

Periprosthetic proximal femur fractures: How to optimize outcomes!

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Burden of Illness

- Increasing prevalence
- Growing elder population
- High mortality rate (post THA) at 1 yr: 11% vs hip fracture (16%) vs primary arthroplasty (2.9%)
- High complication rate (up to 52%)
- Some complications related to limited WB
- Need to optimize medical and fracture management to allow early weight bearing

Medical management is key!

- Multidisciplinary orthogeriatric care
- Rapid medical optimization
- Reduce delays to surgery
- Optimize fluid management
- Prevent delirium
- Allow WBAT post-op

Medical complications lead to delayed mobilization

Treatment of periprosthetic femoral fractures following total hip arthroplasty: results of an online survey of the European Hip Society

Martin Thaler¹ , Carmen Weiss¹, Ricarda Lechner¹, Jean-Alain Epinette², Theofilos S Karachalios³ and Luigi Zagra⁴

HIP International

1–7

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Full weight bearing allowed in 5-49%

Table 6. Weight-bearing (WB) restrictions after surgery for all example cases according to the Vancouver classification.

	Full WB	Partial WB for 6 weeks	Partial WB for 12 weeks	No WB for 6 weeks	No WB for 12 weeks
Vancouver type					
AG % <i>n</i>	17 (27)	55.1 (86)	4.8 (7)	20.4 (32)	2.7 (4)
AL % <i>n</i>	13.3 (8)	55.6 (34)	11.1 (7)	20 (12)	0
B1 % <i>n</i>	49.1 (164)	32.5 (108)	6.3 (108)	9 (30)	3.1 (10)
B2 % <i>n</i>	18.7 (192)	60 (616)	11.9 (122)	7 (72)	2.4 (25)
B3 % <i>n</i>	35.5 (126)	28.6 (101)	17.1 (61)	12 (42)	6.8 (24)
C % <i>n</i>	4.7 (8)	34.7 (59)	26.9 (46)	20.7 (35)	13 (22)

Restricted weight-bearing

- **Why?**

- **Often to compensate for:**

- **Poor mechanics**
 - **Poor fixation**
 - **Poor bone**
 - **Poor patient compliance**



Restricted weight bearing is not the answer to poor mechanics!



Stem in varus
and refracture
X 2

Why does failure occur?

- **No stem revision?**
- **Single lateral plate?**
- **Poor fixation construct?**
- **No medial contact?**
- **Stress riser?**
- **Plate fixation: # of screws?**

These are often issues which lead to restricted weight-bearing! Prevention is the best cure

Failure mechanisms

- Poor mechanics are a common problem
- Mechanisms
 - Implant failure
 - Fracture fixation failure
- Inadequate diagnosis

Is it Always Possible to Tell?



An algorithm for the surgical treatment of periprosthetic fractures of the femur around a well-fixed femoral component

- 20% were found to be loose at time of surgery

Is the Stem LOOSE?? (B1 vs B2)

- Careful analysis of fracture radiographs
- Comparison to pre-injury radiographs
- +/- CT scanning
- Intraoperative
 - Assessment for loosening at the prosthesis bone interface through the fracture site
 - Arthrotomy and dislocation of the hip for assessment of prosthesis stability
 - Prepared for revision if necessary

OPTIONS ?

- **Fix Fracture**
- **Fix Fracture & Revise**
- **Complex Reconstruction**
- **Must allow early WB!**



Periprosthetic Femoral Fractures: Treatment

Type B-1 (stem well-fixed):

Treatment (must allow early WB)



