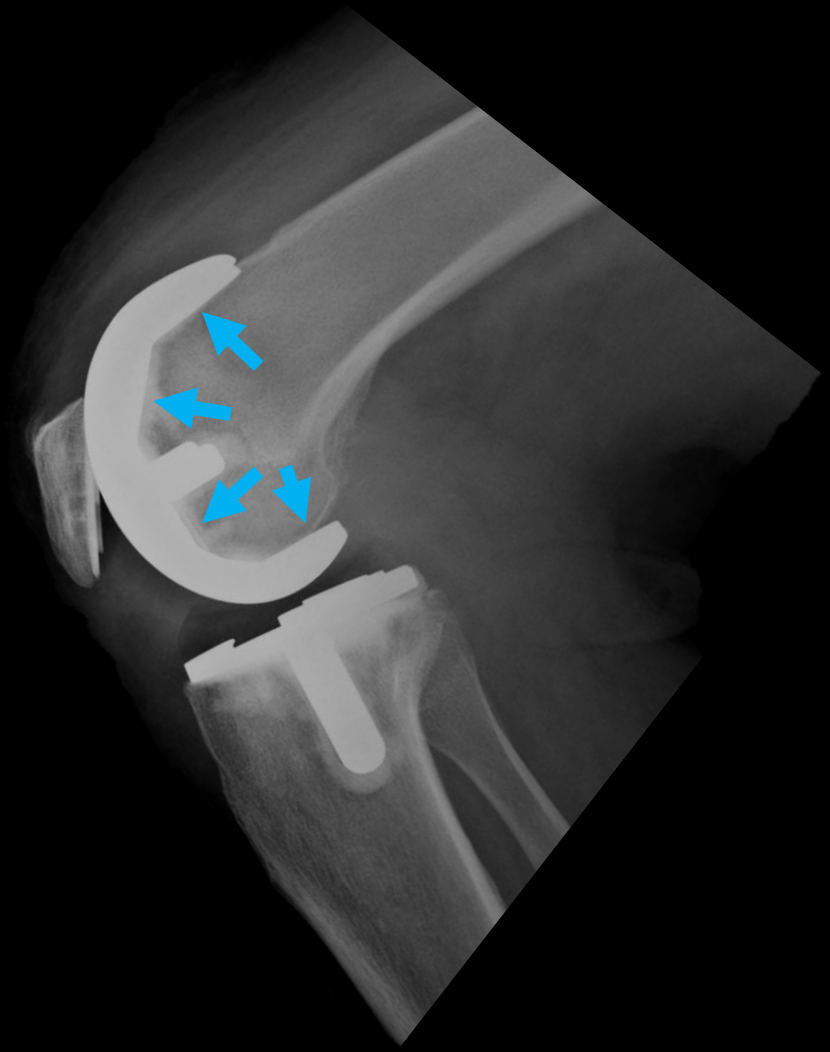




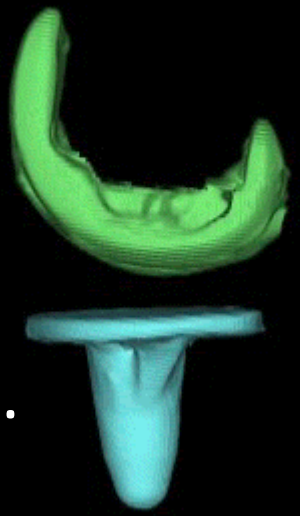
CR: cruciate retaining

Thin metal surface where the cartilage used to be
Polyethylene liner (poly) creates the space between
You keep your PCL

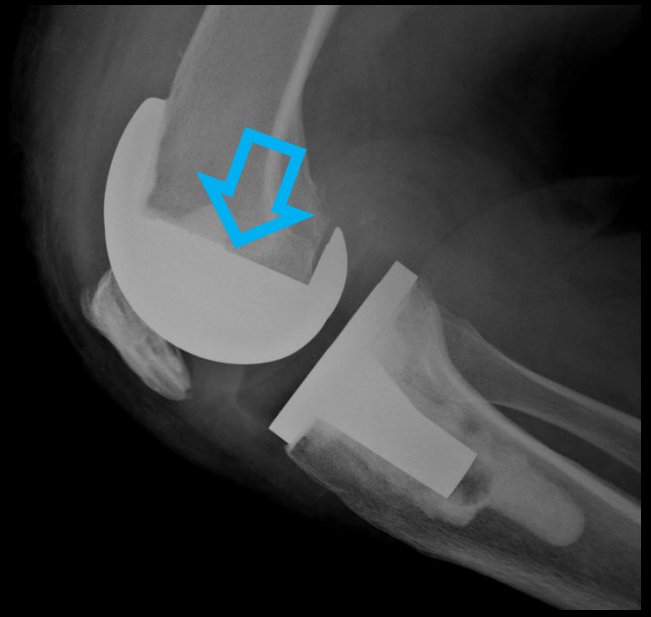


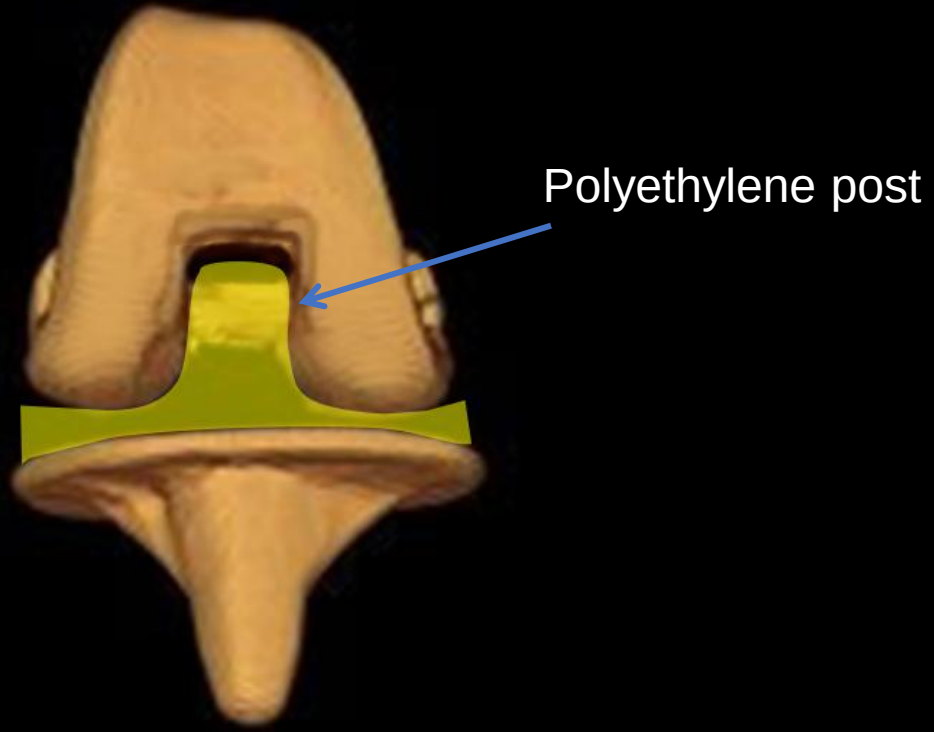


PS: Posterior stabilizing

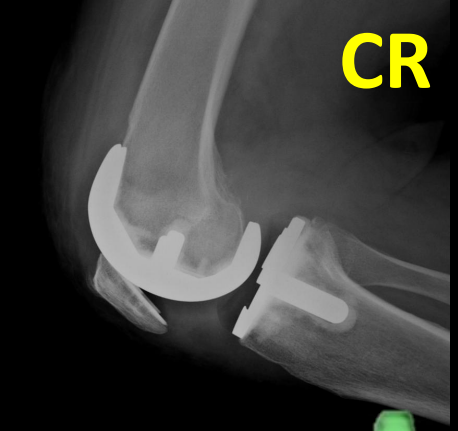


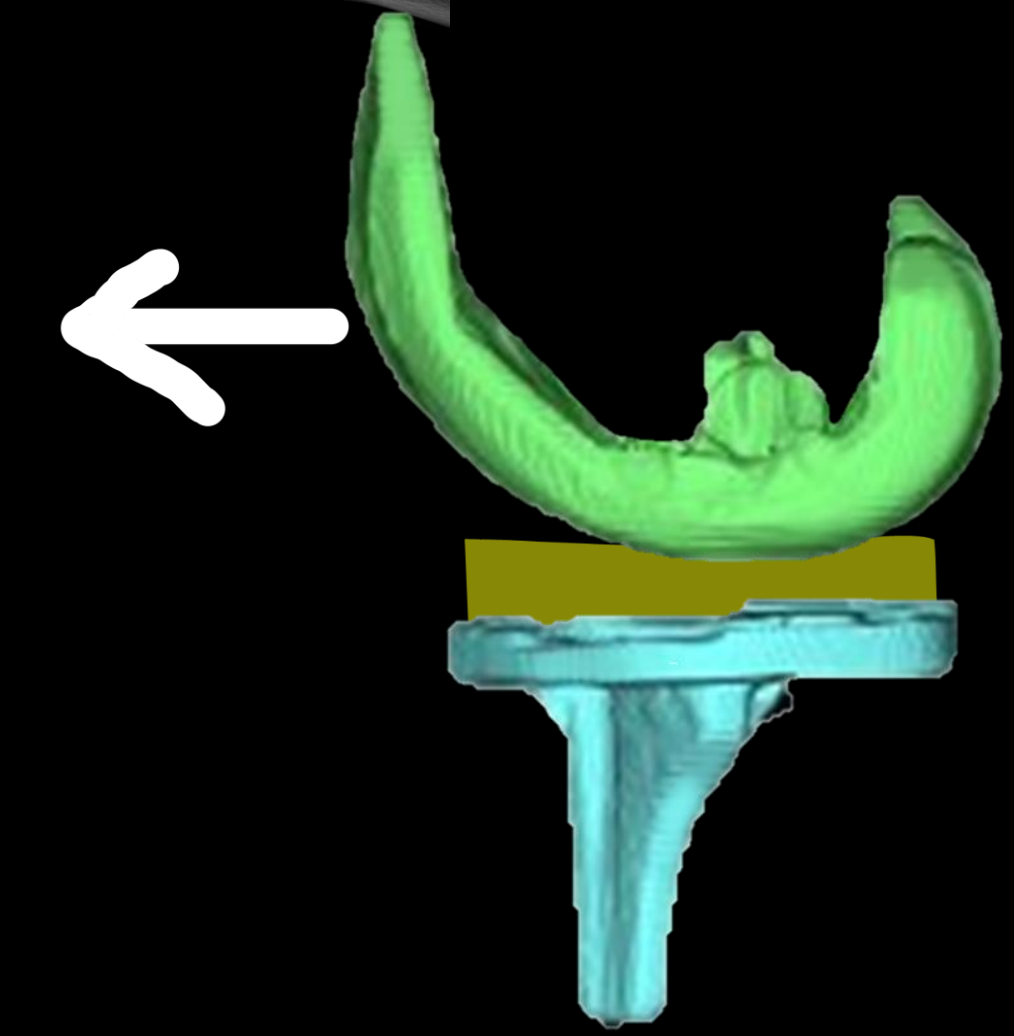
- For knees with incompetent PCL that need more instability
- Femoral component contains a box with a cam bar
- Tibial component also has an extra piece: a polyethylene post.

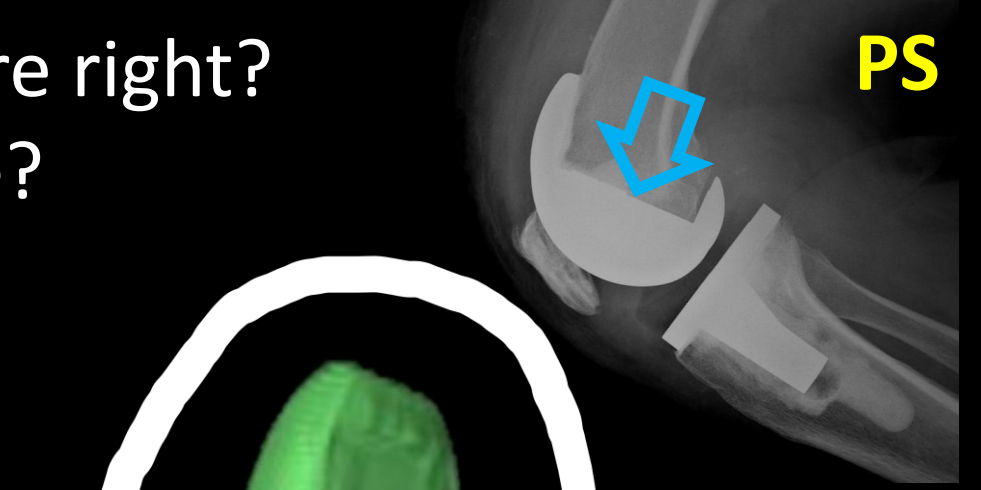


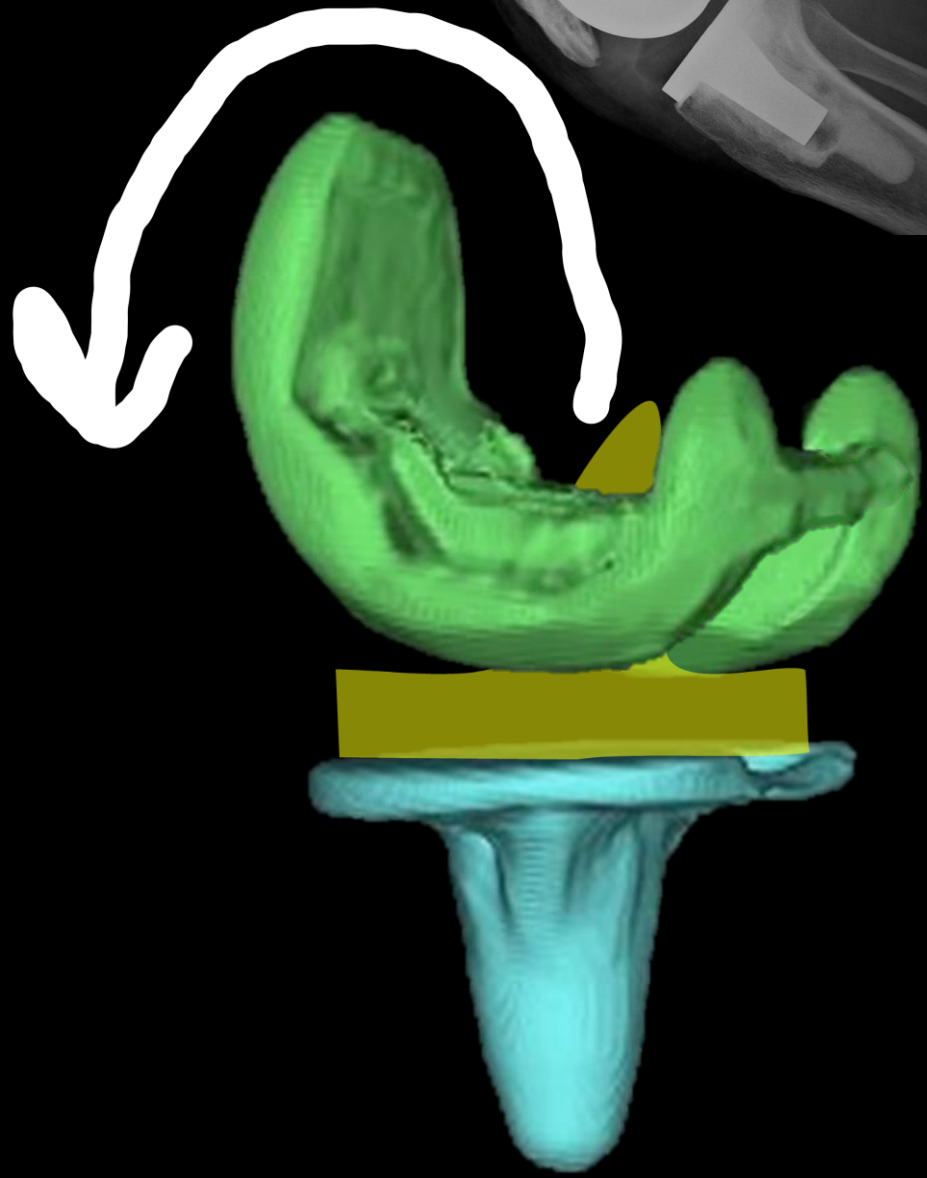


This is a Radiology lecture right?
Why should I care?

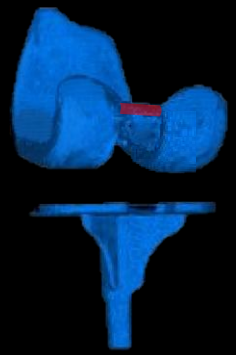


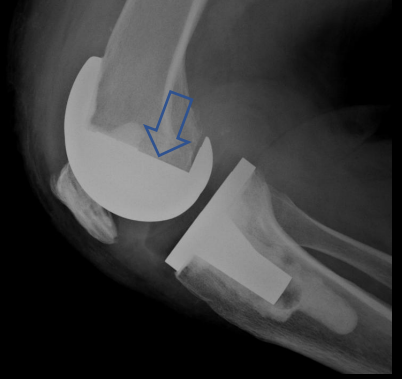


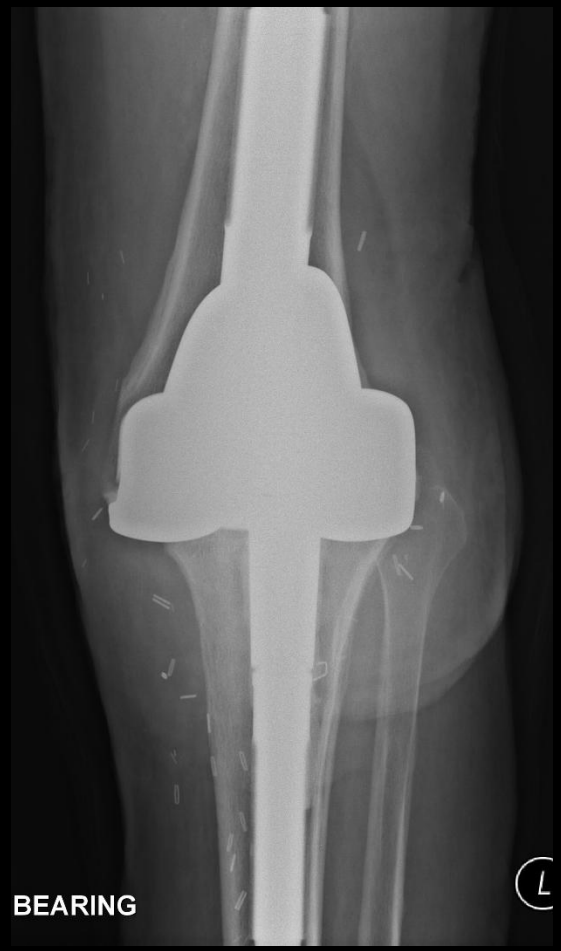


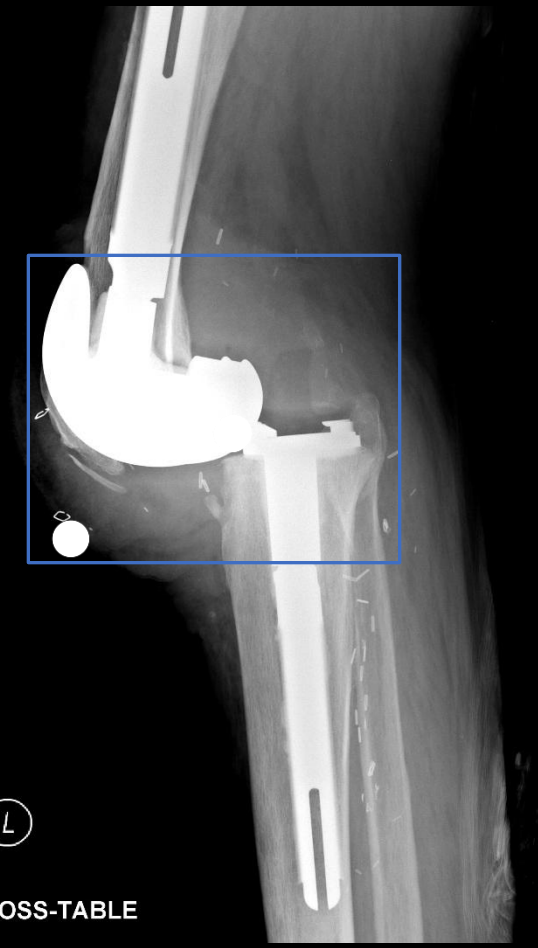


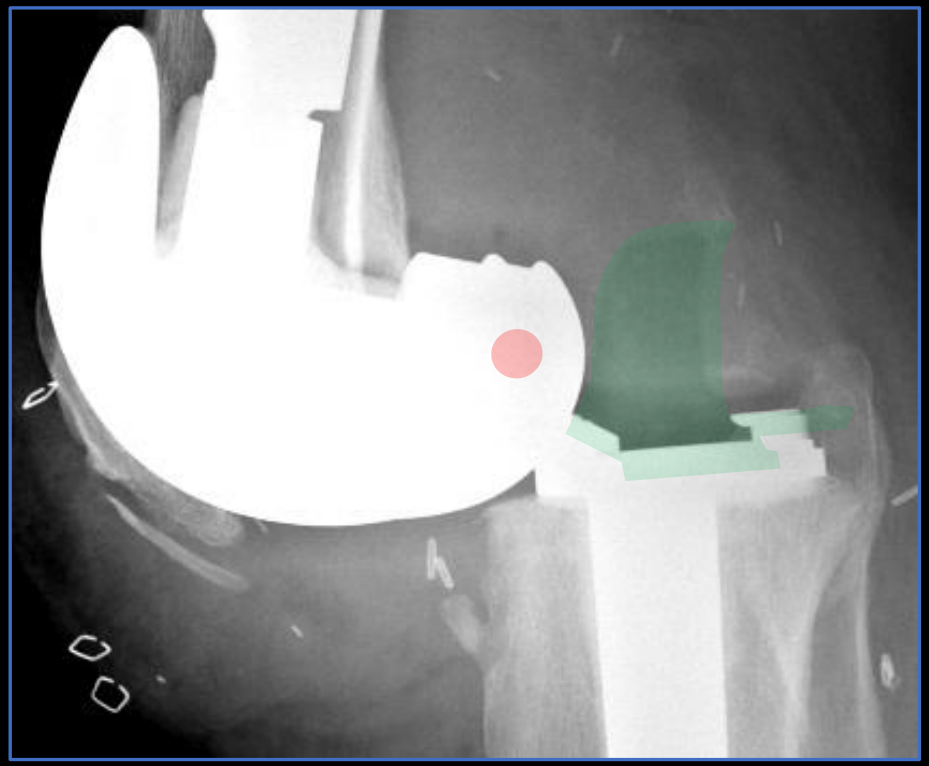
So let’s go back to that pt from earlier…
This is a posterior stabilizing (PS)



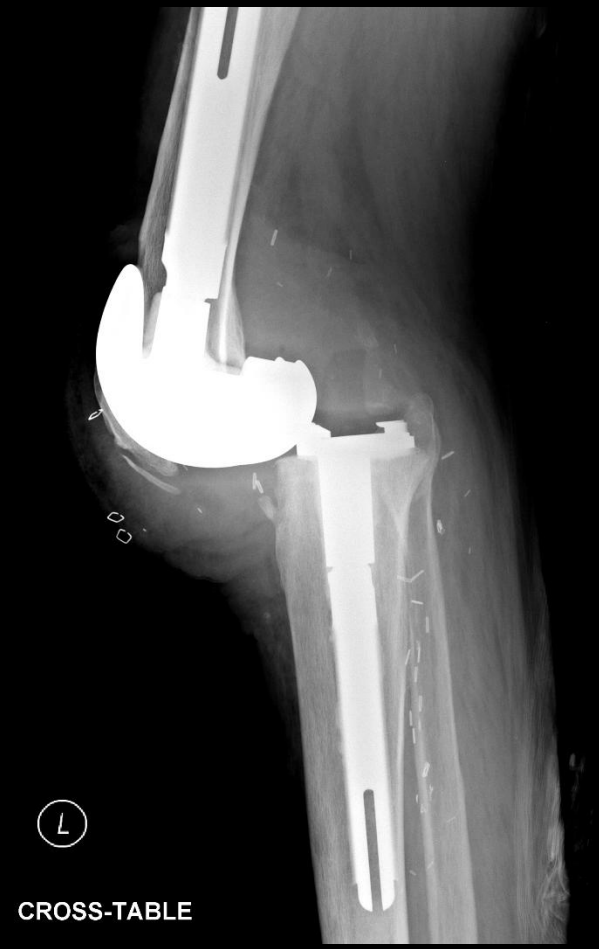


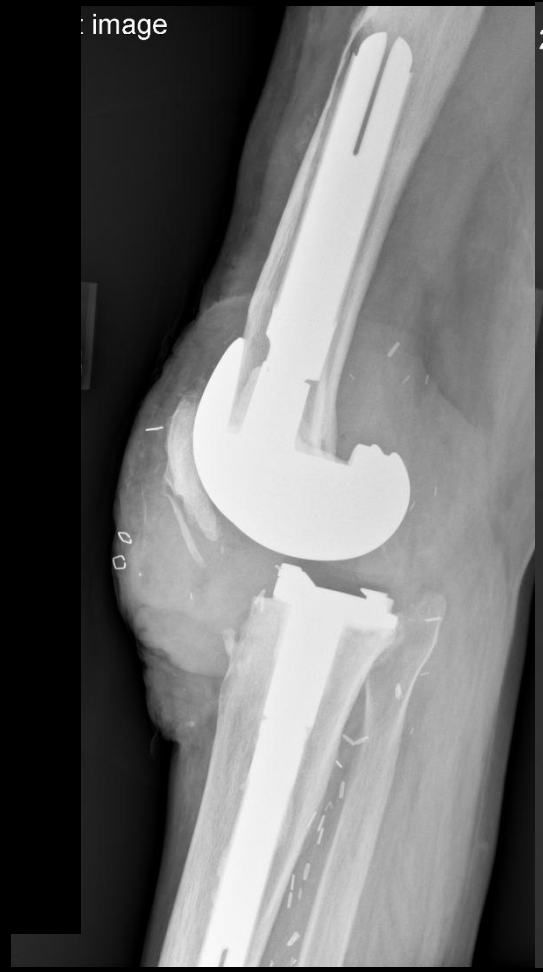


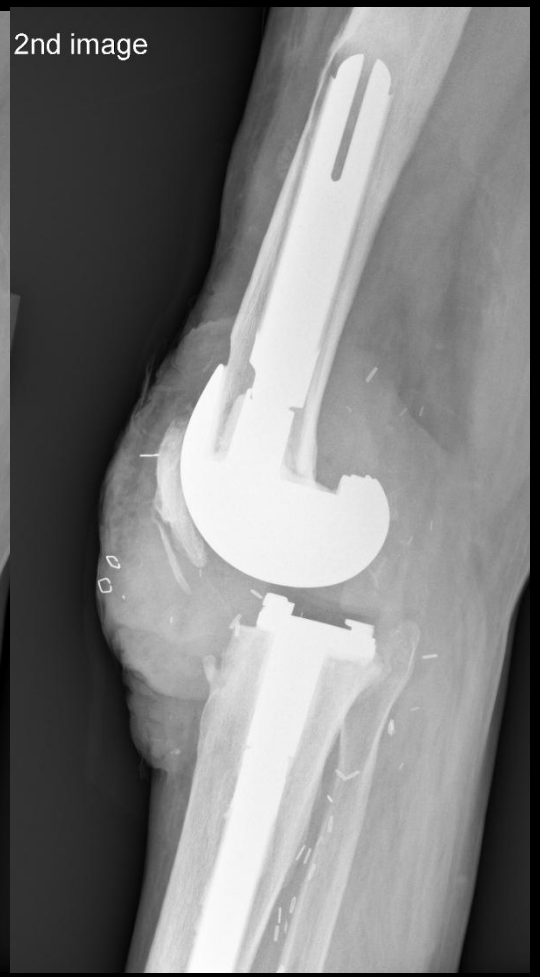


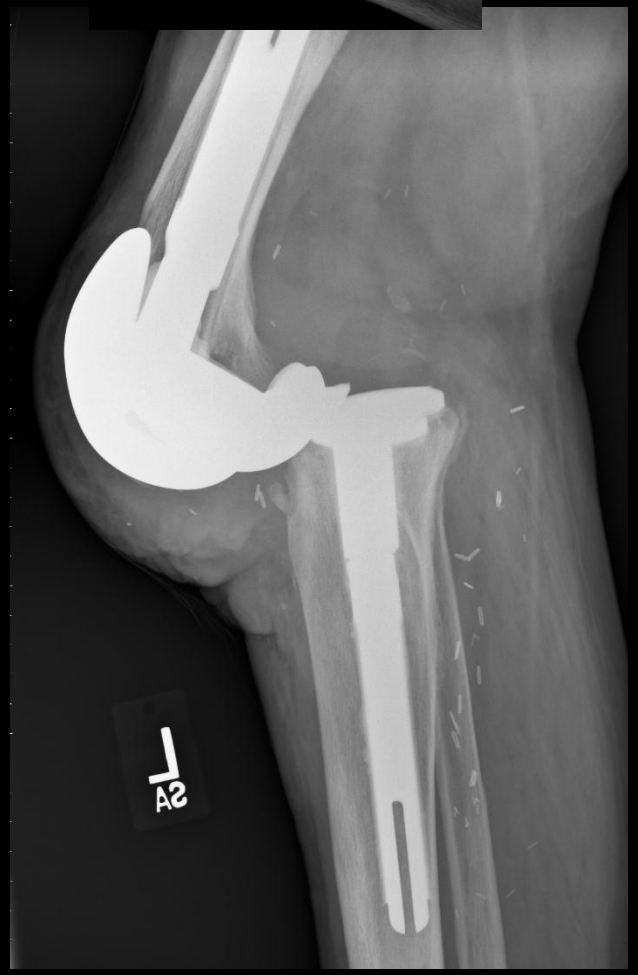


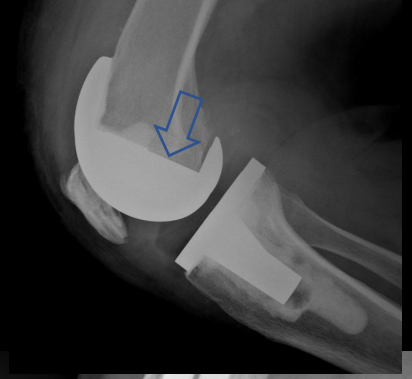
So let’s go back to that pt from earlier…
This is a posterior stabilizing (PS)









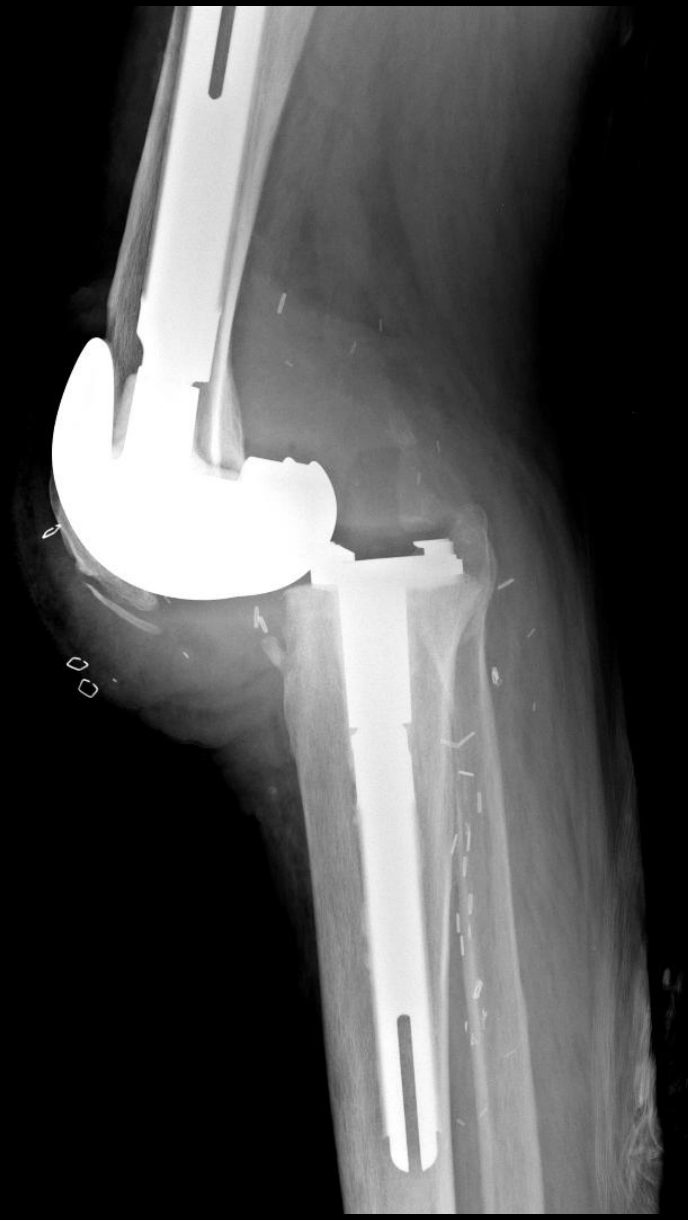


This is cam jump

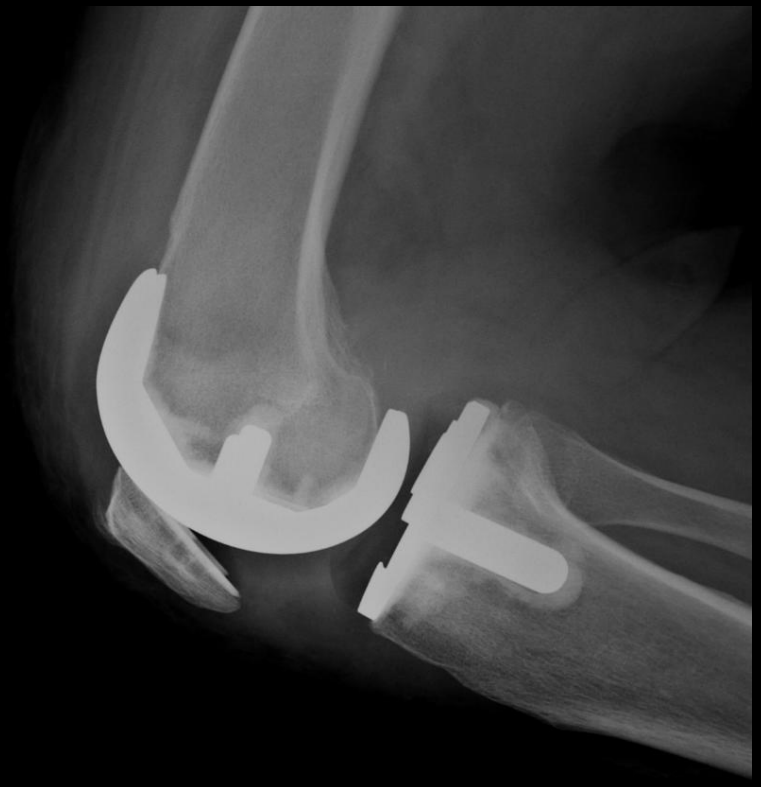
Can’t reduce the knee by just pulling it back into alignment

Have to get the cam bar back over the post…

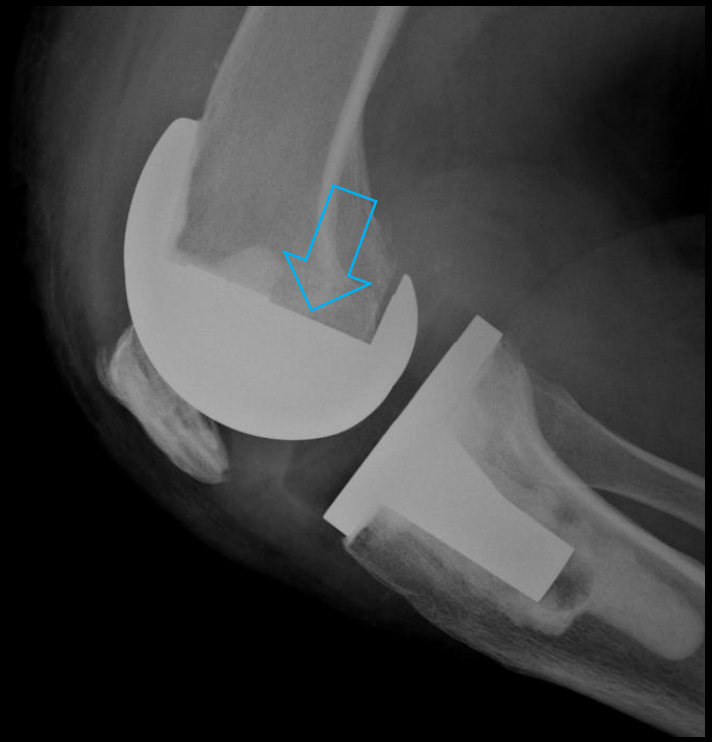
Save your pt some uncomfortable and unhelpful reduction attempts by recognizing this injury!

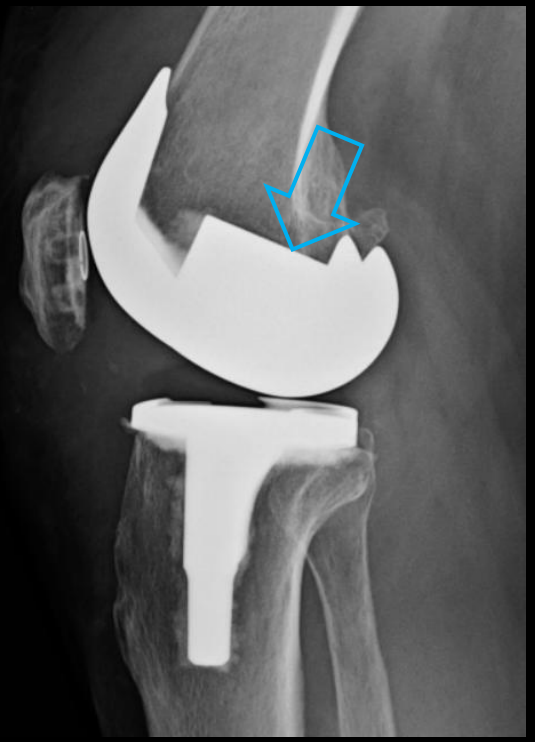


Cruciate-retaining:
basic resurfacing

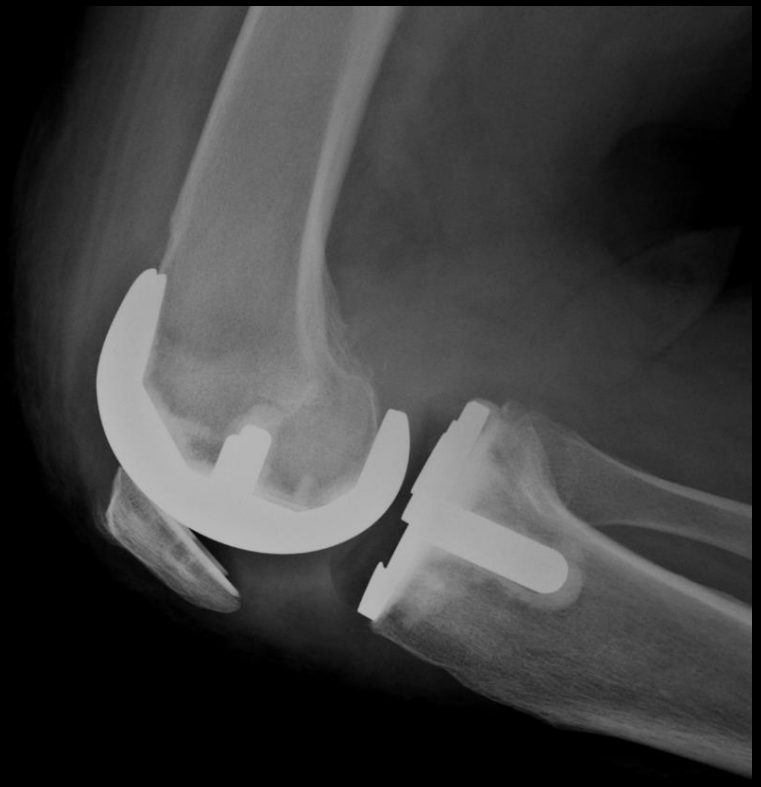


Posterior-stabilizing:
PCL gone, look for the “box”