ORIF - plates&screws/cables
- Locking plate

+/- cortical strut allograft

+/- supplementary plate

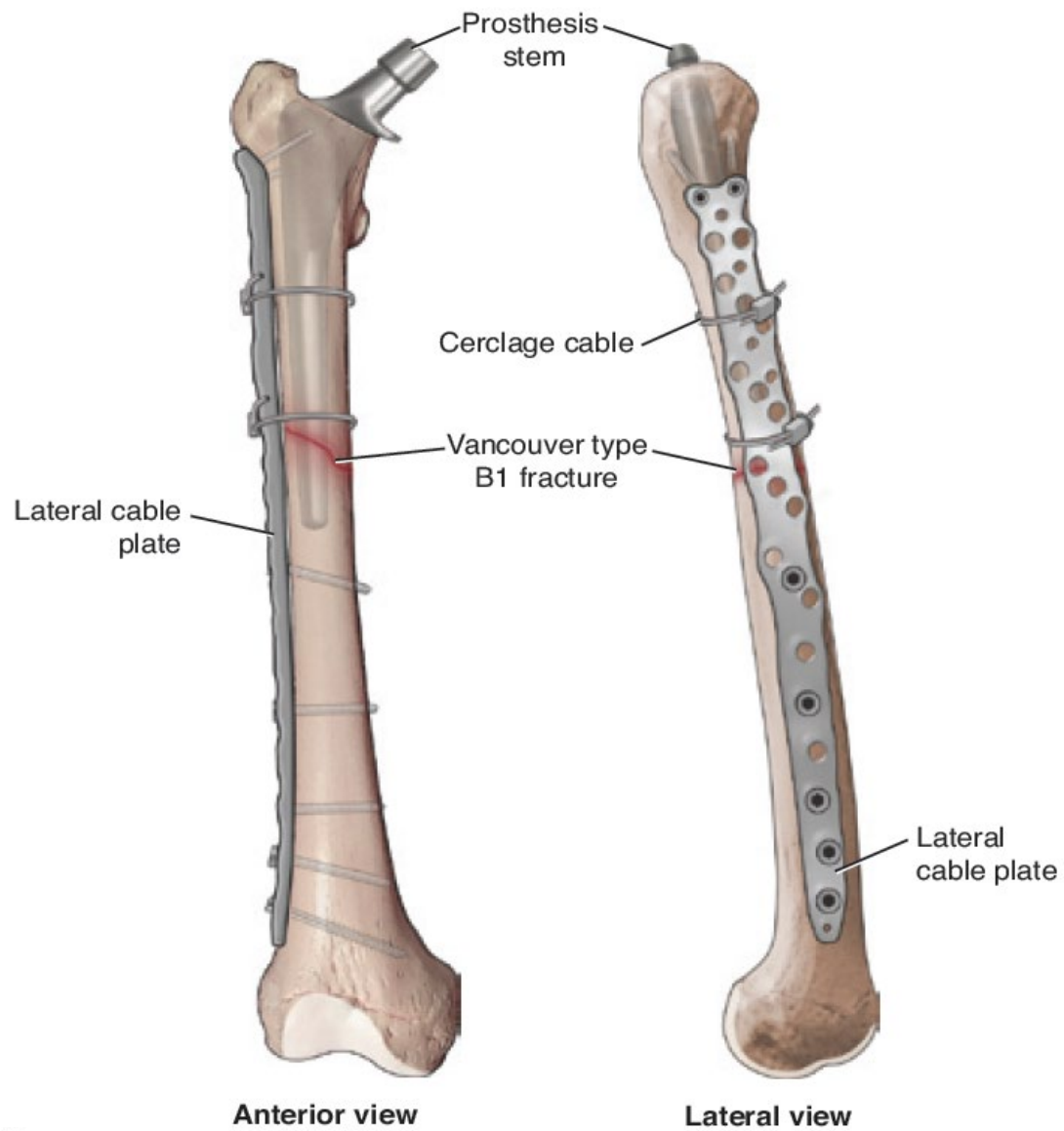
+/- additional bone graft