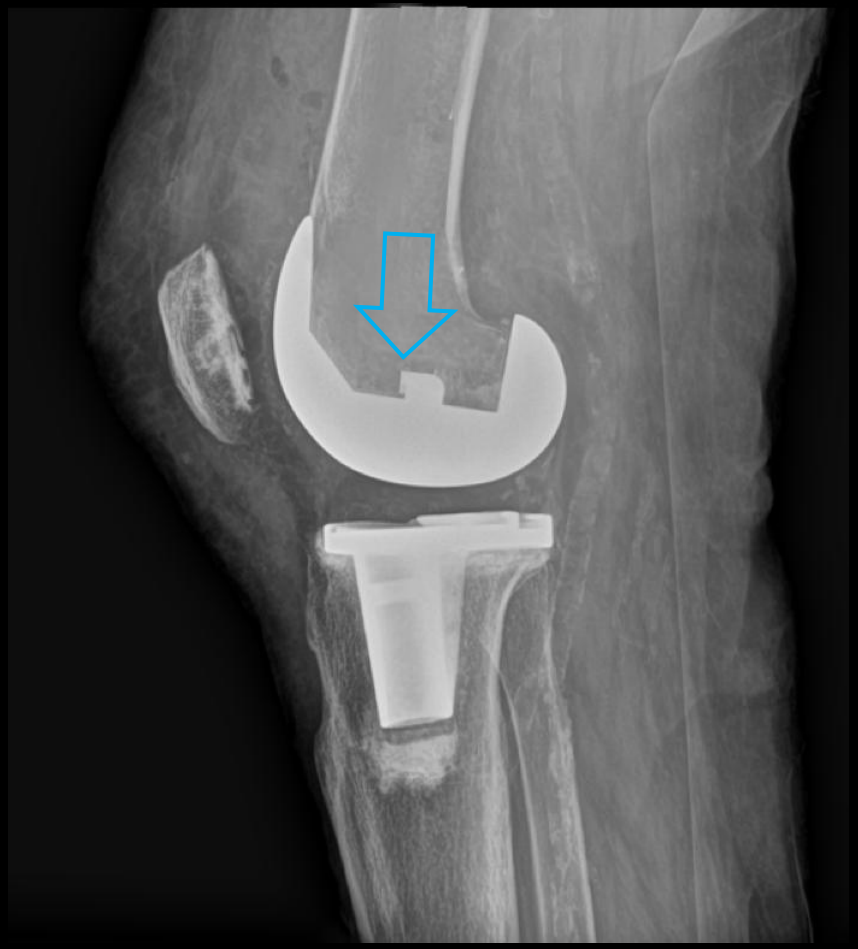


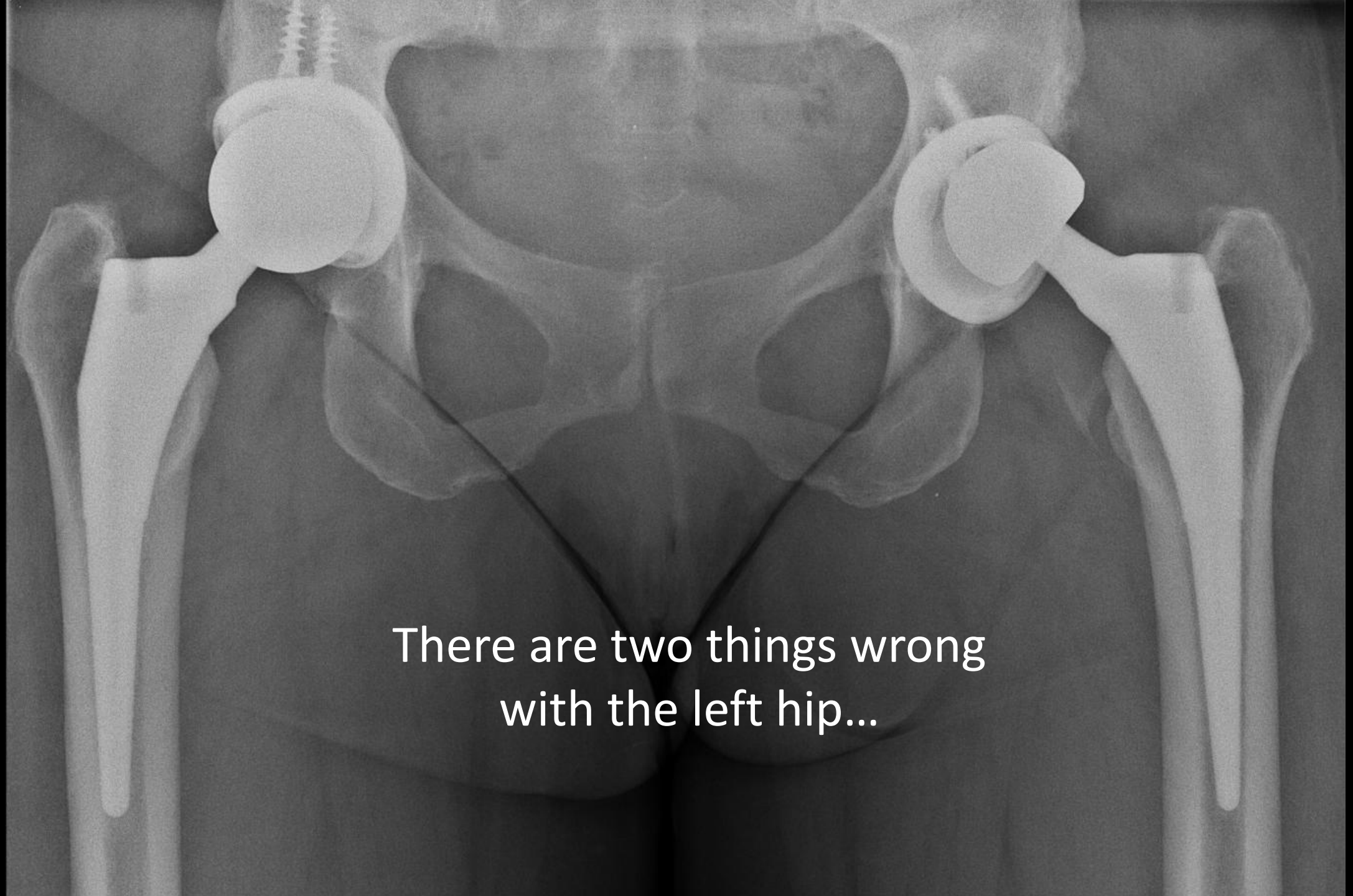


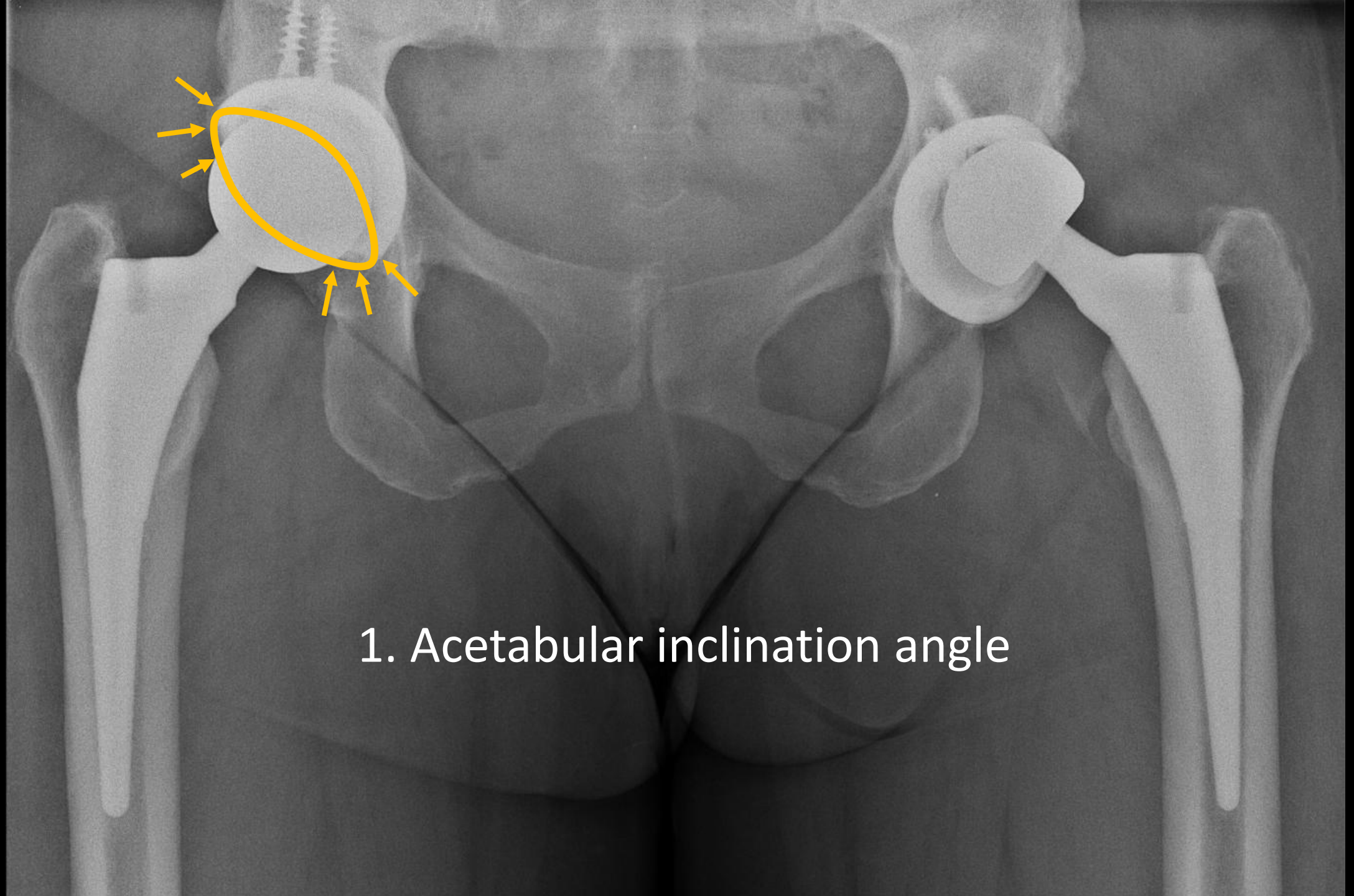
Cruciate-retaining:
basic resurfacing

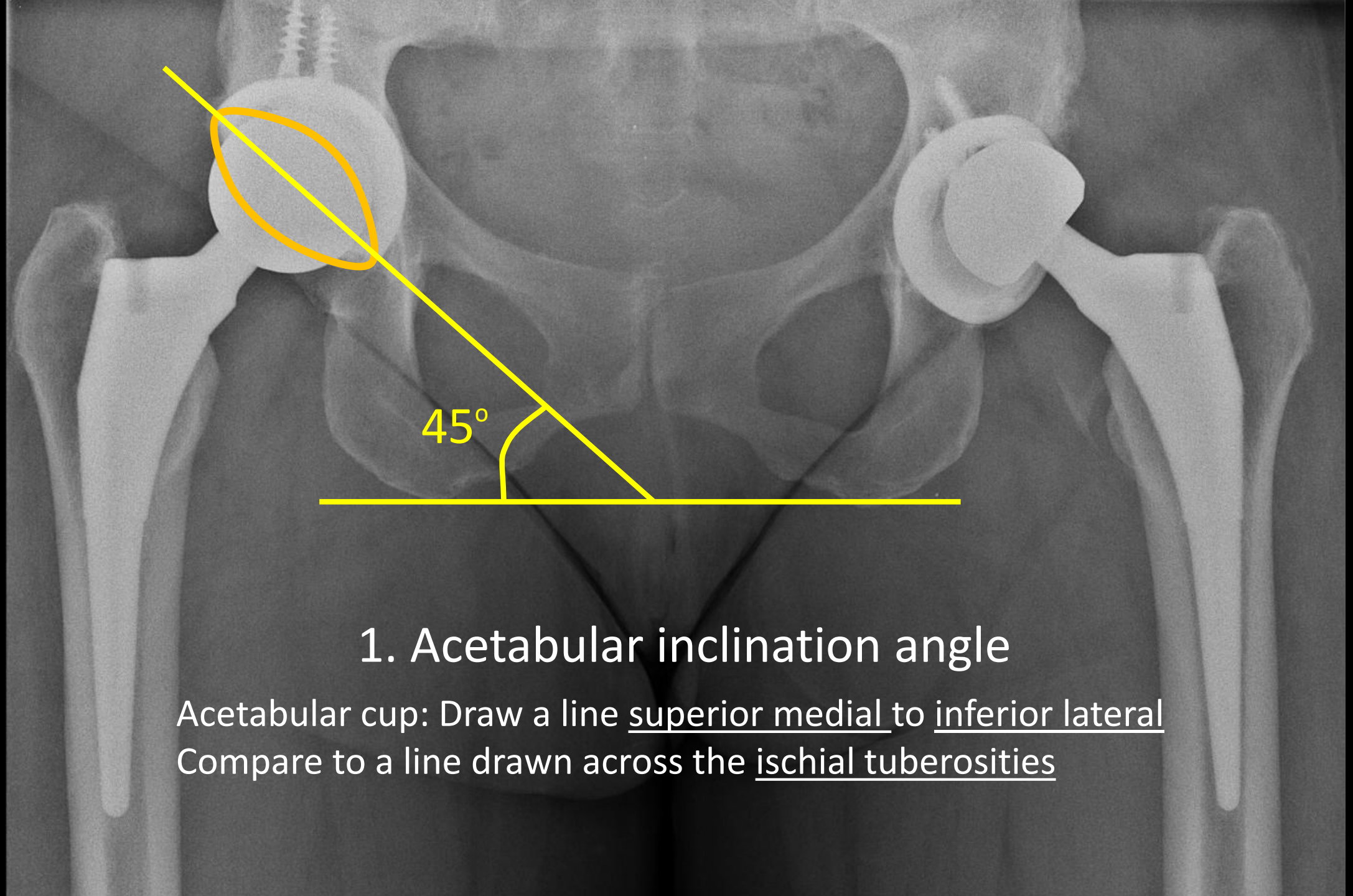


Posterior-stabilizing:
PCL gone, look for the “box”



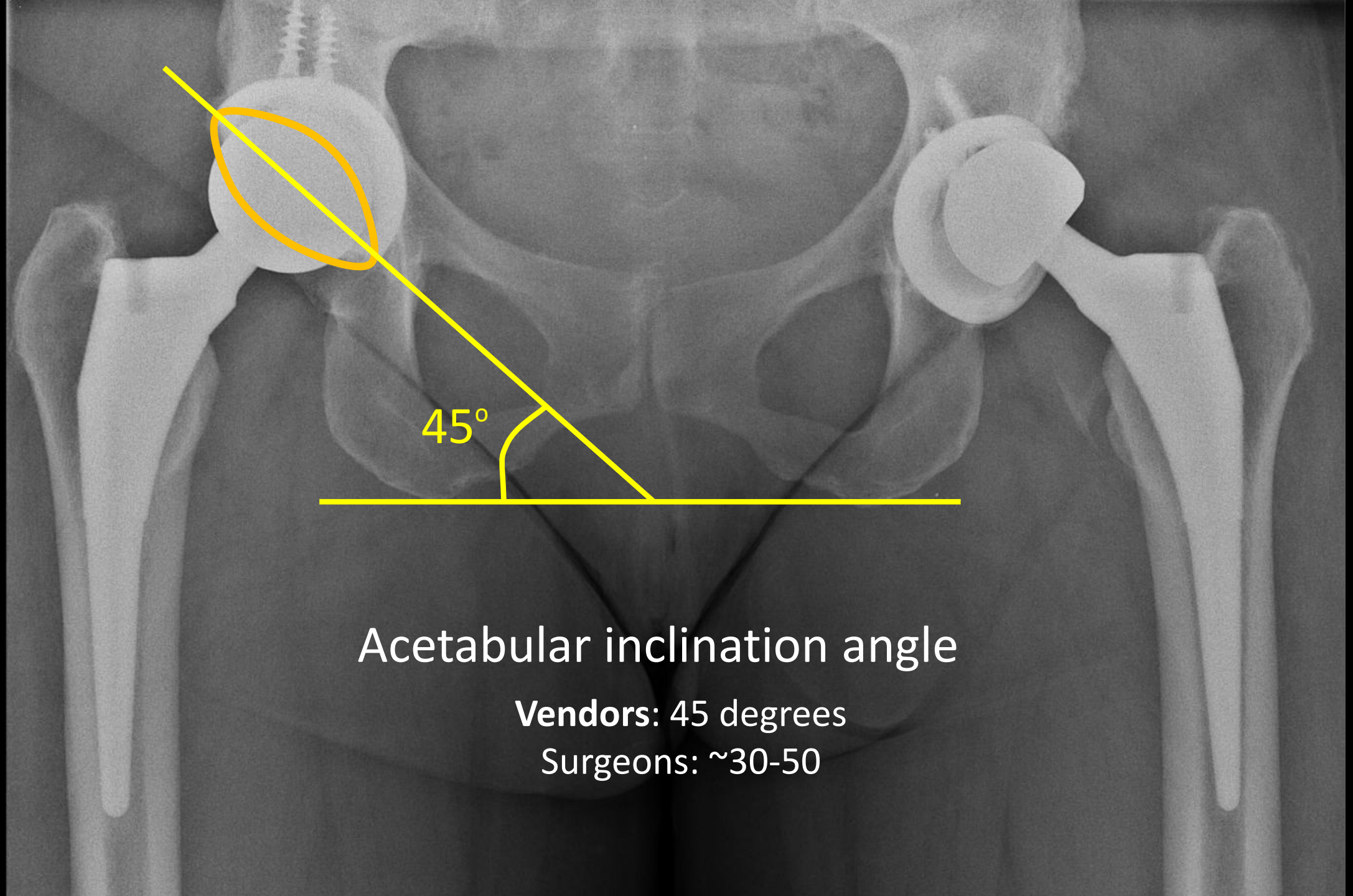

There are two things wrong
with the left hip…


1. Acetabular inclination angle



1. Acetabular inclination angle

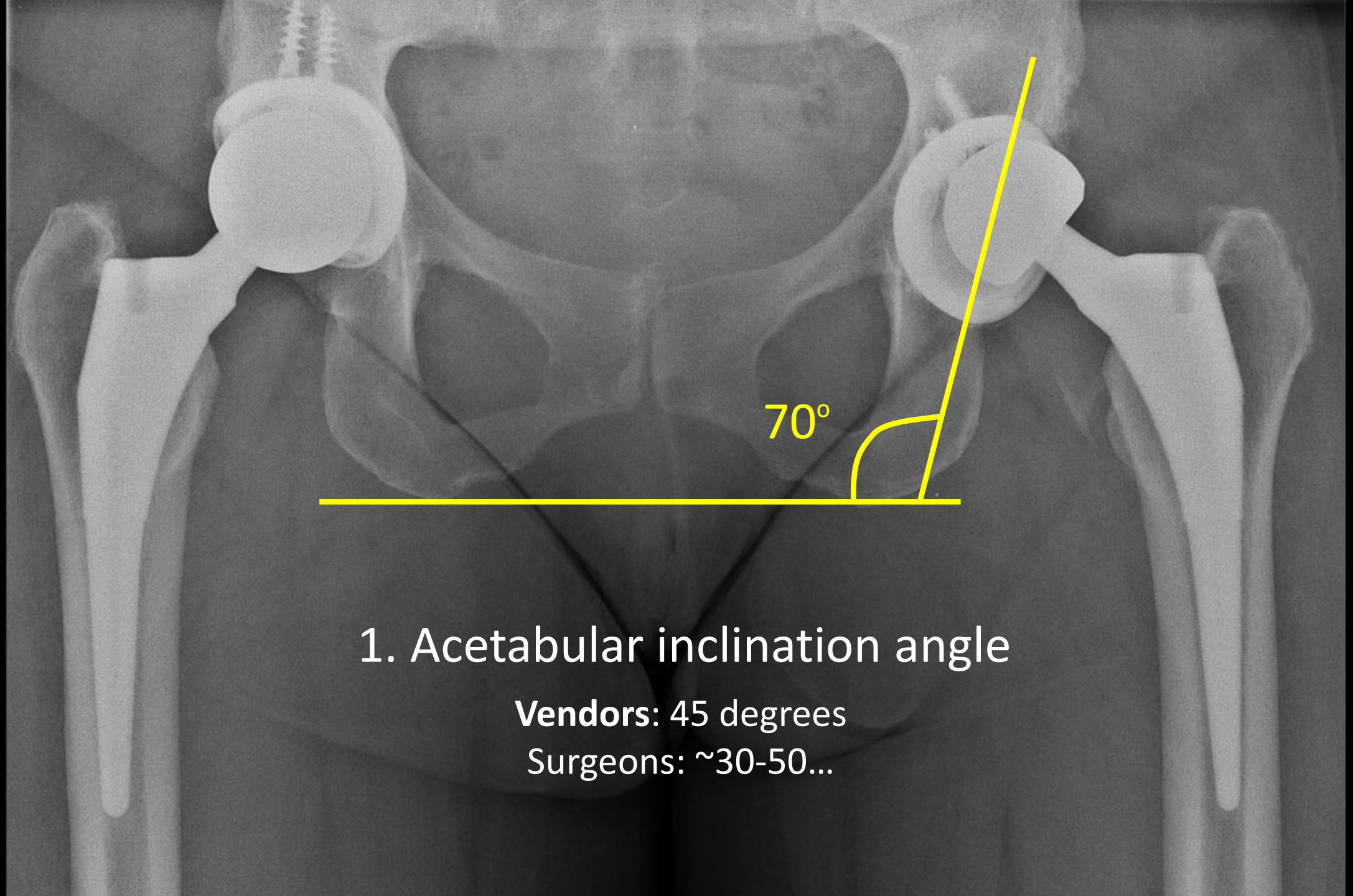
Acetabular cup: Draw a line superior medial to inferior lateral
Compare to a line drawn across the ischial tuberosities



Acetabular inclination angle

Vendors: 45 degrees

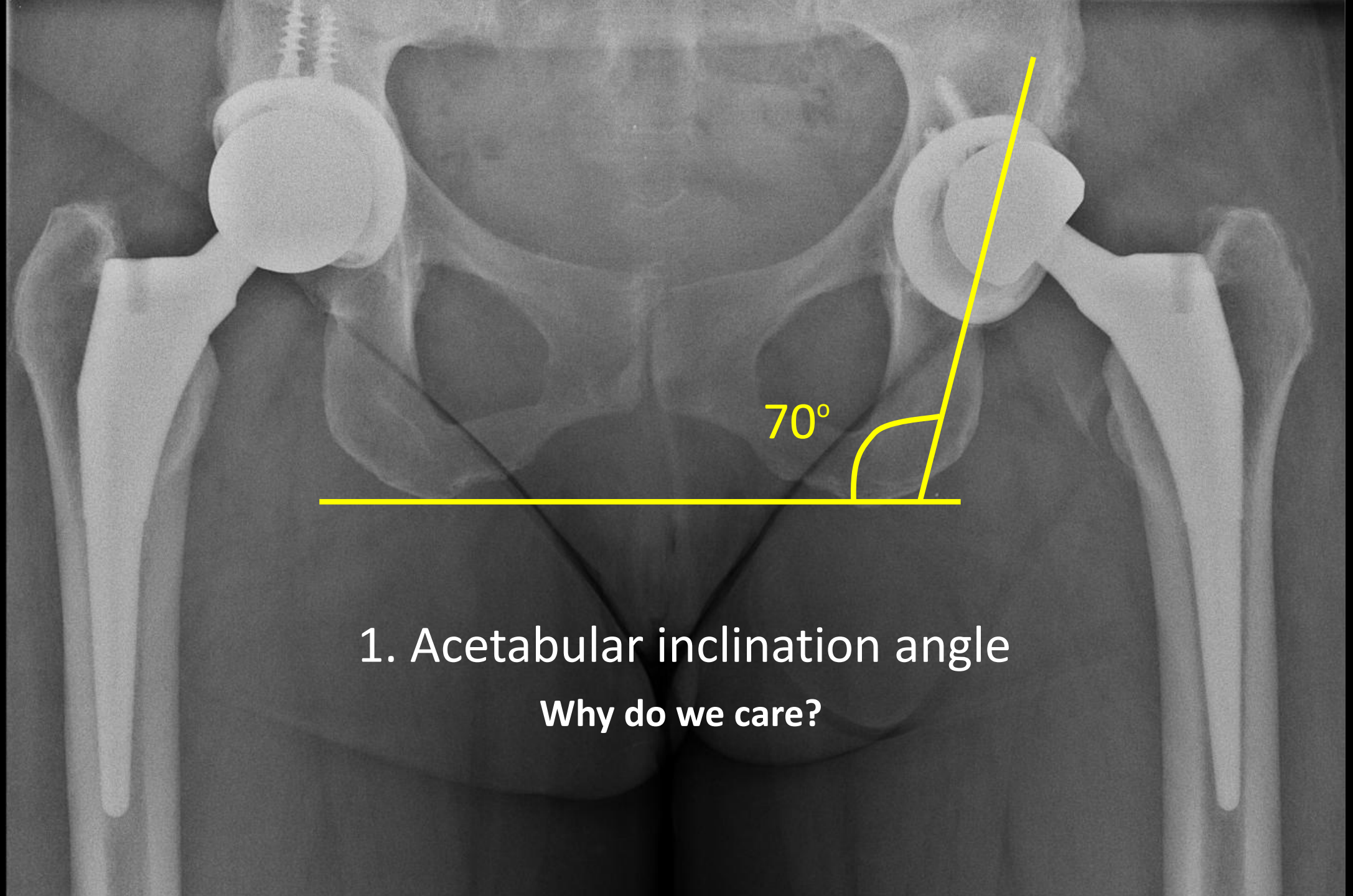
Surgeons: ~30-50



1. Acetabular inclination angle

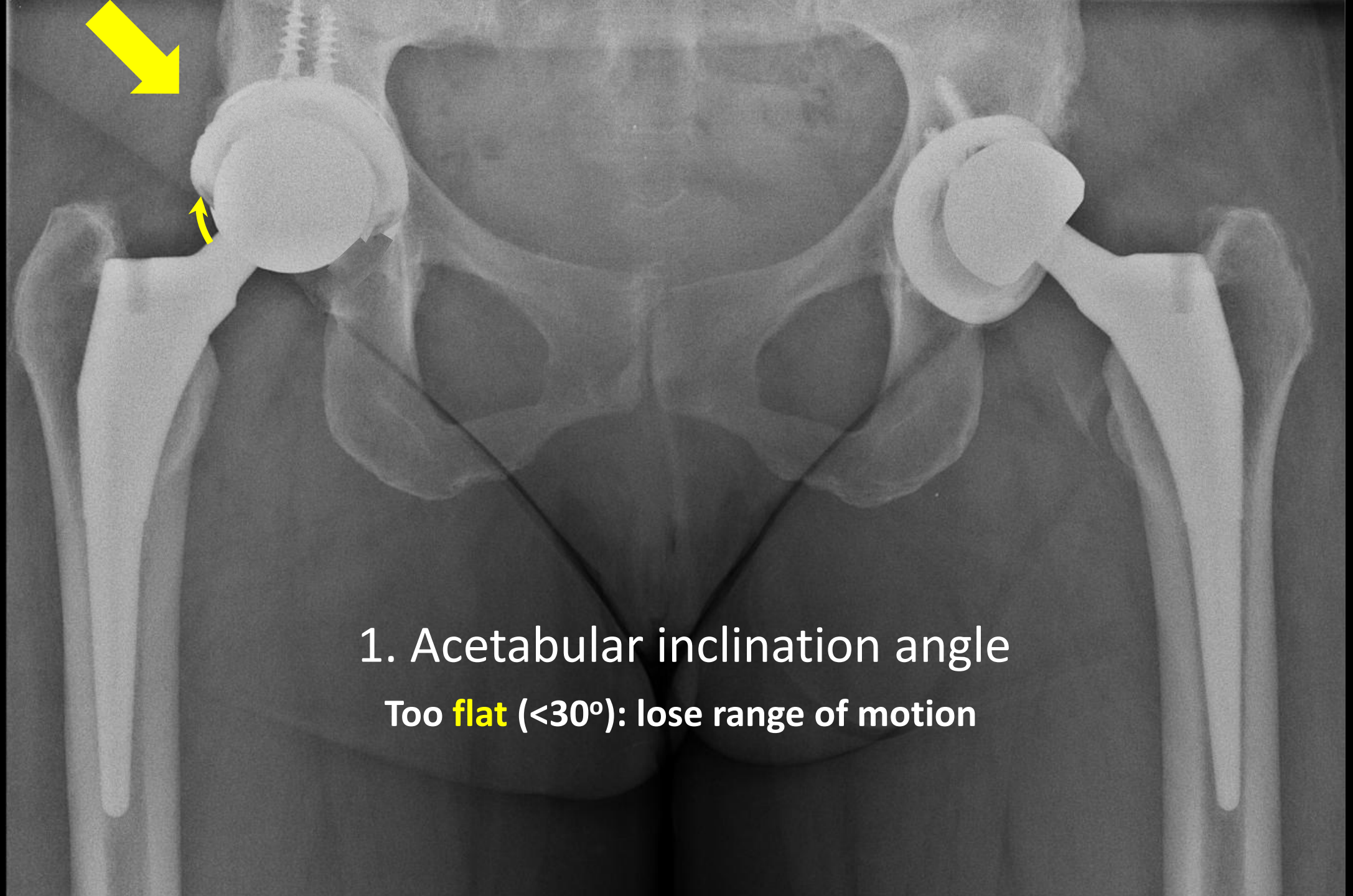
Vendors: 45 degrees

Surgeons: ~30-50…



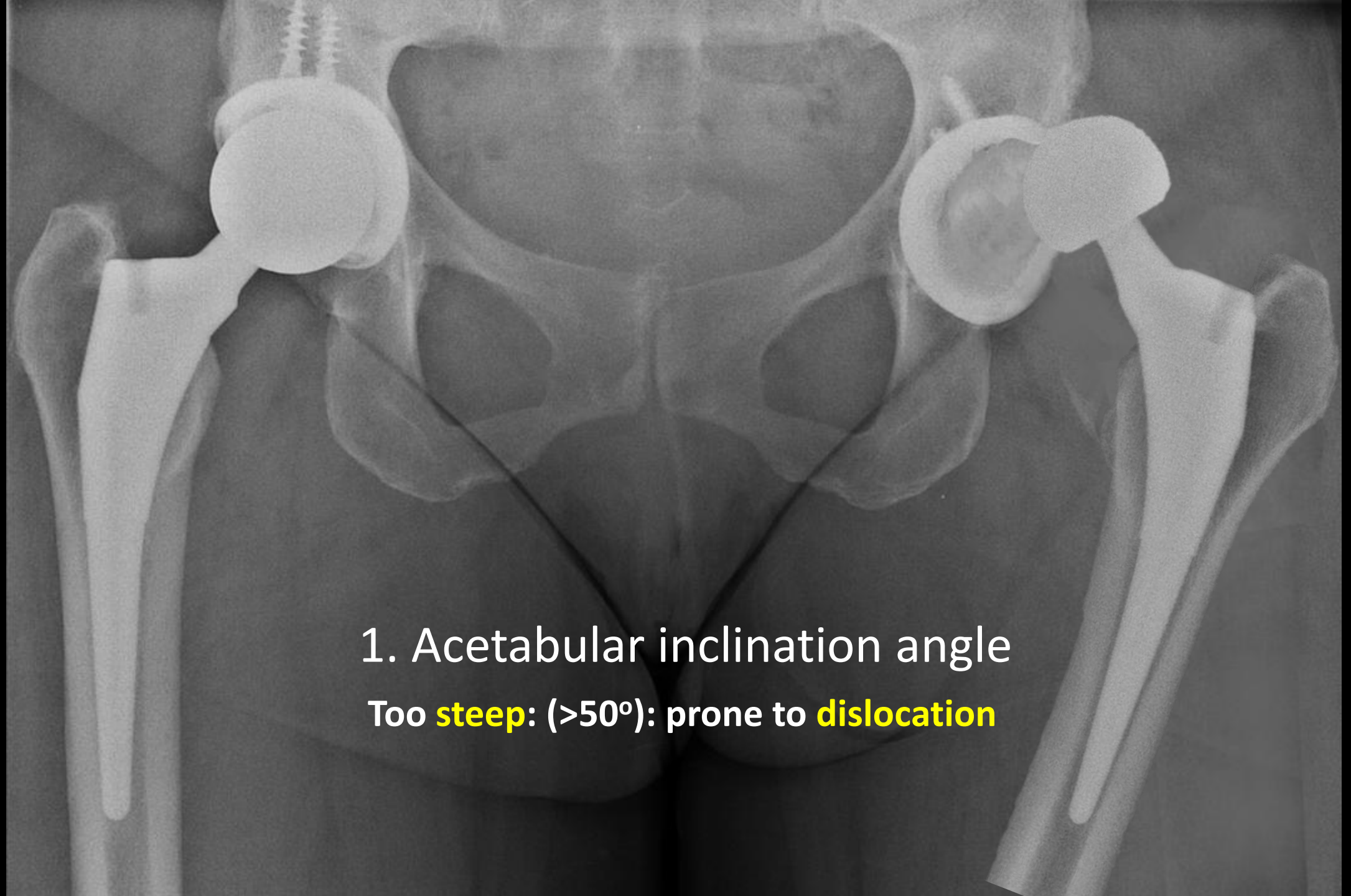
1. Acetabular inclination angle

Why do we care?



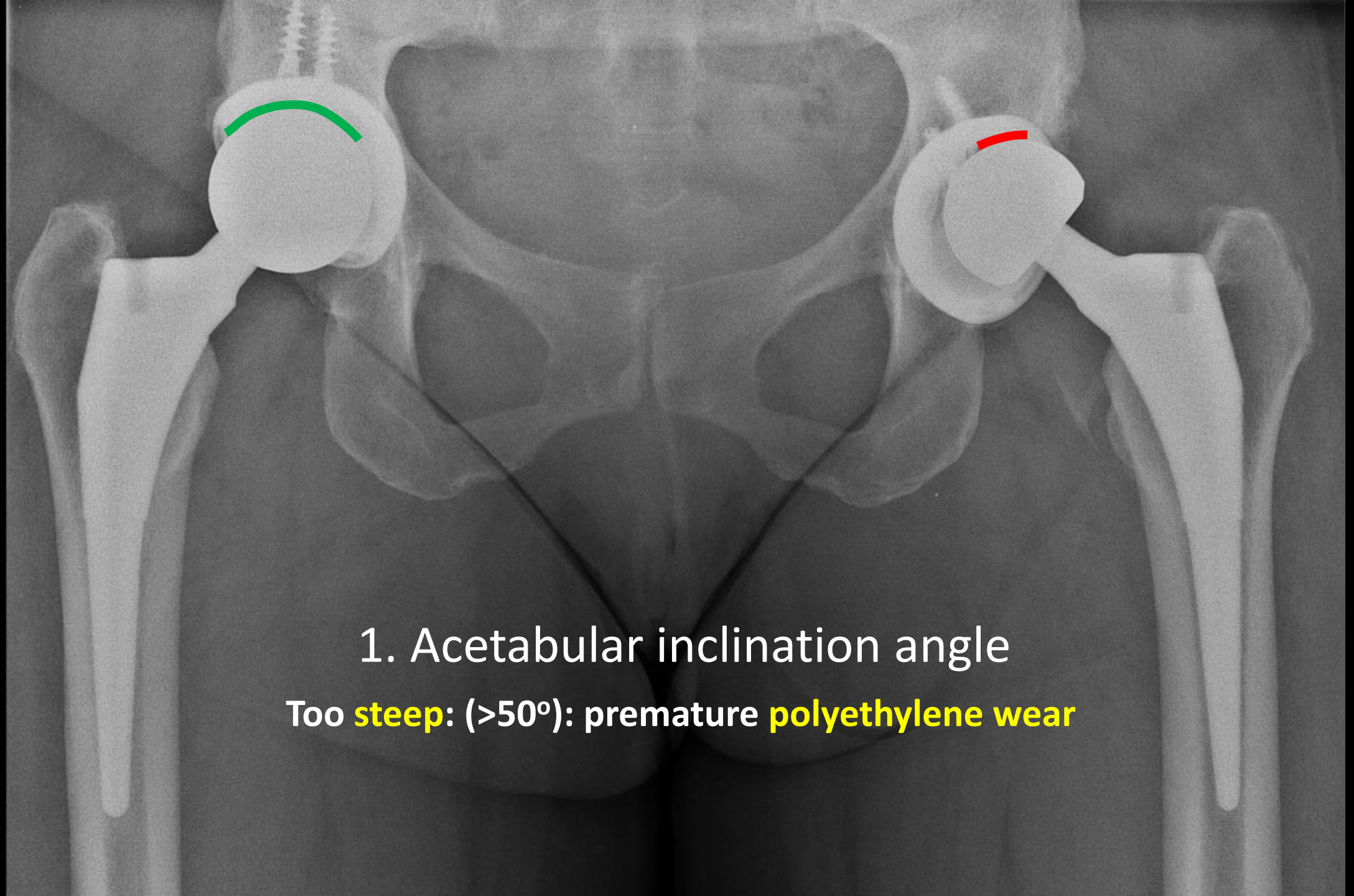
1. Acetabular inclination angle

Too flat (<30°): lose range of motion



1. Acetabular inclination angle

Too steep: (>50^{o}): prone to dislocation

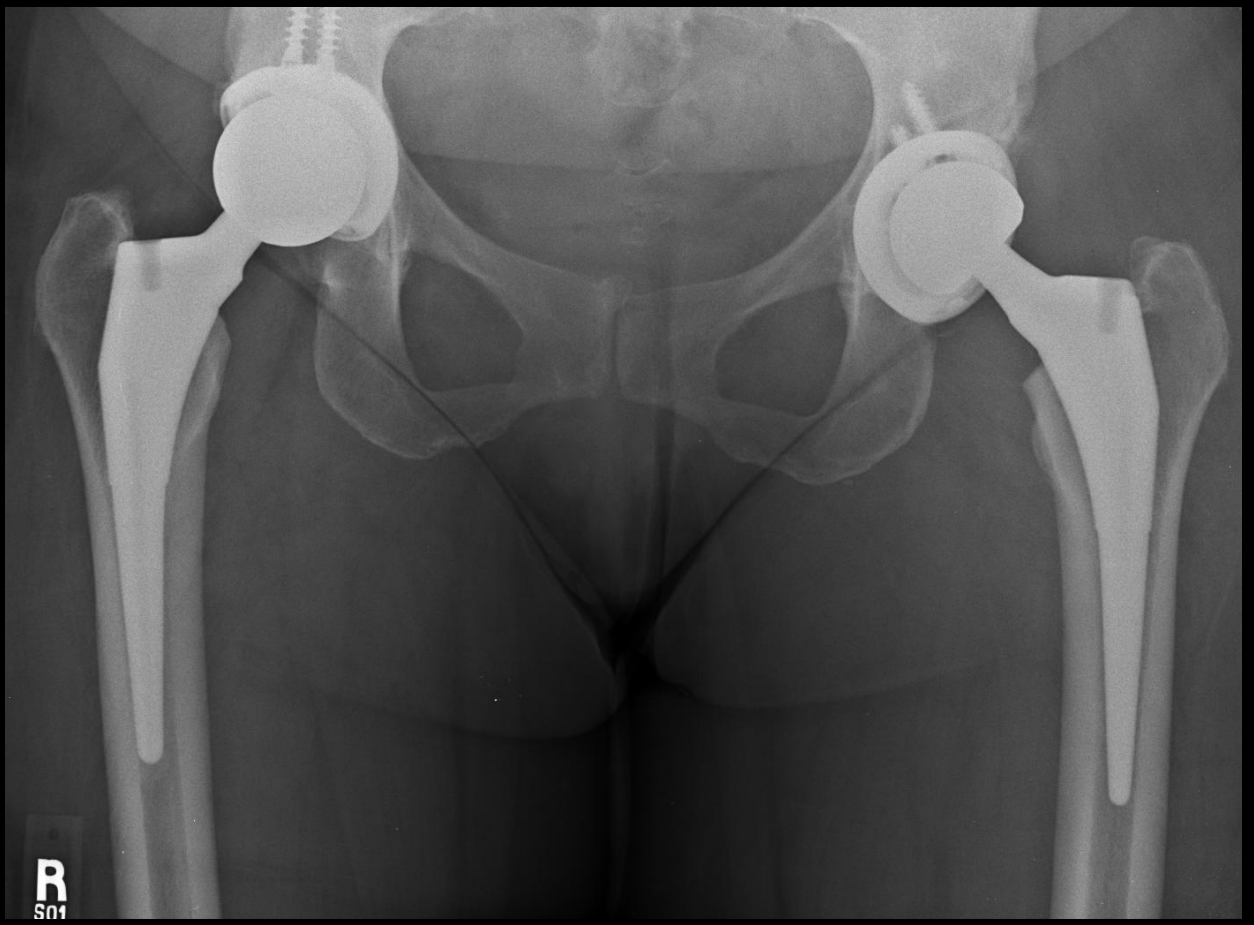


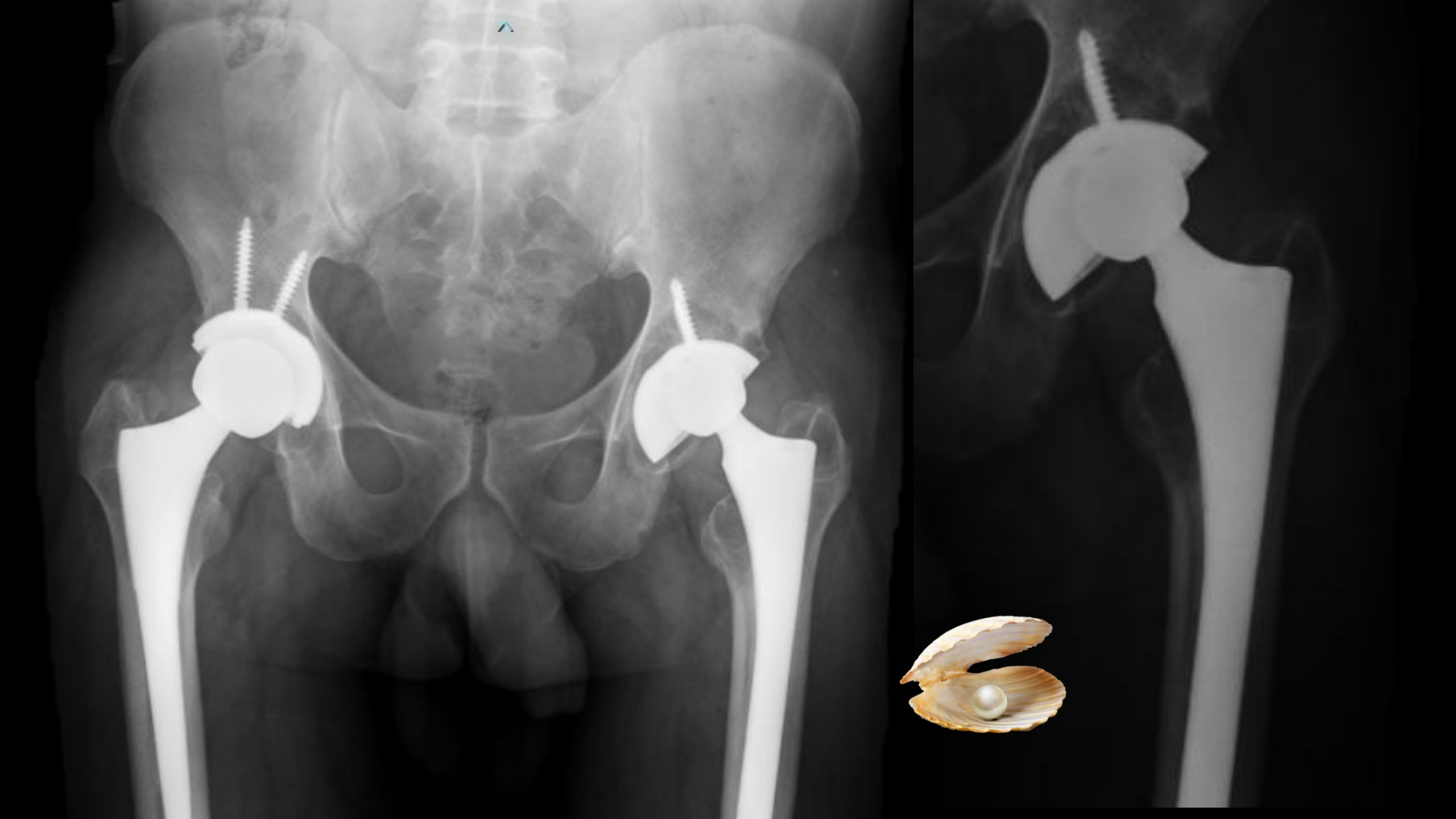
1. Acetabular inclination angle

Too steep: (>50^{o}): premature polyethylene wear

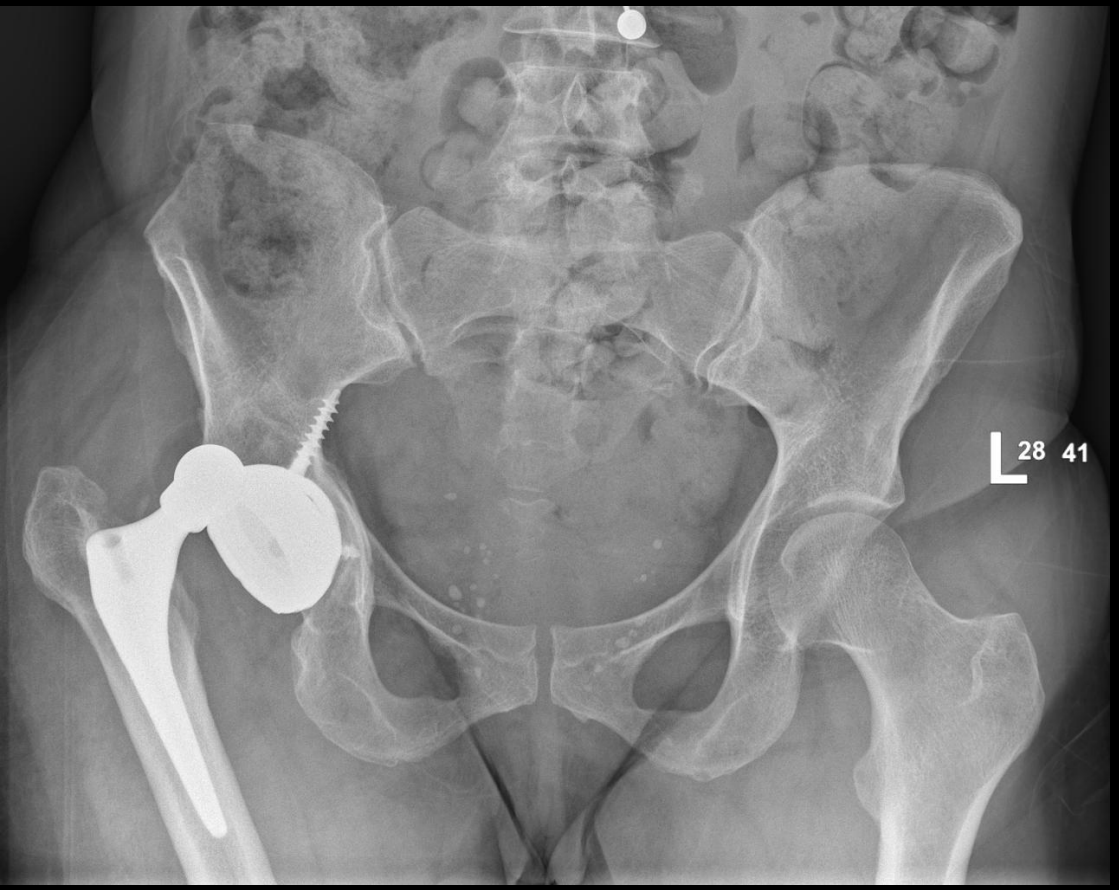
1 month post op

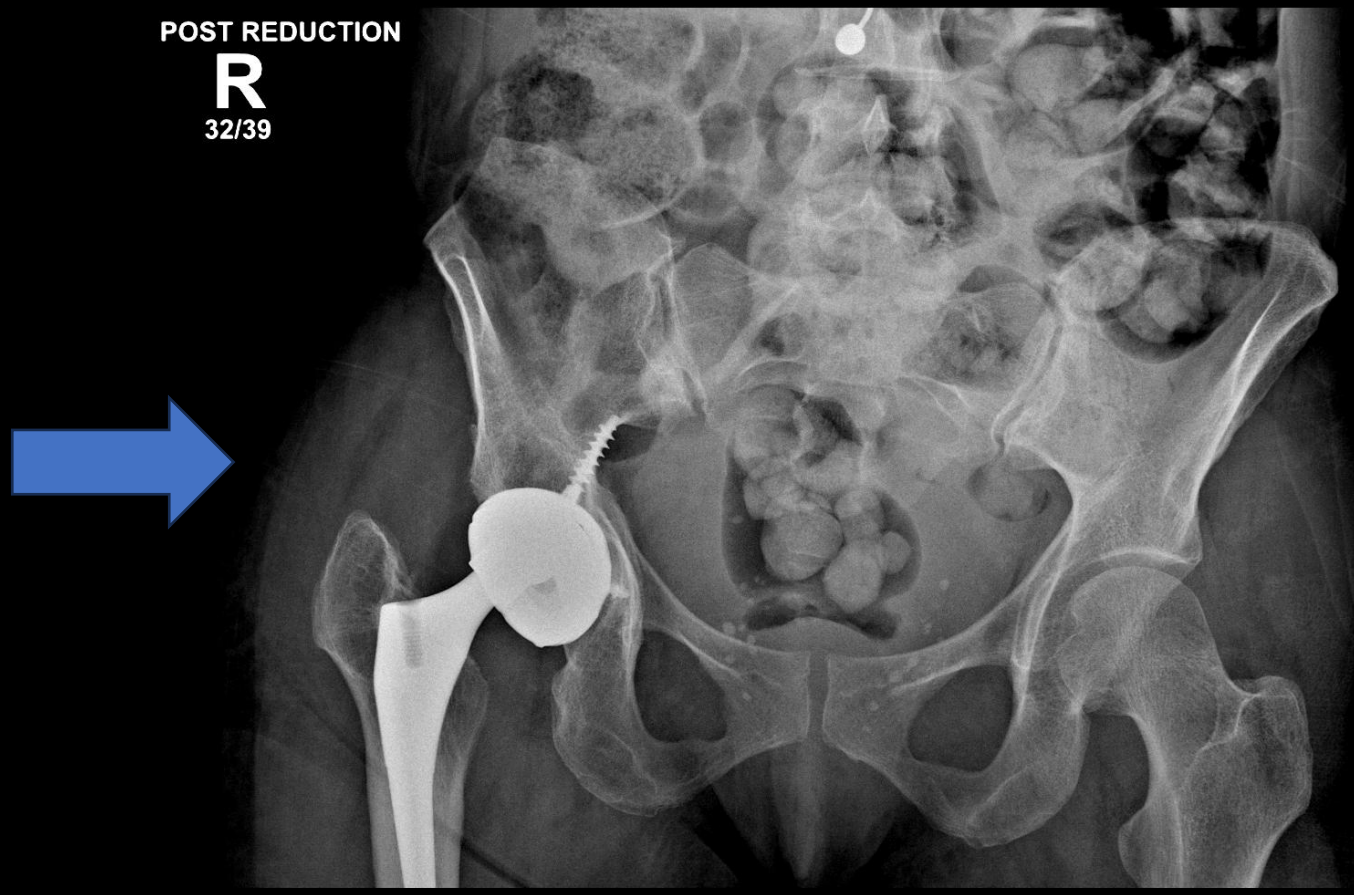
14 months later



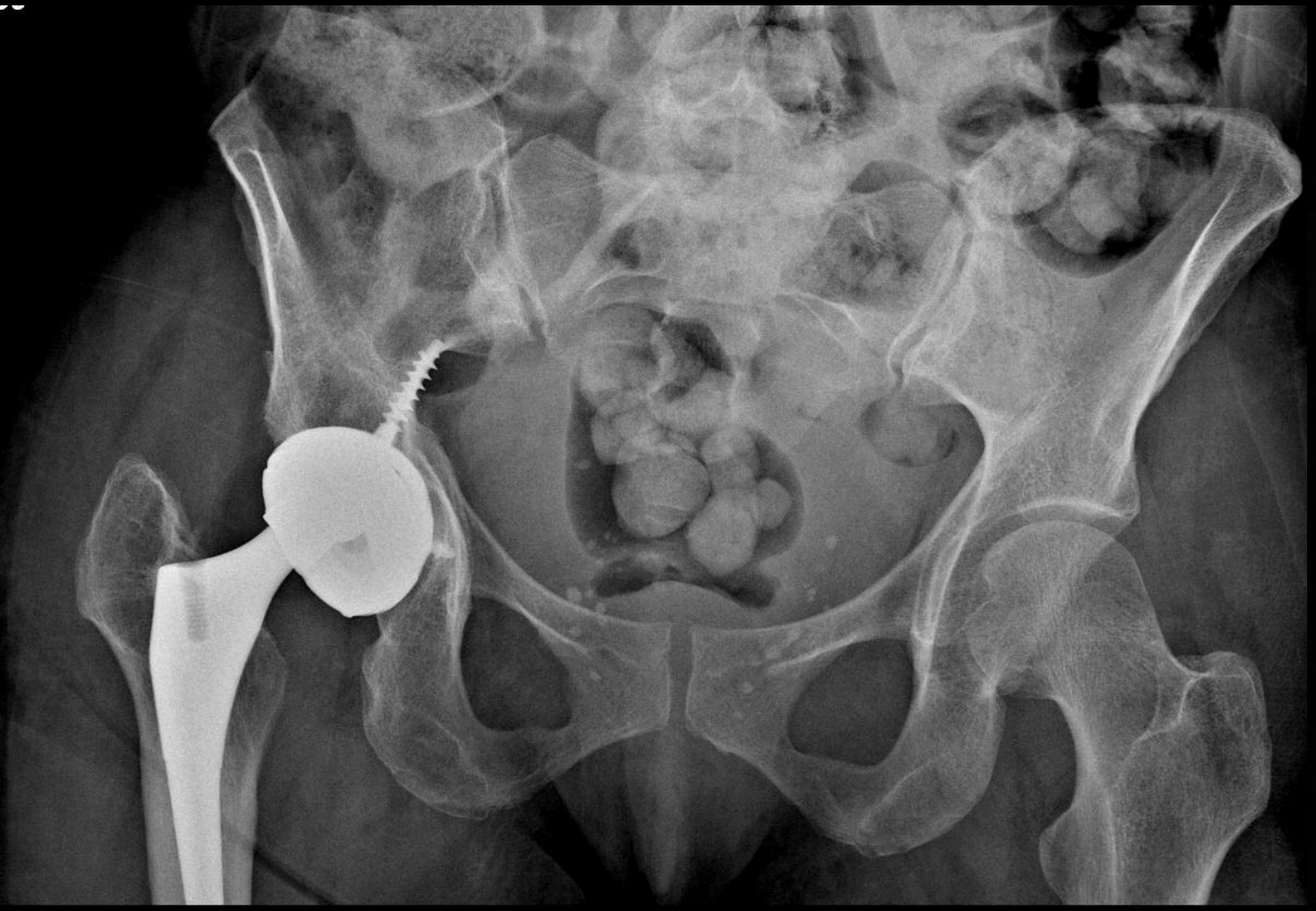


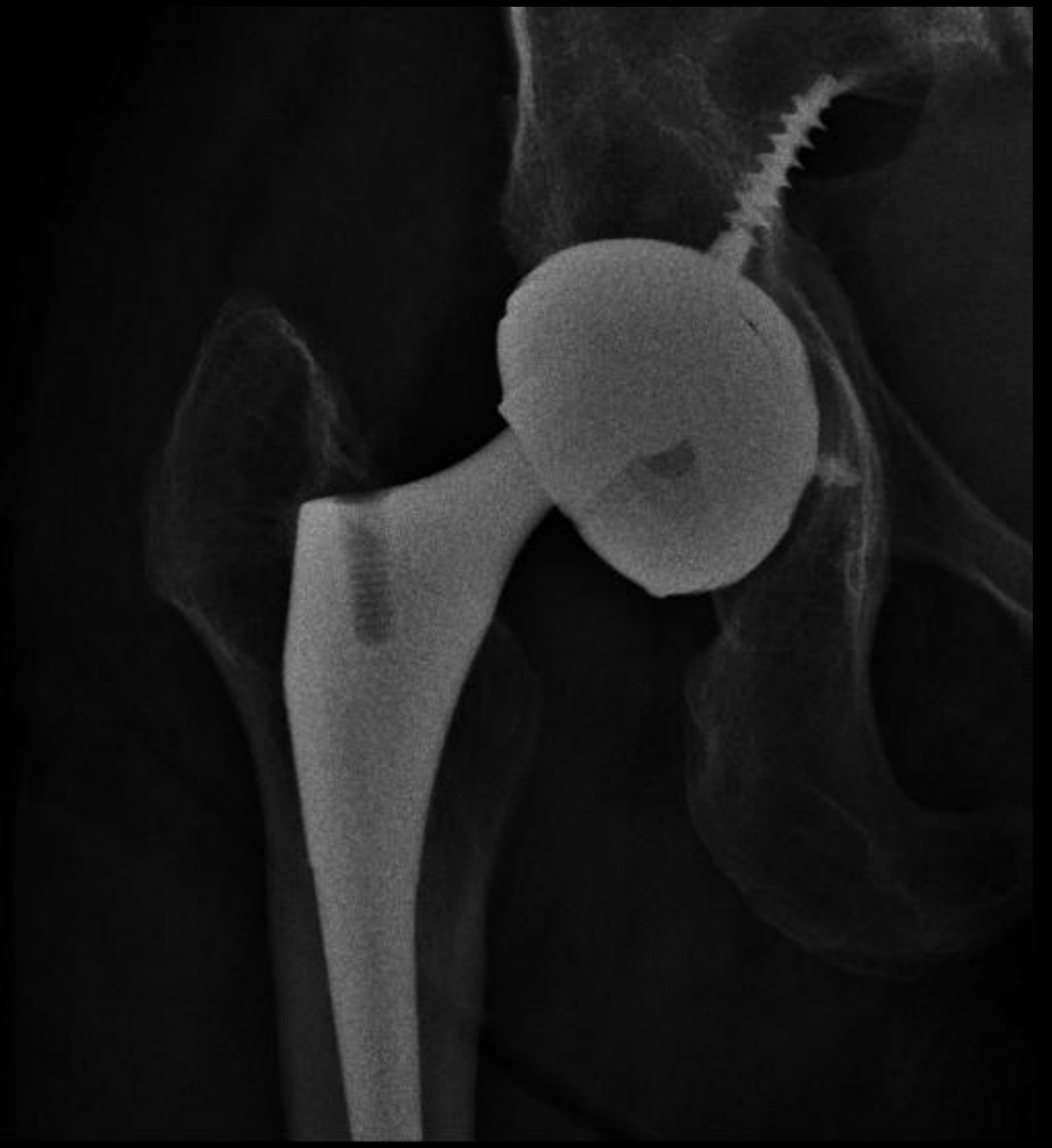
Pt is 1 month post op and dislocated her hip.
Hip dislocation was reduced in the ED