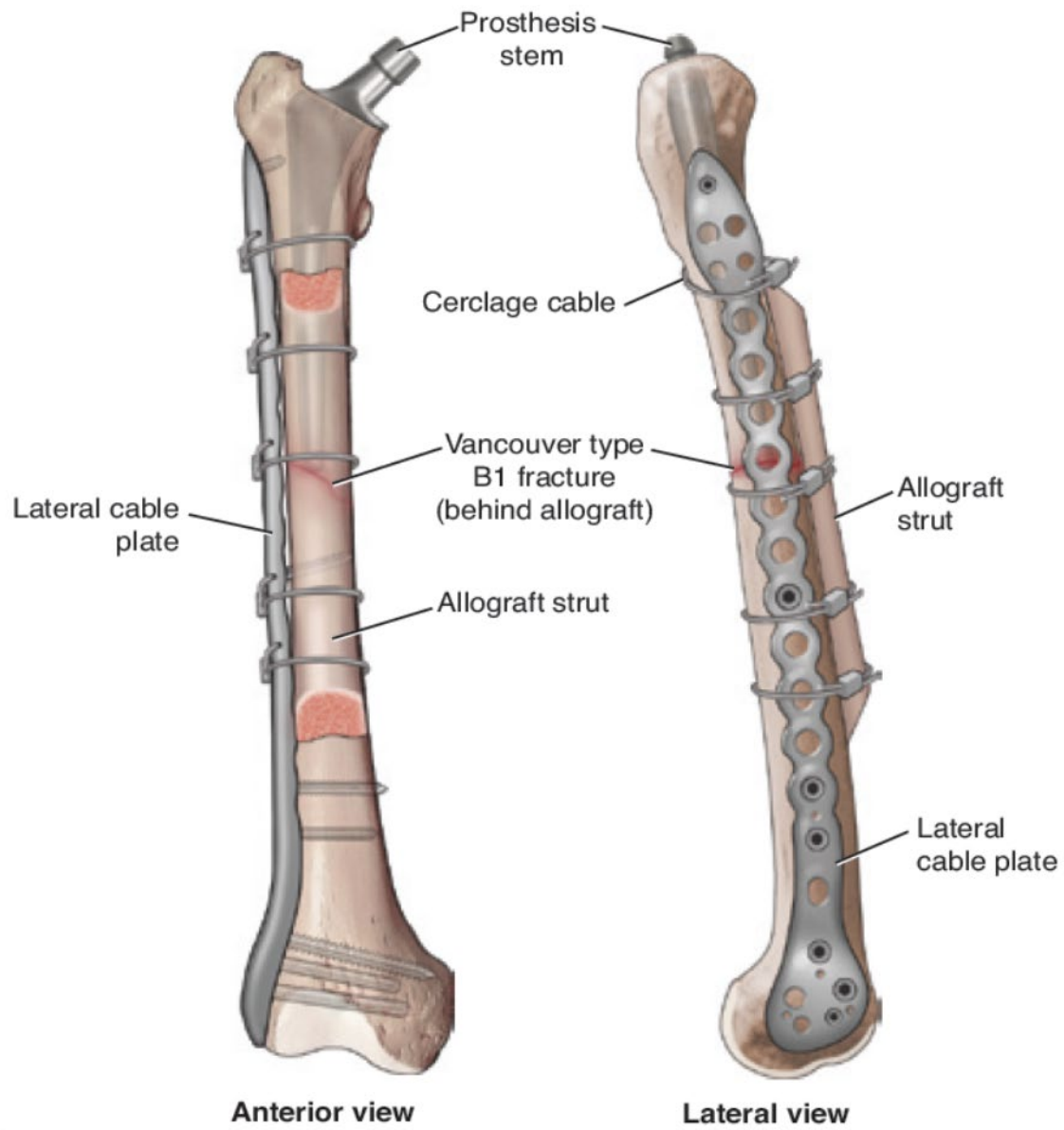
? Revision



B1 Fixation

- Main controversy is centered on “isolated lateral locked plating” versus “biplanar fixation”





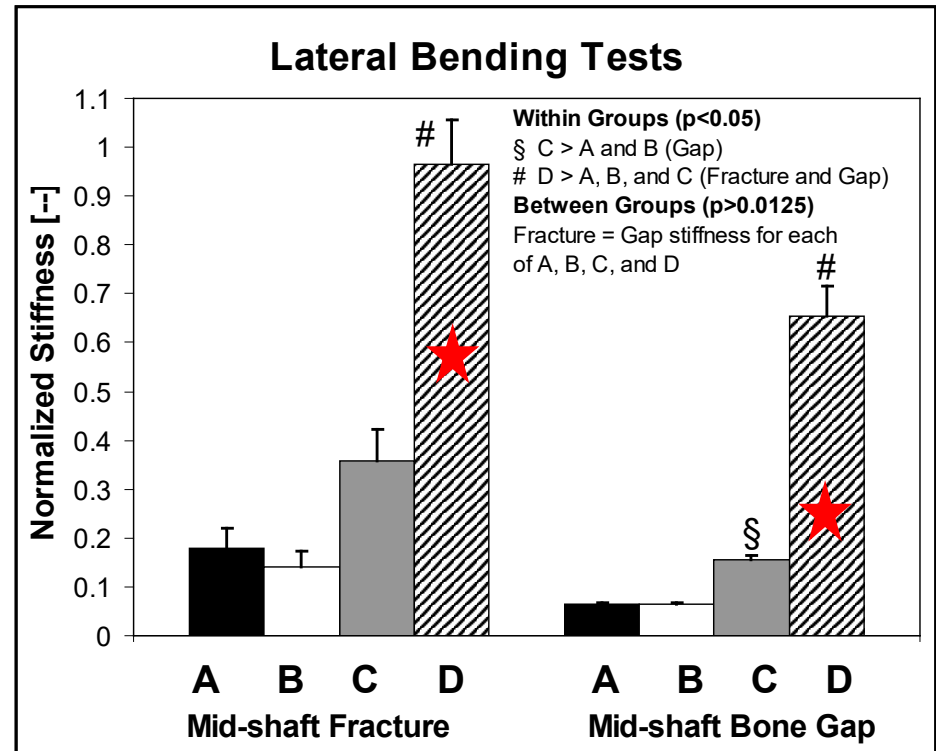
Questions?

- **What is ideal plate fixation construct?**
- **? Role of:**
 - **90/90 fixation with allograft struts**
 - **Bicortical vs unicortical fixation**
 - **Cables**
- **Much of the current evidence is biomechanical**



Zdero and Schemitsch, JBJS 2008

Single implant vs. 90/90 fixation?