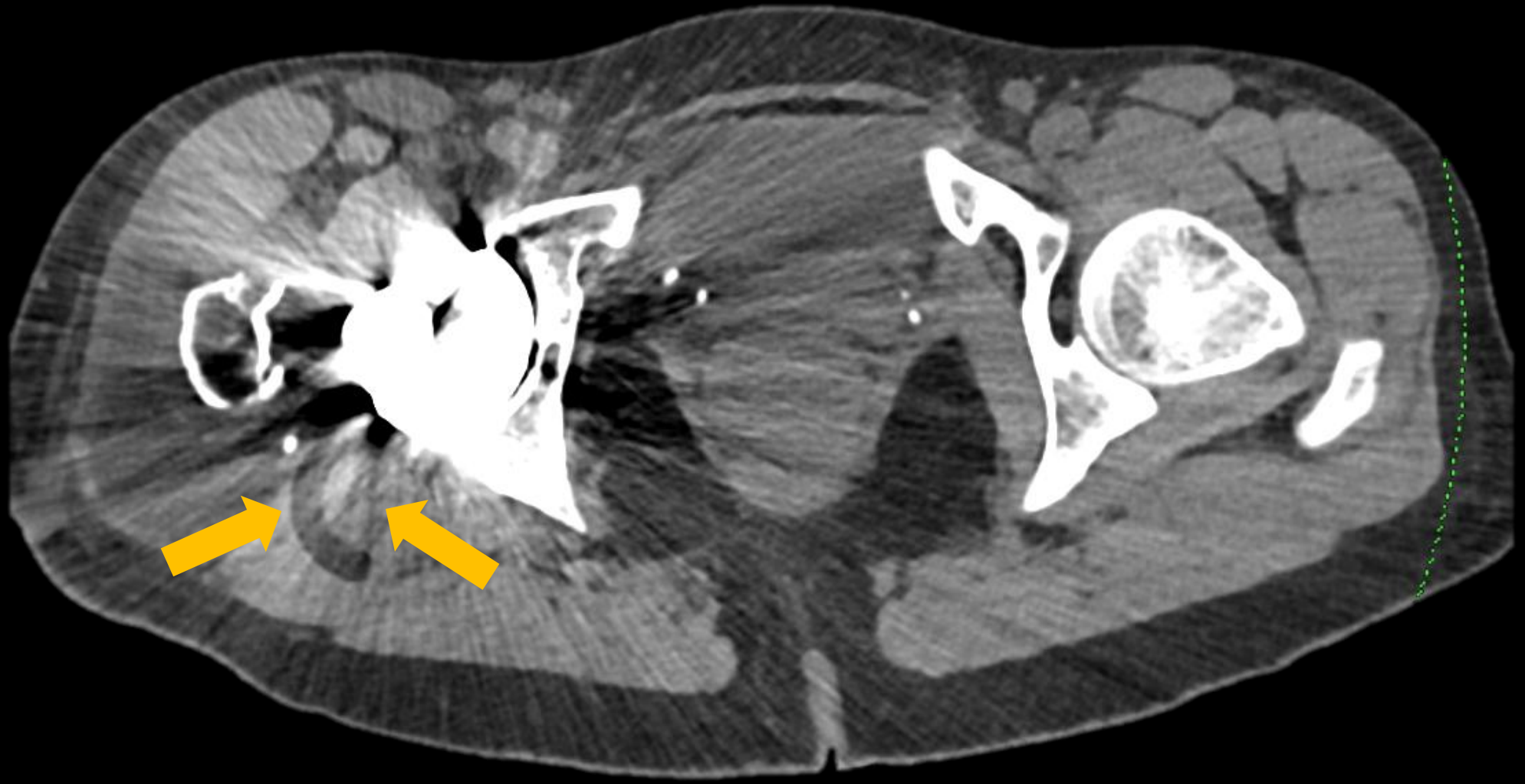


How centered are you feeling?

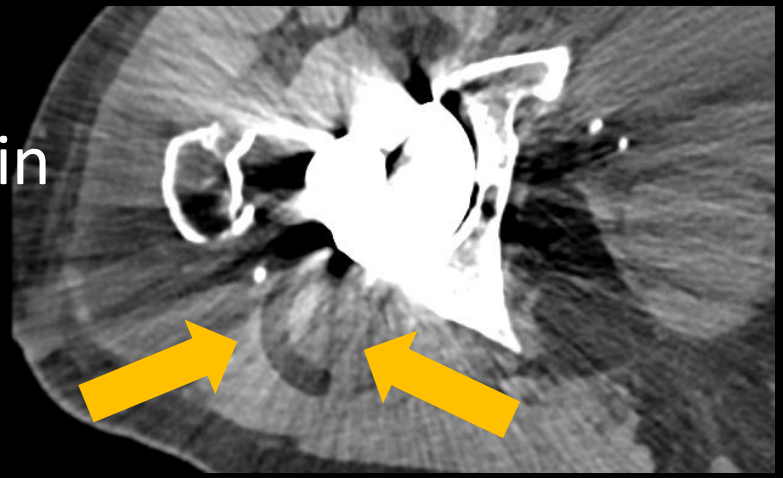




See anything here?



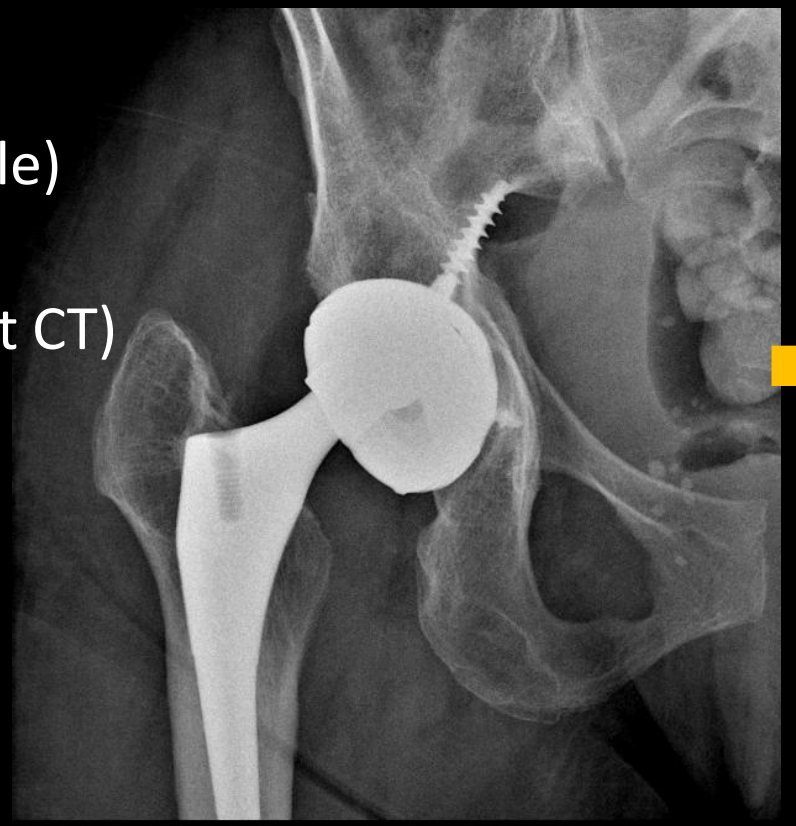
- Femoral head is not centered within the acetabular cup

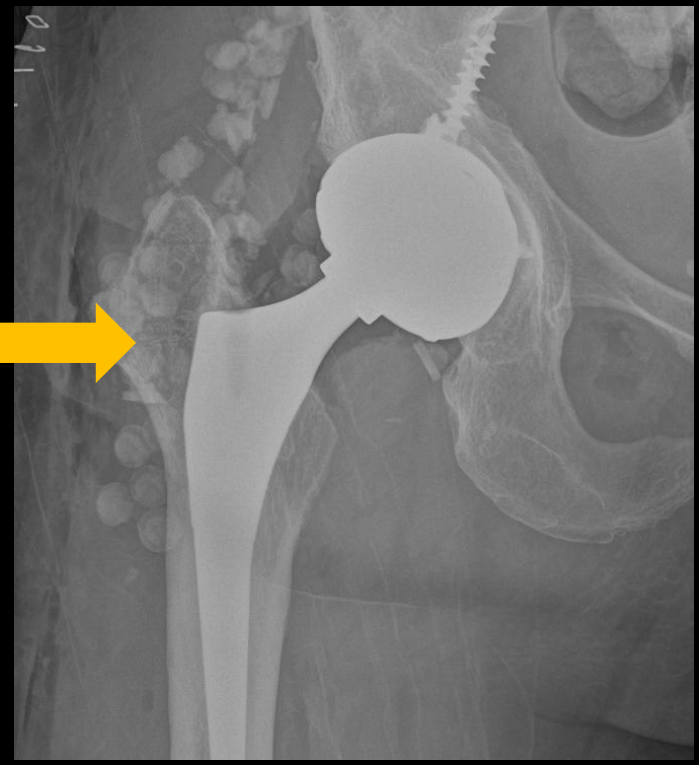


- Possibilities to consider acutely:

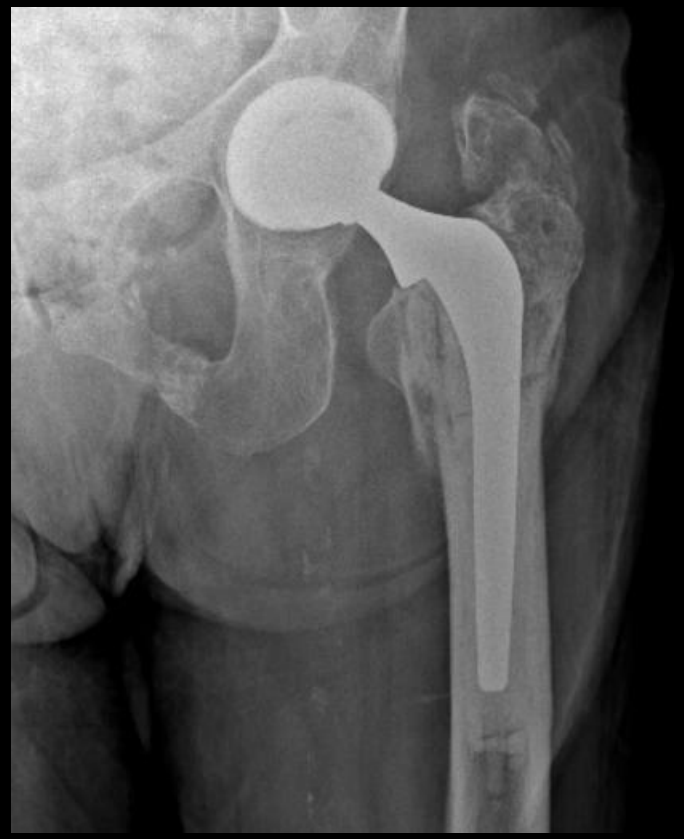
1. Hip is still dislocated (get crosstable)

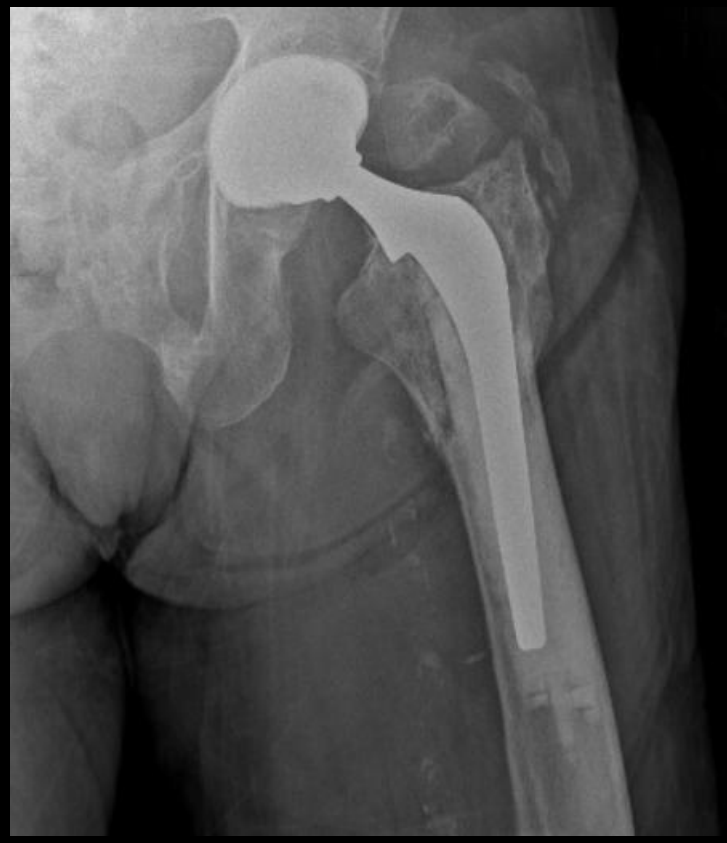
2. Spacer is dislocated/displaced (get CT)

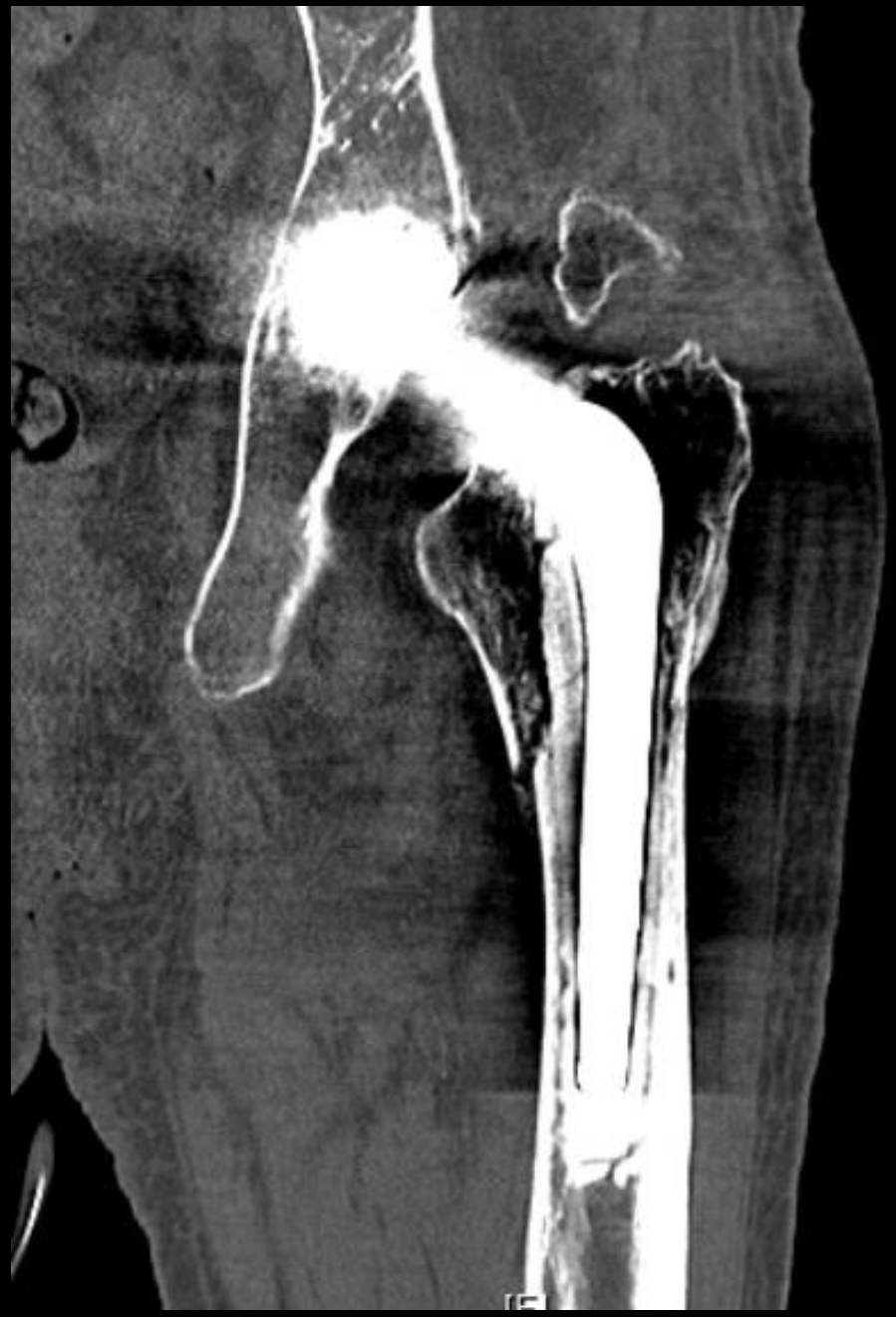




Perihardware fractures: classification







We can make this hard
or we can make this easy…

Let’s start here:

Vancouver

A: Apophyeseal: just greater or lesser troch

Ag and Al

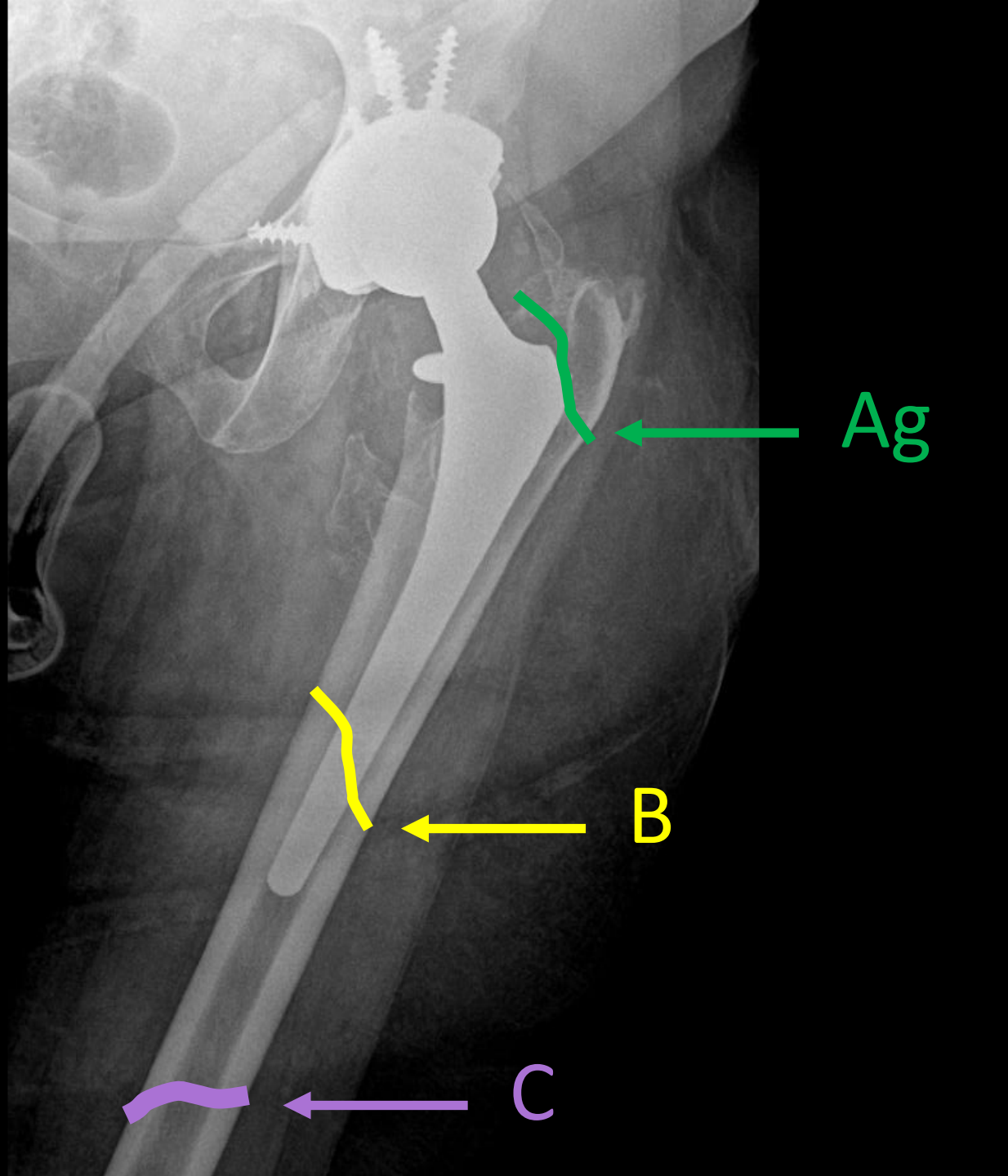
B: through the Bed of the implant

B1: stable

B2: unstable

B3: unstable w bone mineralization

C: Clear of the implant



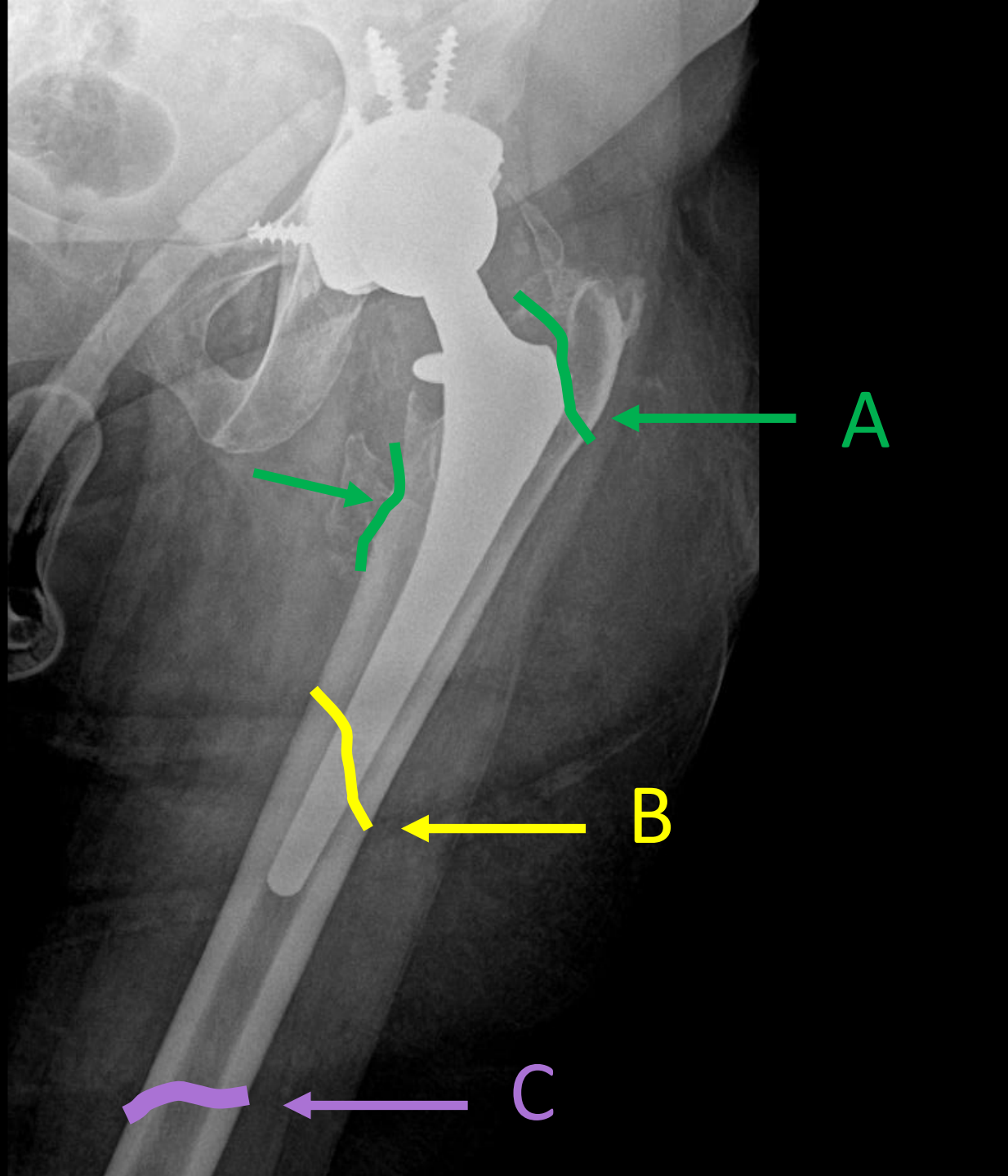
The quick version?