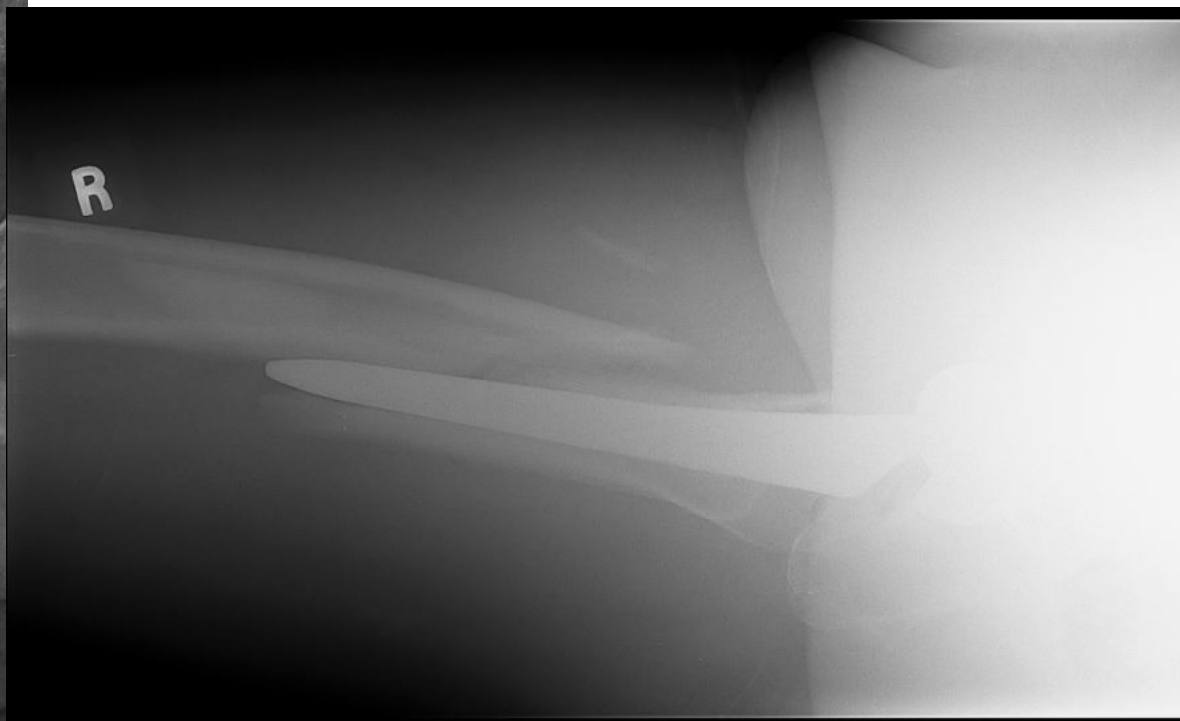
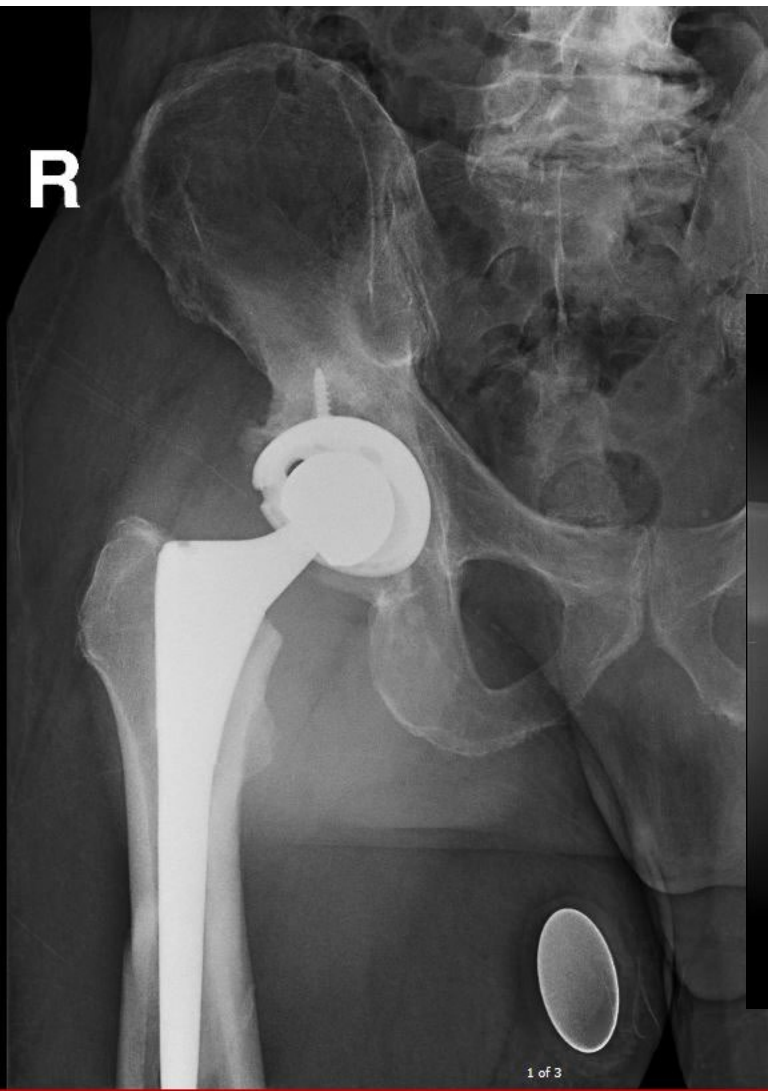
This study did not evaluate a single plate with bi-cortical fixation

Evidence Based Bottom line

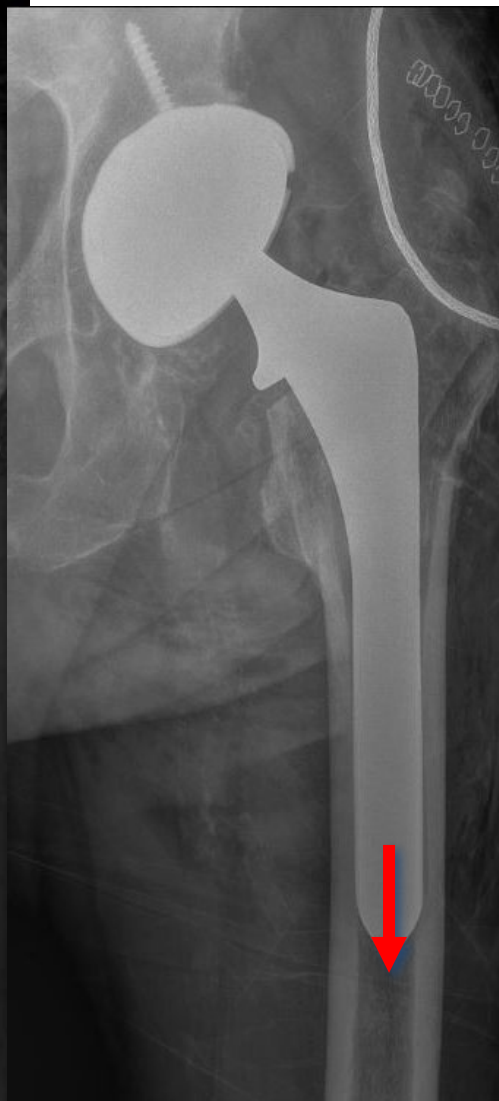
- Biplanar or dual fixation results in improved fixation stability and best biomechanics
- Bicortical fixation doesn't eliminate advantage of 90/90 fixation
- If using a single LP, try and achieve bicortical fixation
- 4 points of proximal fixation / spaced fixation
- **Question: Is bi-planar fixation always necessary?**

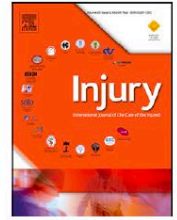
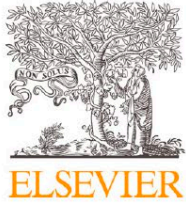
Need to consider patient factors

- Age
- Bone quality
- Fracture pattern
- Implant type
- Co-morbidities
- Previous surgery









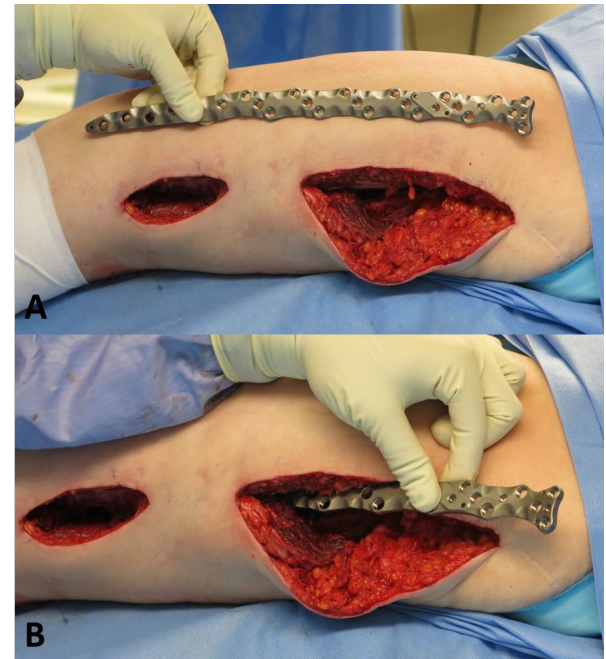
Mini-invasive approach vs. traditional open reduction for periprosthetic hip fracture osteosynthesis with the NCB® plate