Vancouver

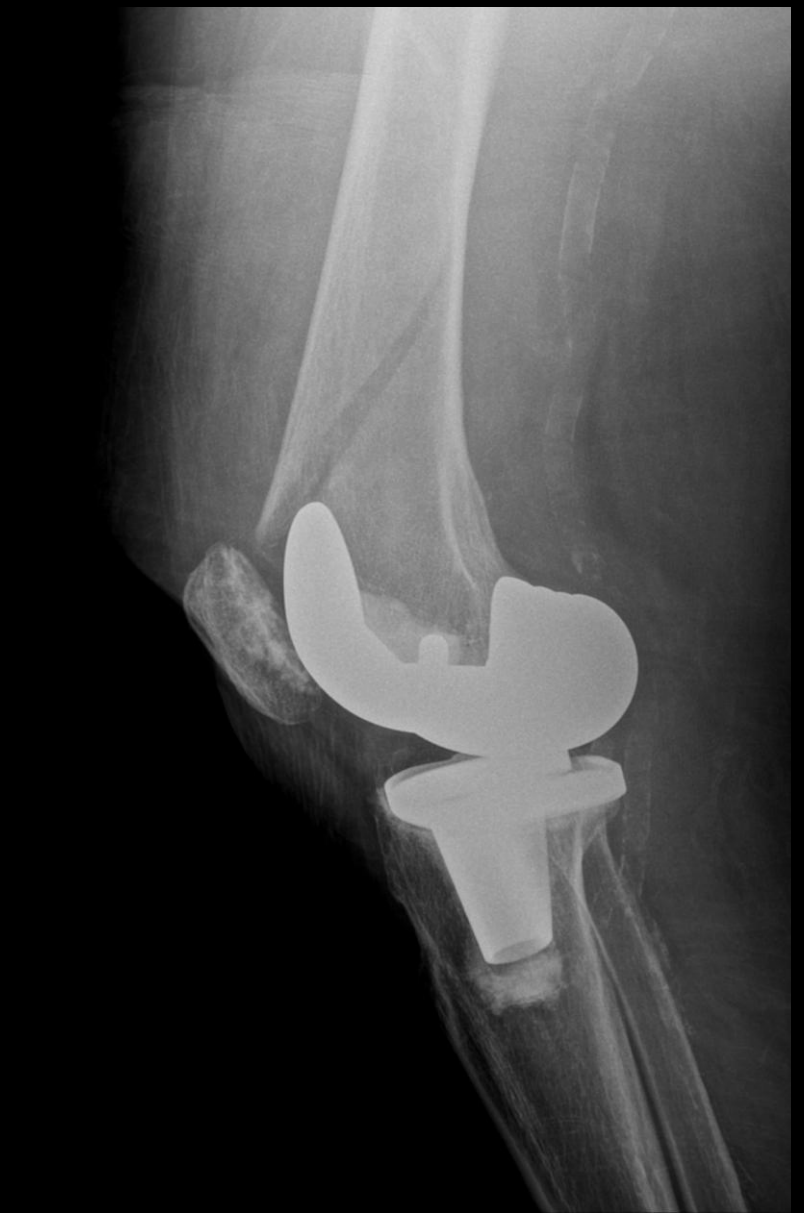
A: Appendage only

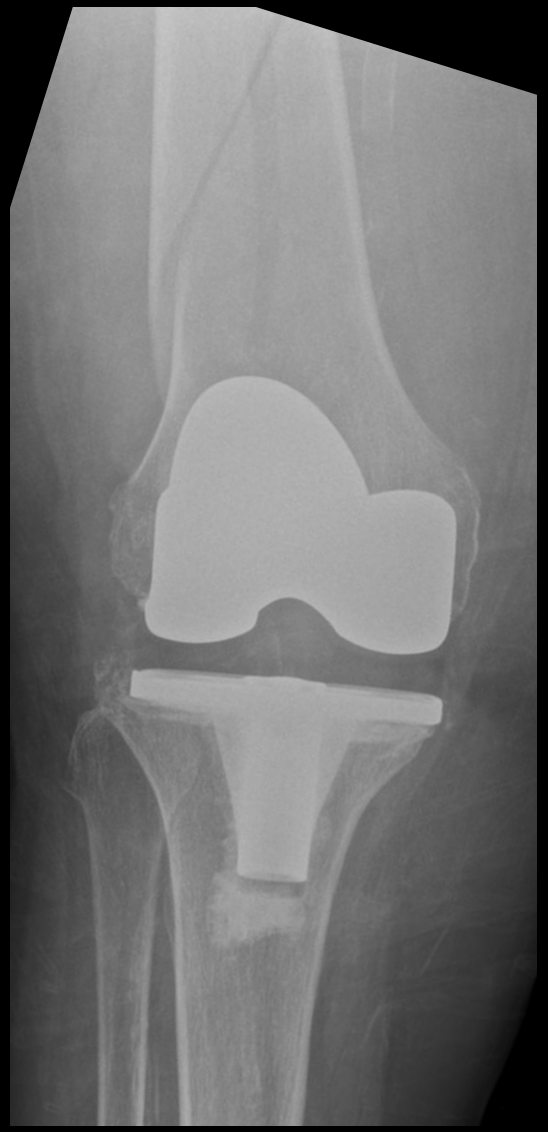
B: through the Bed of implant (+/- bone loss)

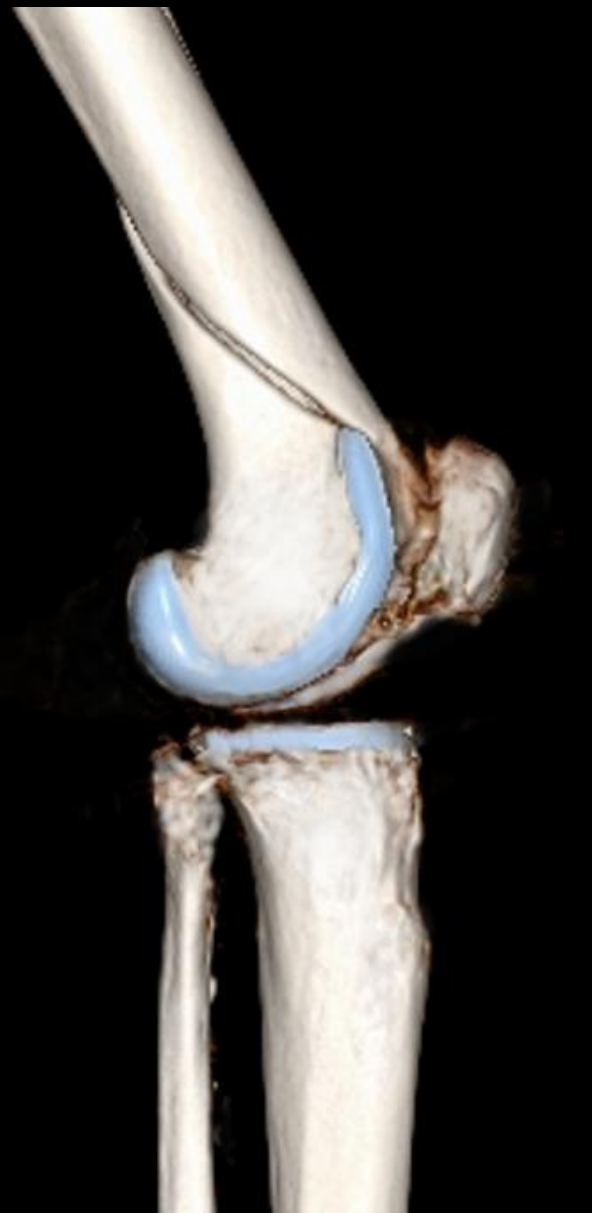
C: Clear of the implant



Hold that thought. What about **this** pt? Frx near a total knee?







Classifications of Periprosthetic Distal Femur Frx:

Neer and associates
Type 1: Nondisplaced (<5mm) and nonangulated (<5 degrees)
Type II: Displaced >1cm
Type IIa: Displaced >1cm with lateral femoral displacement
Type IIb: Displaced >1cm with medial femoral displacement
Type III: Displaced and comminuted

Lewis and Rorabeck Classification
Type I: Nondisplaced, component intact
Type II: Displaced, femoral component intact
Type III: Displaced, component loose or failing

DiGiola and Rubash
Group I: Extra-articular, non-displaced
Group II: Extra-articular, displaced
Group III: Lost of cortical contact or angulated

Su et al
Type I: Fracture proximal to femoral component
Type II: Fracture originates at proximal femoral component and extends proximally
Type III: Any part of fracture line is distal to upper edge of anterior flange

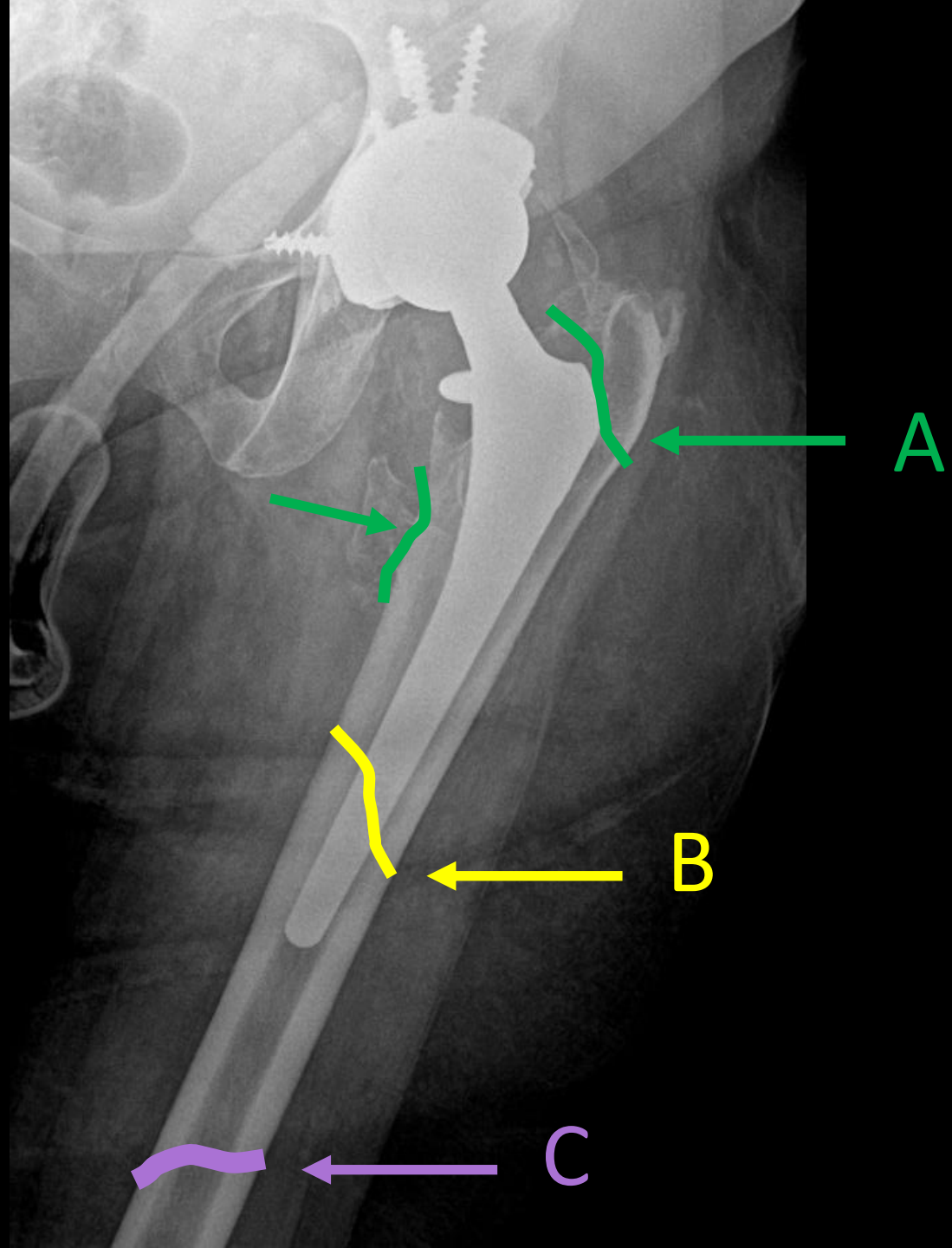
Chen et al
Type I: Nondisplaced
Type II: Displaced and/or comminuted

Knee: why can’t you be more like hip?

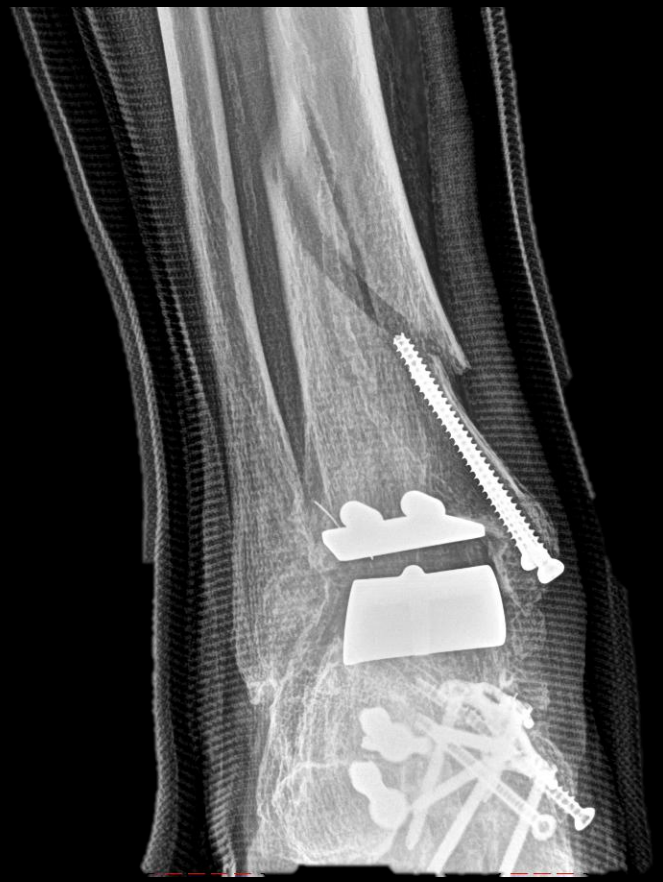
A: Appendage only

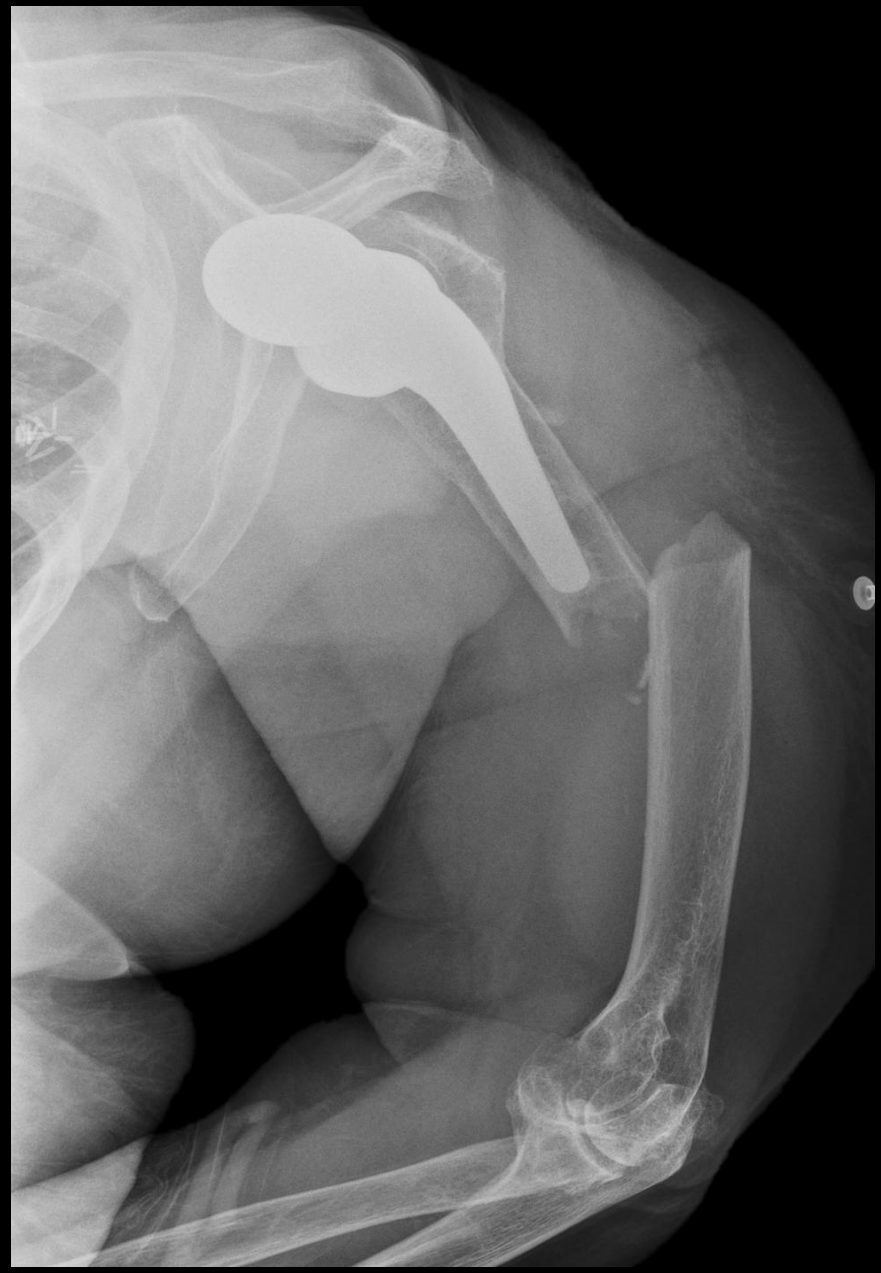
B: through the Bed of implant

C: Clear of the implant



And will I need to learn even MORE classifications…?





AO Unified Classification (A-F)

A – Apophyseal

B – Bed of implant

C – Clear of implant

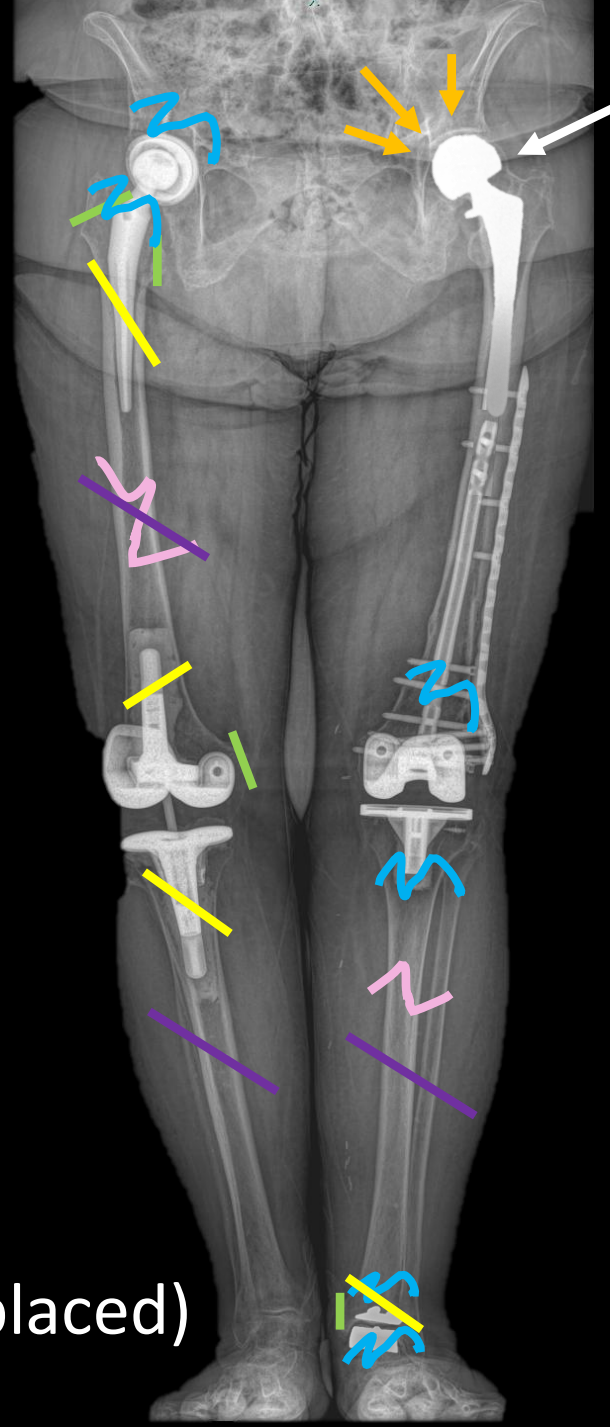
Manage based on the above, but further complicated if:

D – Dividing two implants

E – Each of two bones

F – Facing an implant

(in a bone that is NOT replaced)



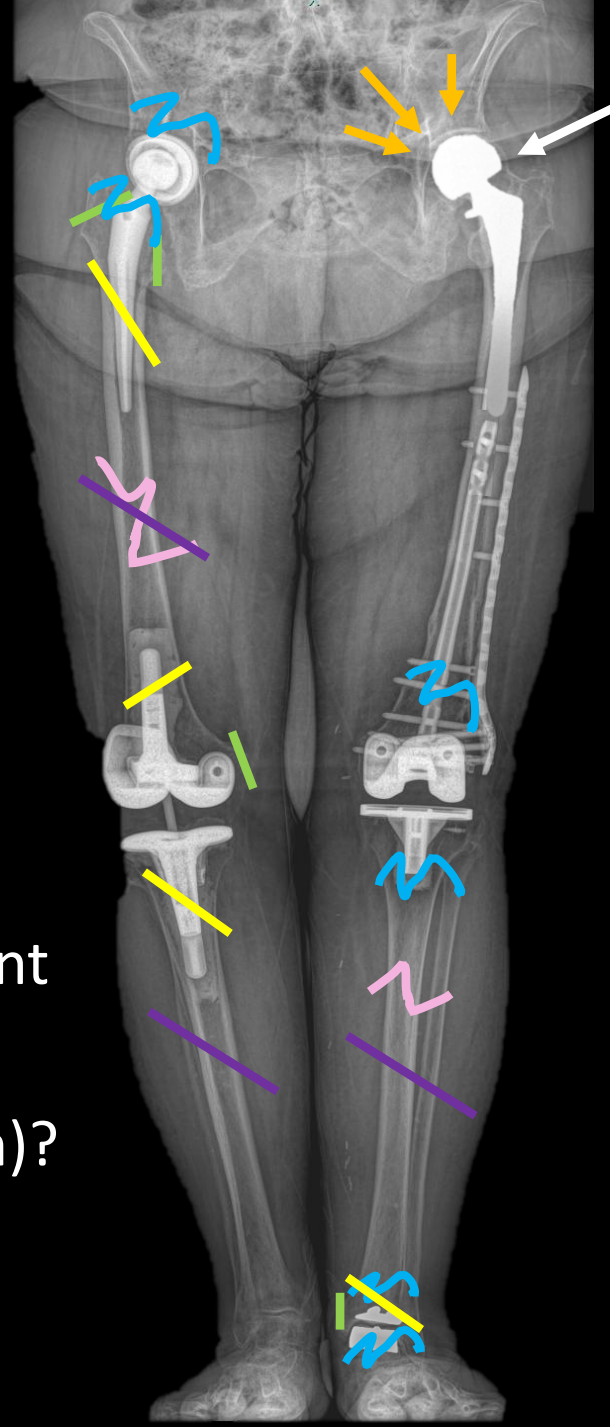
Also applies to:

- Shoulder
- Elbow
- Wrist
- Talonavicular arthroplasty…

AO Unified Classification

Describe 3 things:

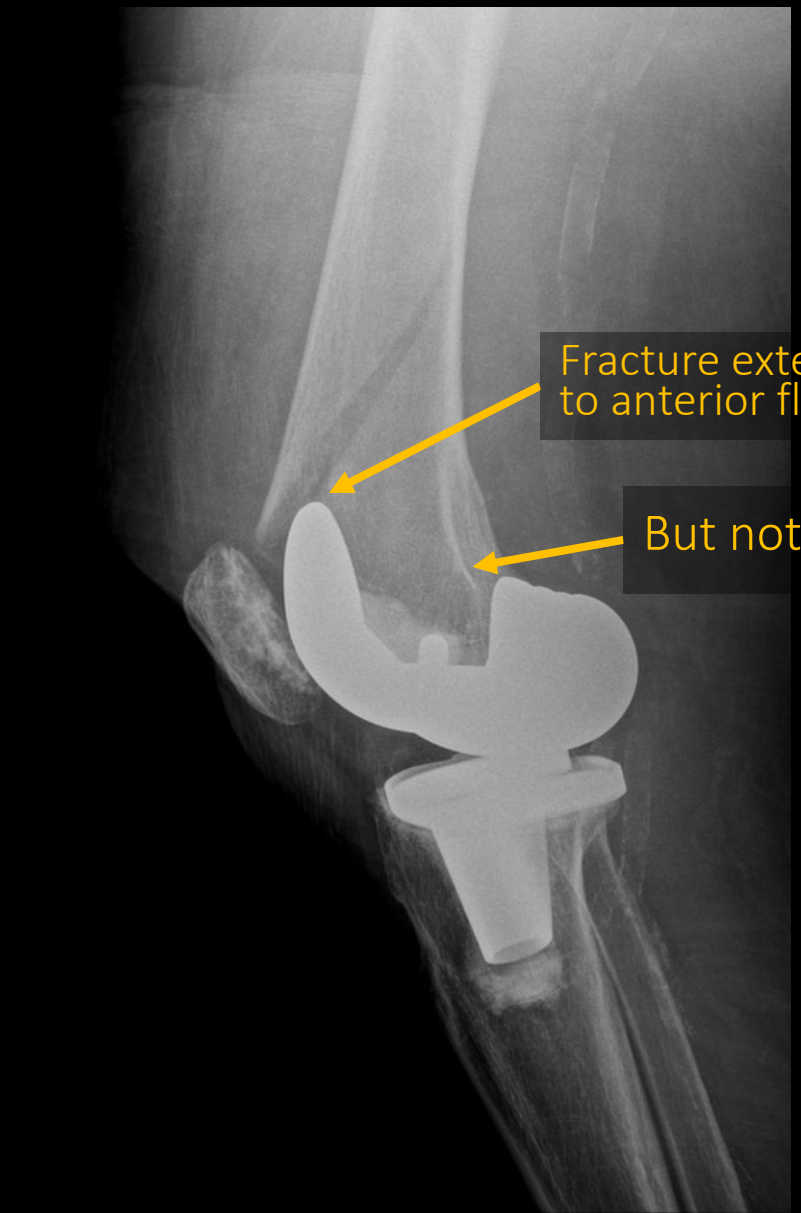
- Fracture **location** (including in relation to <u>any adjacent hardware</u> in the same or an articulating bone)
- Whether the fracture involves the **bed** of the implant
- Whether **bone stock** **is** poor (↓bone mineralization)?

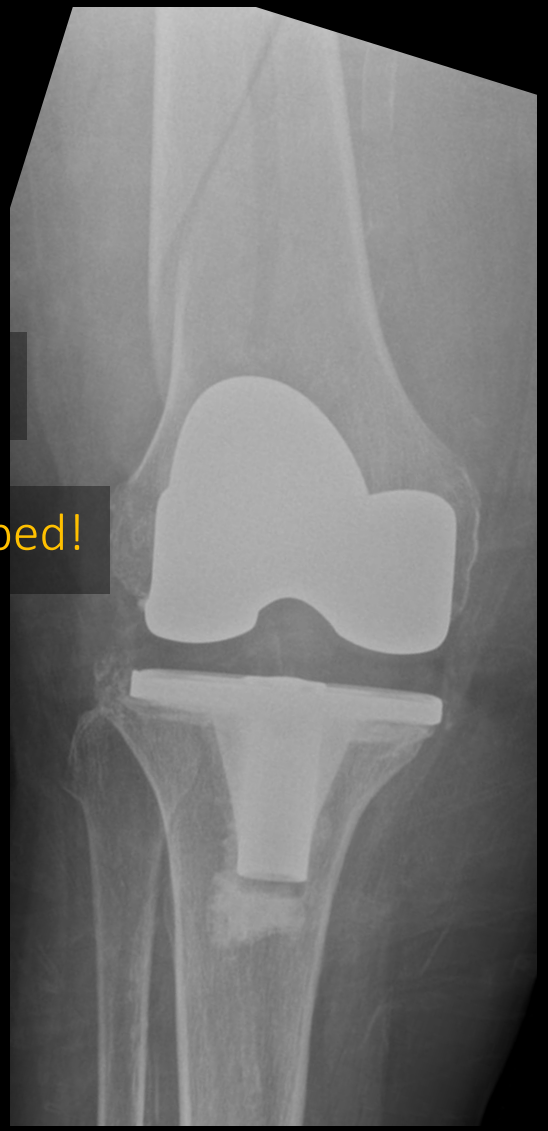


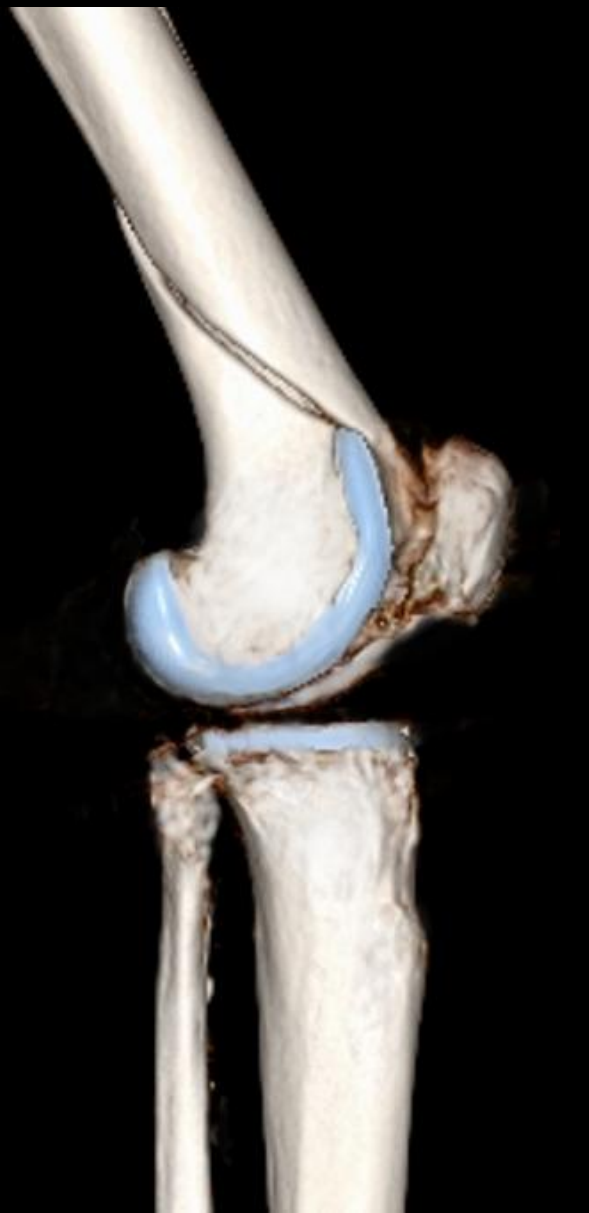
Also applies to:

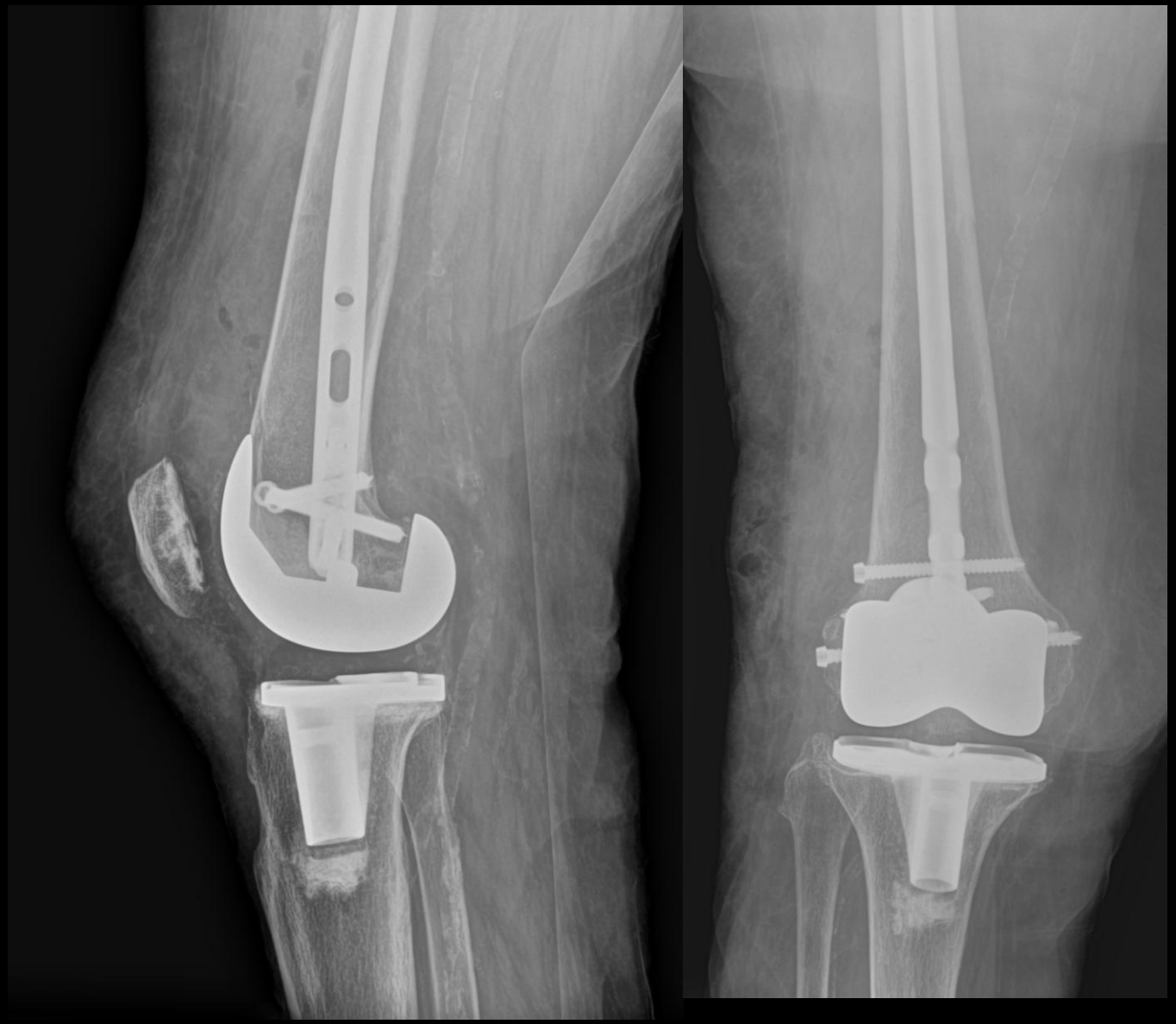
- Shoulder
- Elbow
- Wrist
- Talonavicular arthroplasty…

Describe if the implant is involved, and if so, how much?

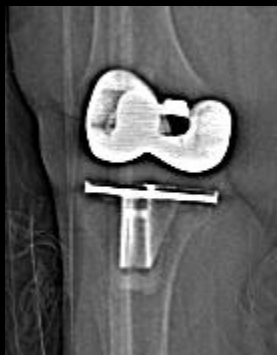


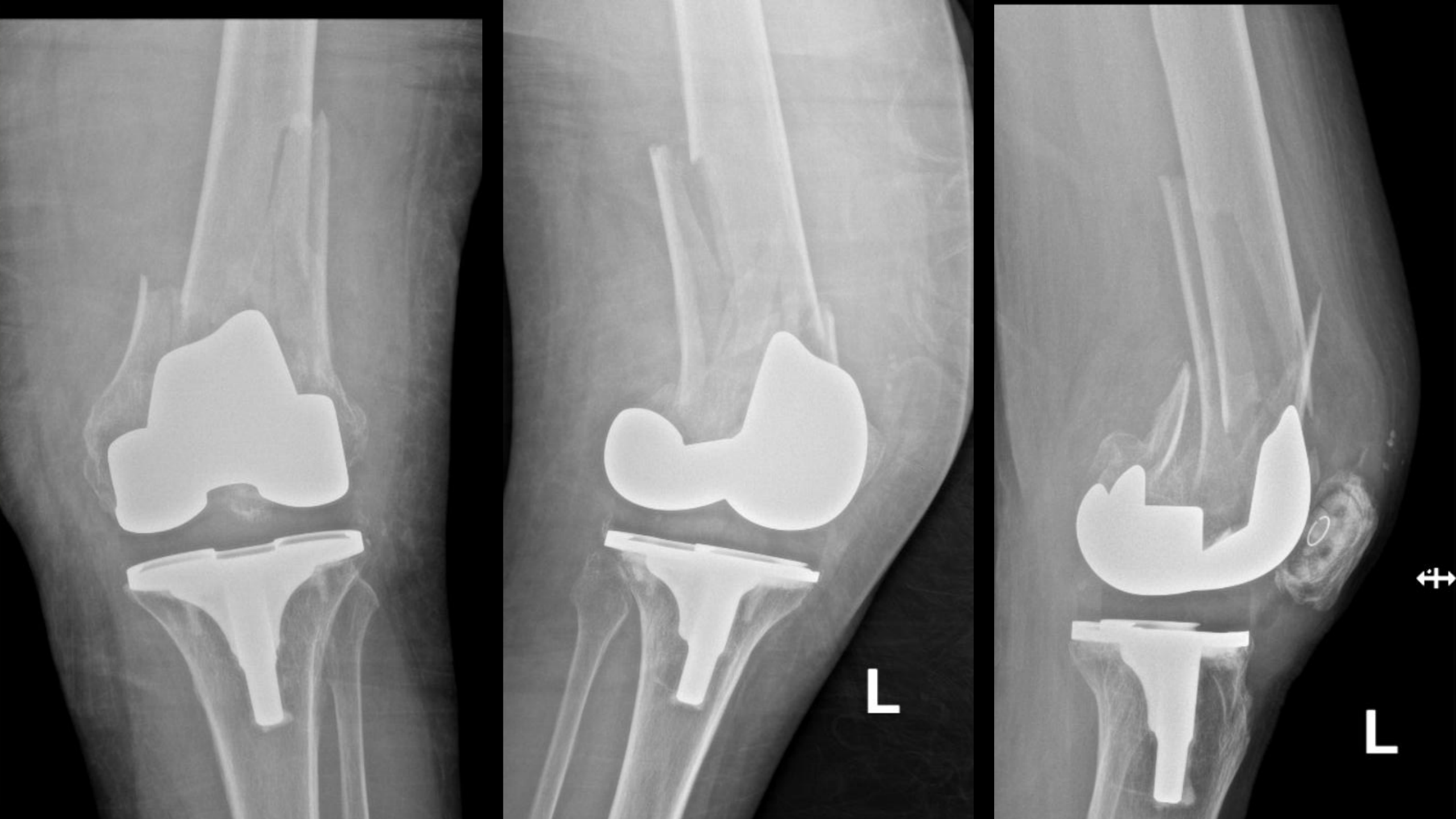


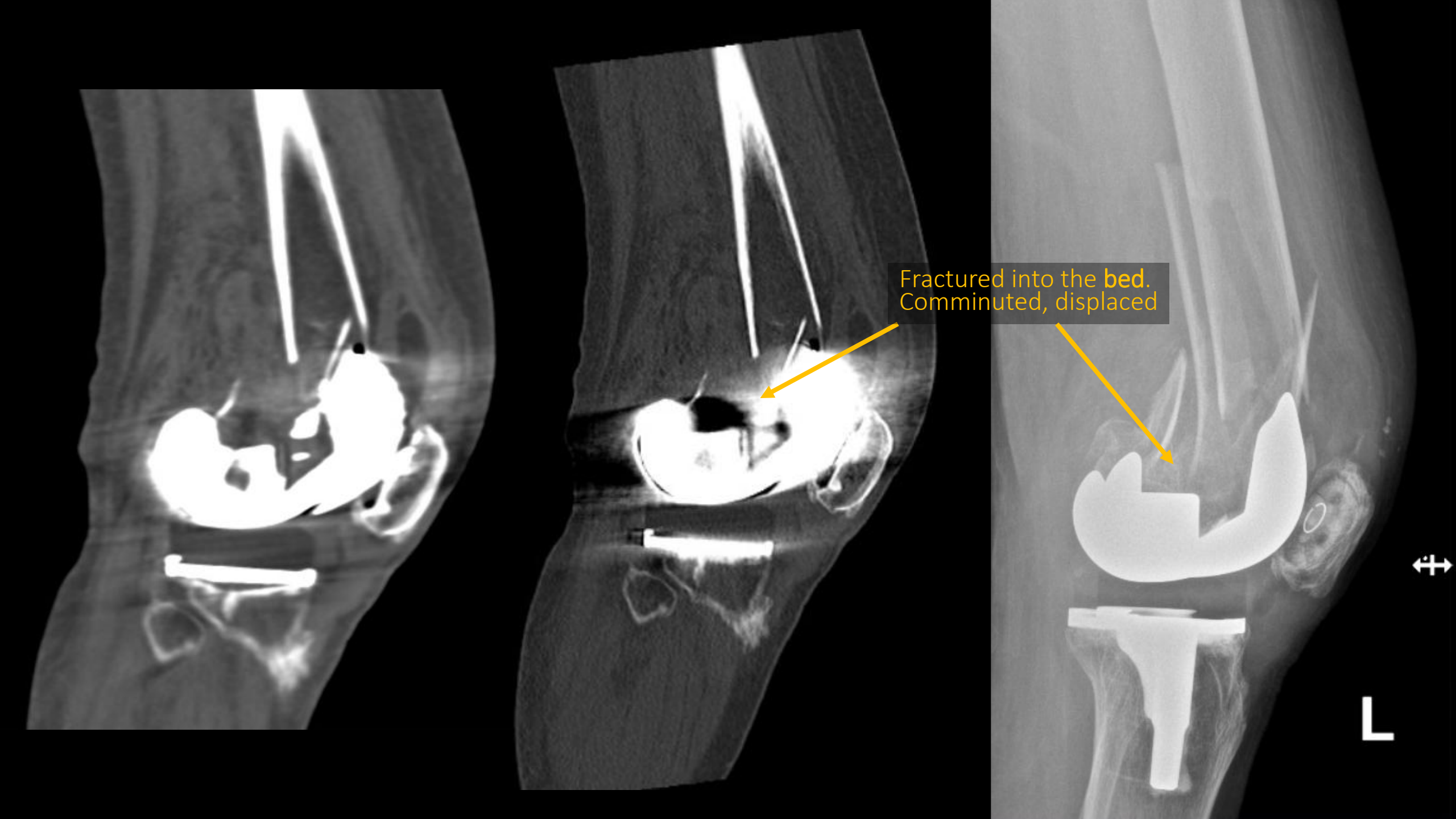


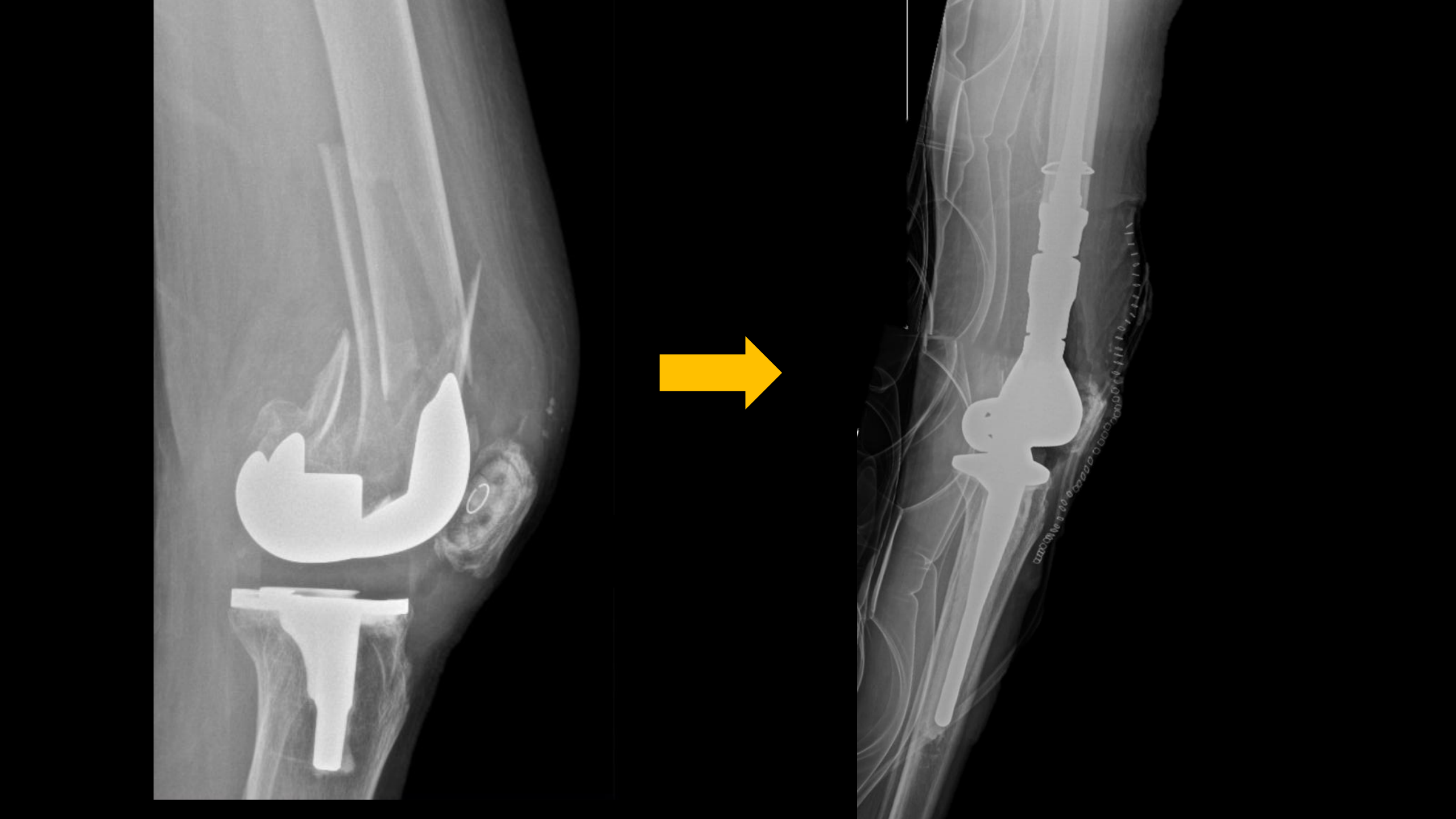


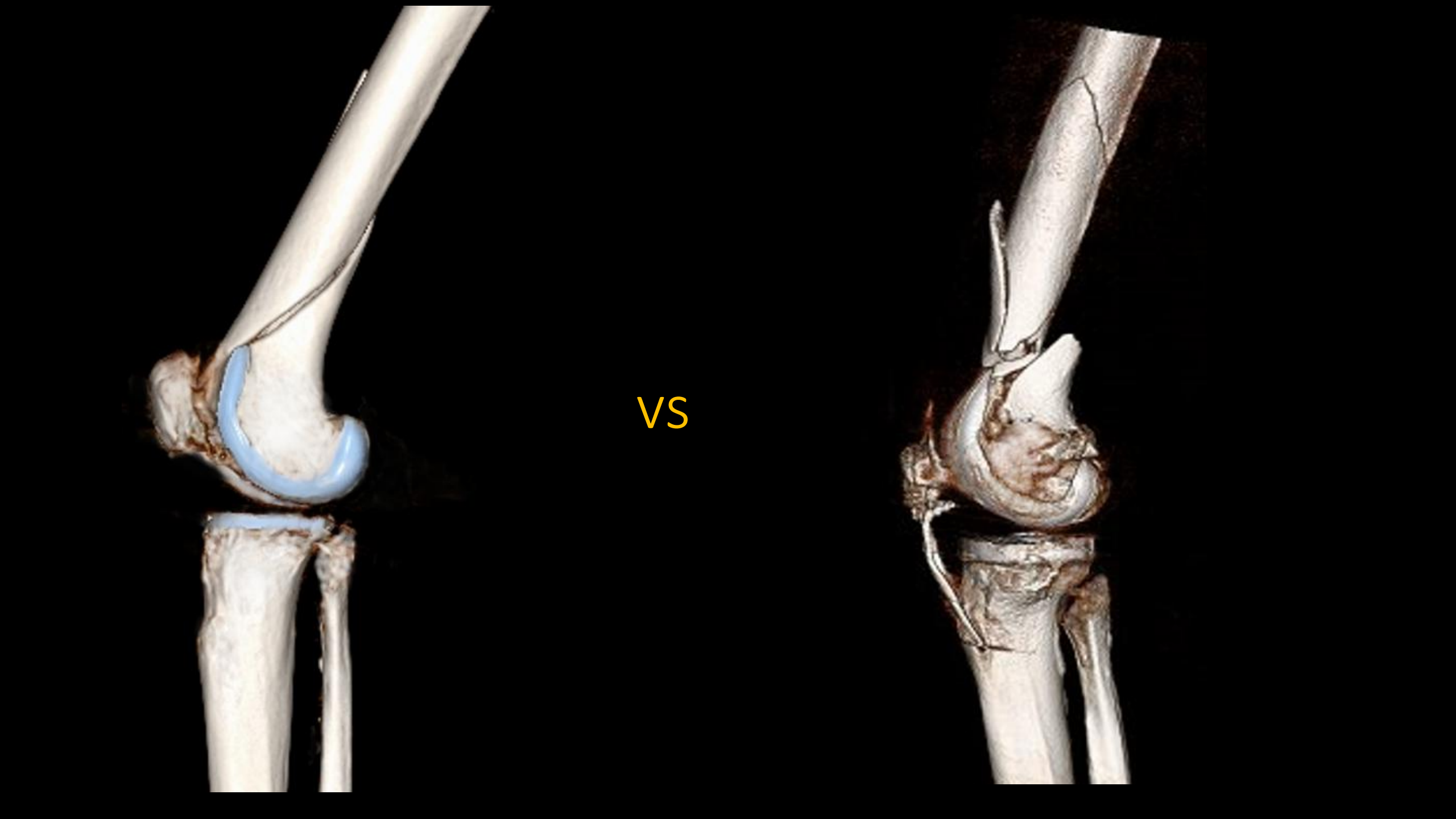
This one can be fixed!

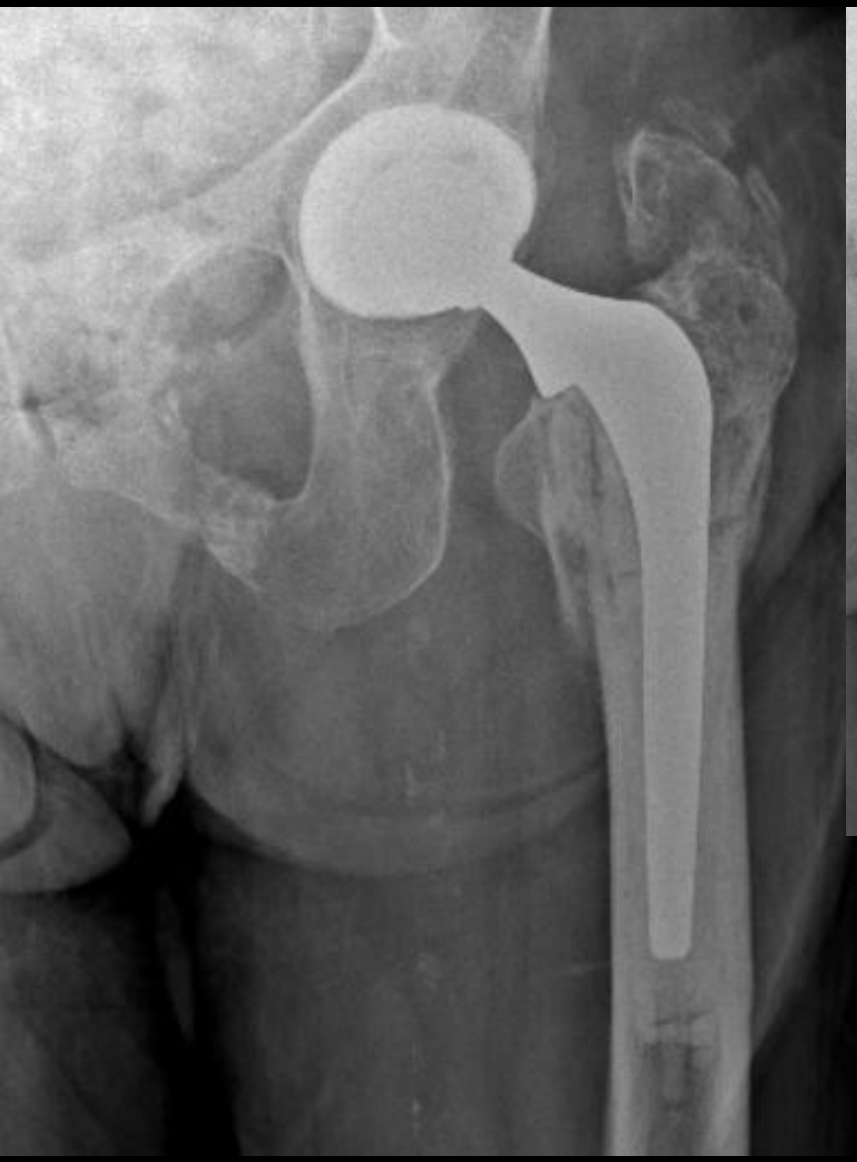


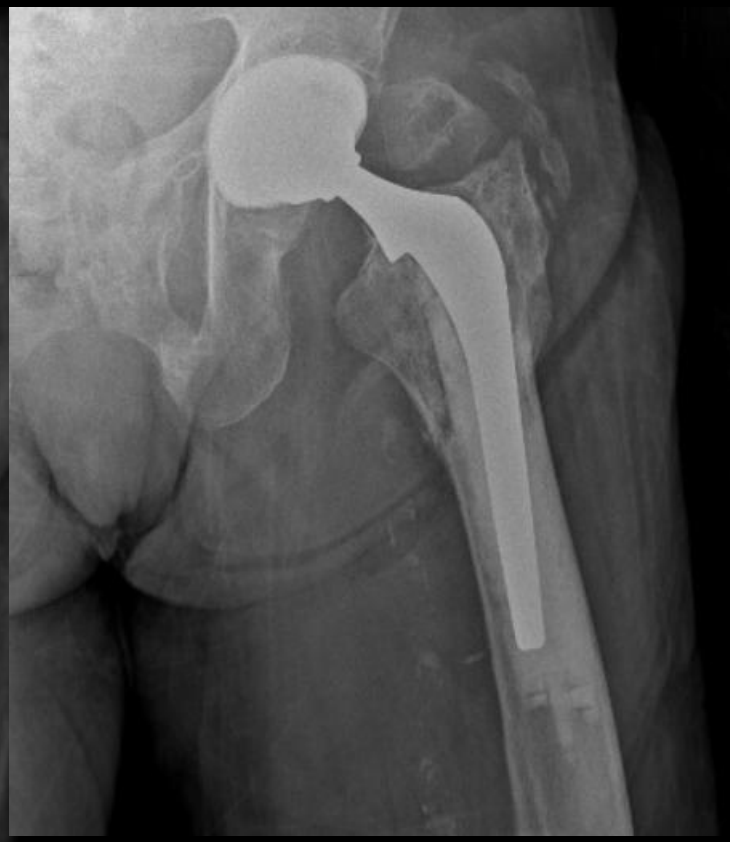

L
L

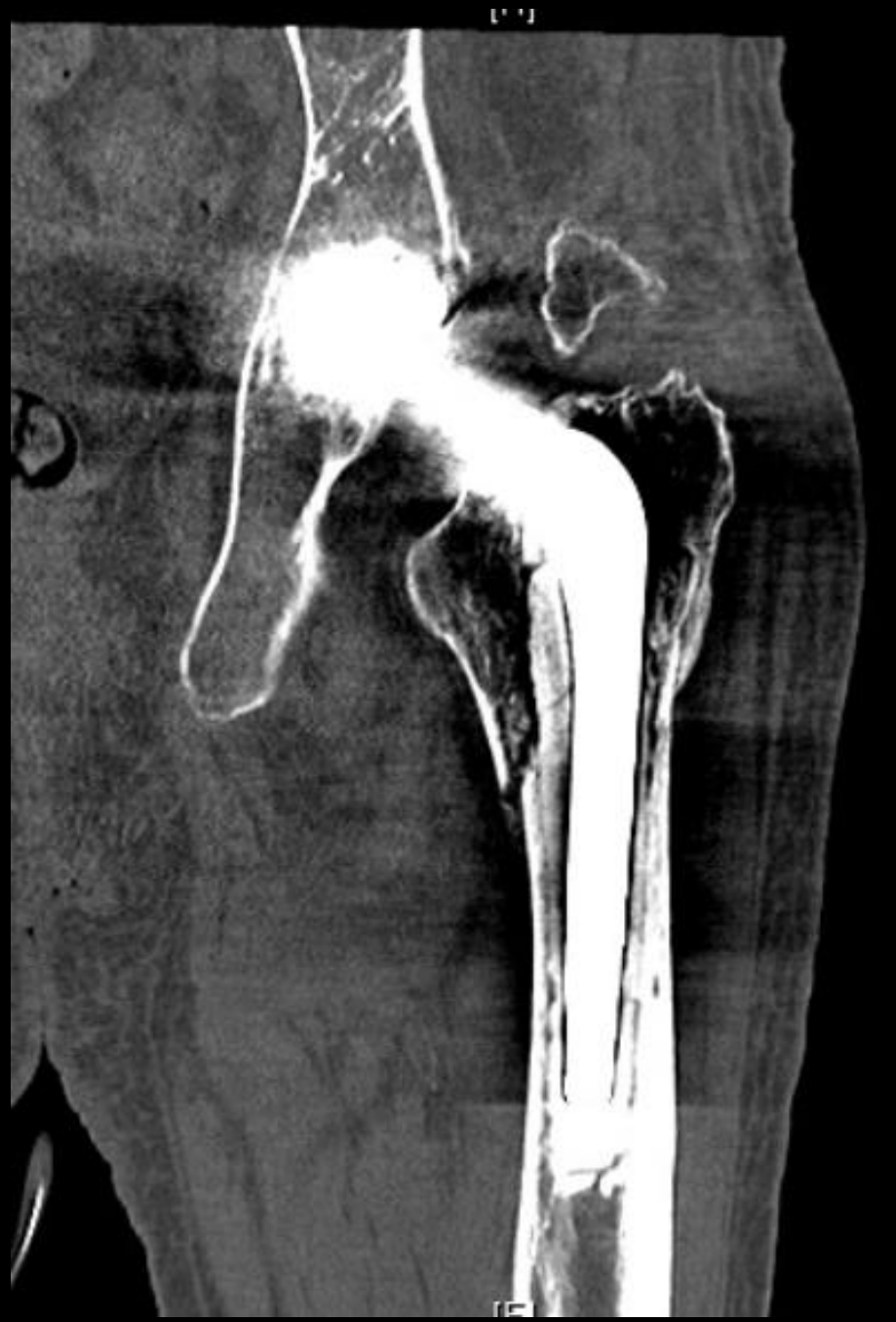

Fractured into the bed.
Comminuted, displaced
L

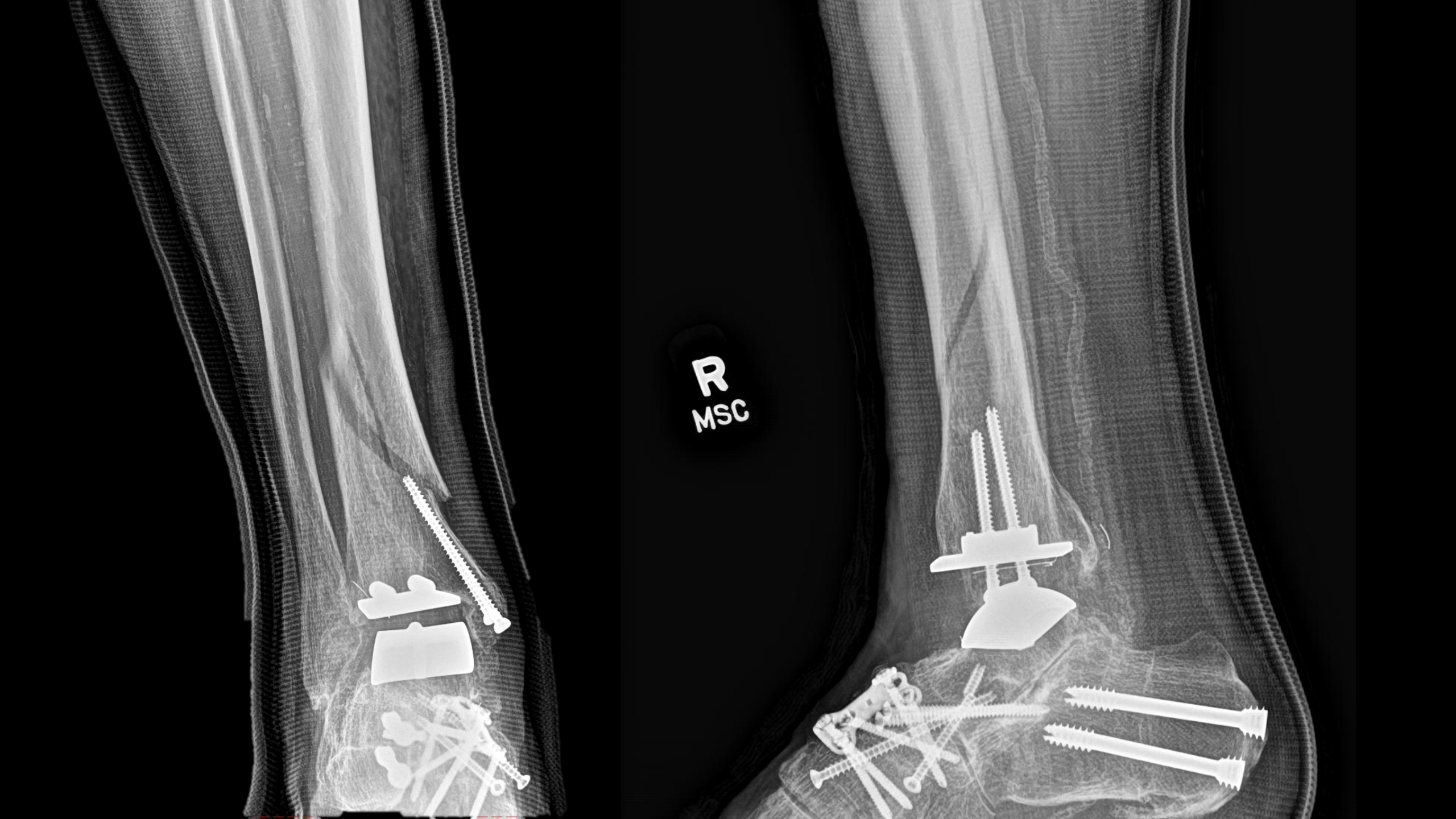


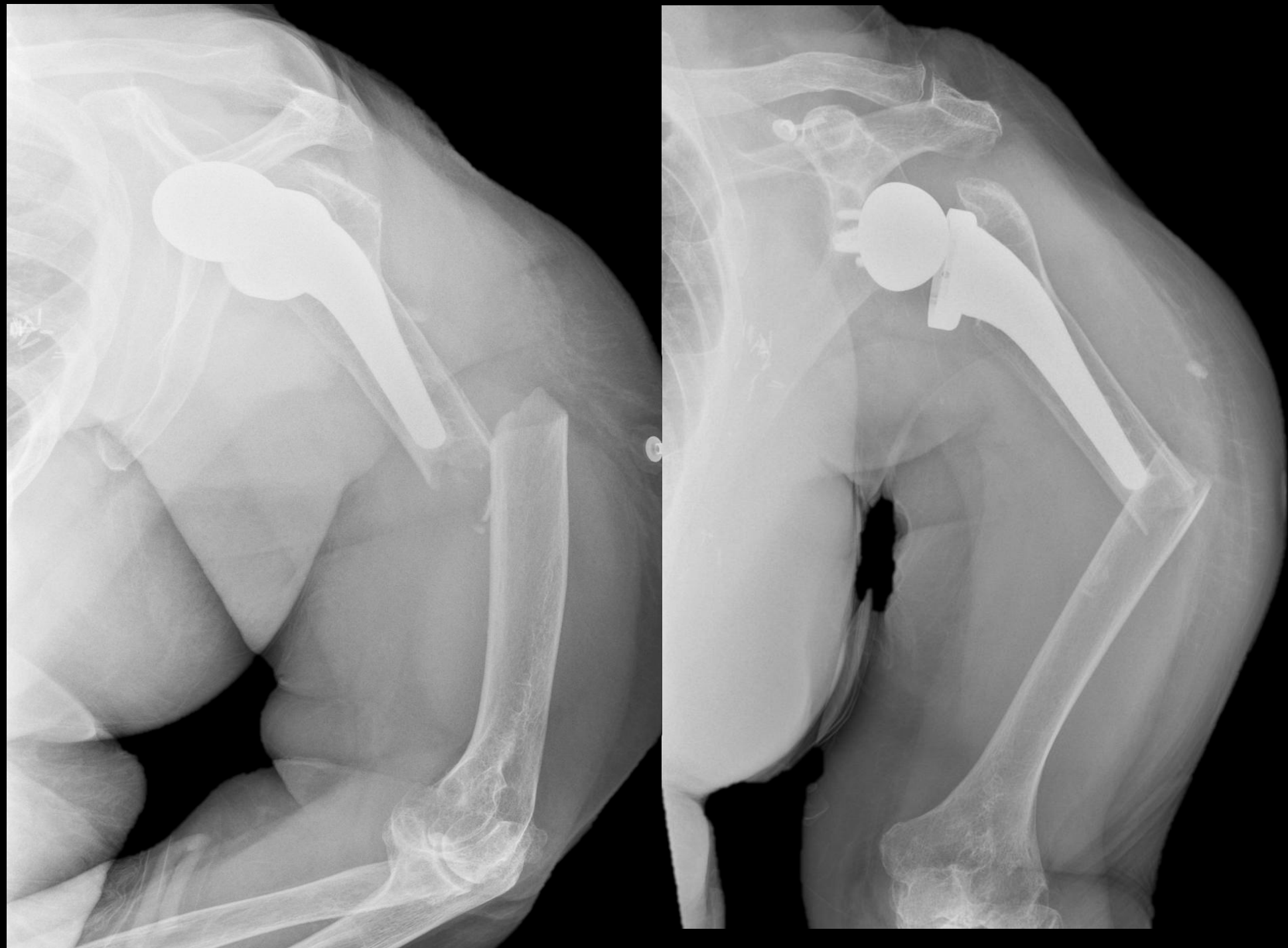

VS



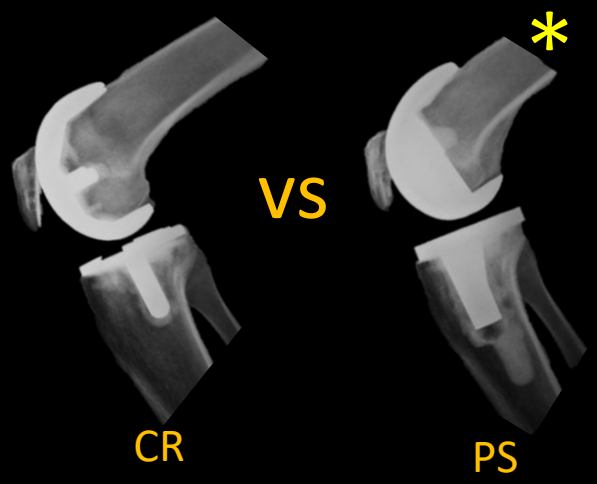





R
MSC

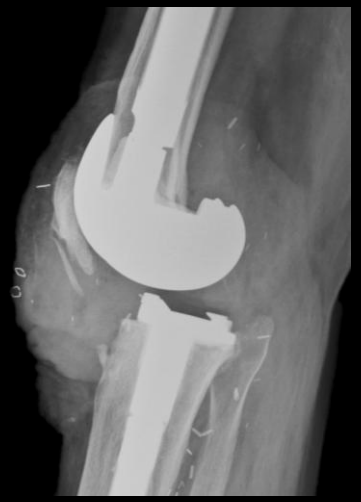


Summary



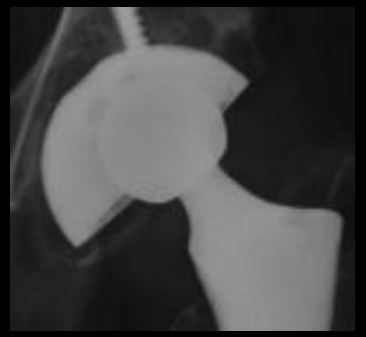
Cam jump :
Arthroplasty jumped the post. Not a simple reduction

Occurs with posterior stabilizing arthroplasty



Acetabular inclination angle

~45

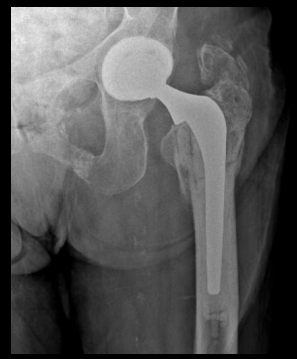


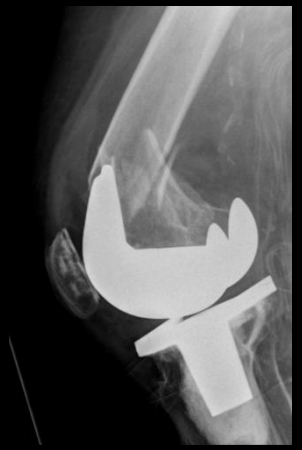
Too steep: ↑ risk dislocation
↑ poly wear
Too shallow: ↓range of motion

Femoral head not centered?

- Poly fracture/displacement
- Poly wear

Frx location
Frx involves bed of implant?
Bone stock





U A
n B
i C
f
i D
e E
d F

Additional Reading

- Current Concepts in Knee Replacement: Complications Hyojeong Mulcahy and Felix S. Chew American Journal of Roentgenology 2014 202:1, W76-W86
- CT of the Hip Prosthesis: Appearance of Components, Fixation, and Complications Trenton D. Roth, Nathan A. Maertz, J. Andrew Parr, Kenneth A. Buckwalter, and Robert H. Choplin RadioGraphics 2012 32:4, 1089-1107
- Vanrusselt J et al. Posteroperative Radiograph of Hip Arthroplasty: what the Radiologist should know. Insights Imaging. 20215 Dec:6(6): 591-600
- https://doi.org/10.1186/s12891-021-04801-9
- https://www.orthobullets.com/recon/5027/tka-periprosthetic-fracture
- AO Foundation Unified Classification system reference: https://media.aofoundation.org/-/media/ao-surgery/pdf/ucpf-classification_aoota-compendium-2018.pdf?rev=c425f09a36bf4b9bb4bed9865c67334c&_ga=2.88027672.1470788627.1748962516-2064786972.1748962516&_gl=1*12shgkg*_ga*MjA2NDc4Njk3Mi4xNzQ4OTYyNTE2*_ga_SDWQGHPK6G*czE3NDg5NjI1MTYkbzEkZzEkdDE3NDg5NjI1MjIkajU0JGwwJGgw
- Duncan C & Haddad F. The Unified Classification System (UCS): Improving Our Understanding of Periprosthetic Fractures. The Bone & Joint Journal. 2014;96-B(6):713-6.