Lucas Martorell de Fortuny*, Alexandre Coelho Leal, Juan Francisco Sánchez-Soler, Santos Martínez-Díaz, Alfonso León, Marqués López F

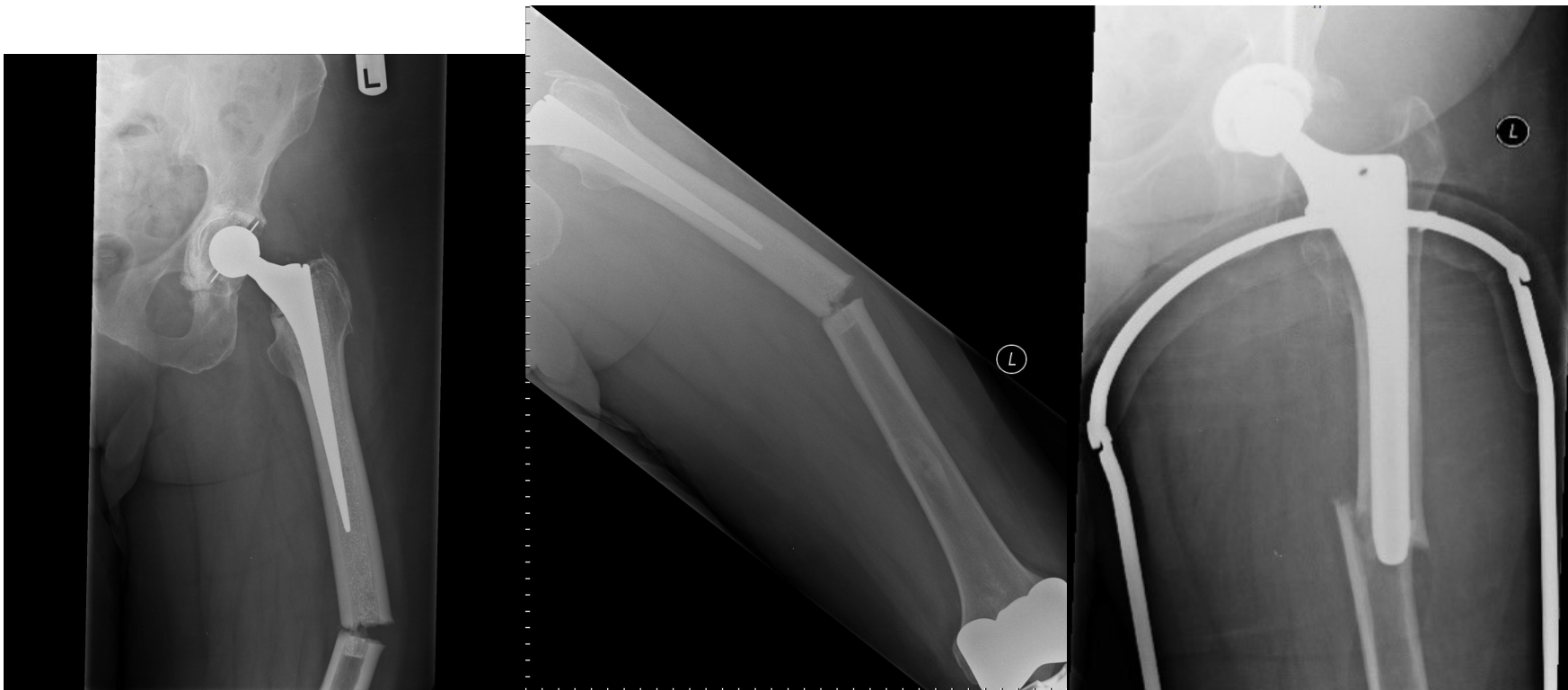
• MIS

- Decreased OR time
- Decreased intra-op blood loss
- Trend to greater independence and better mobility



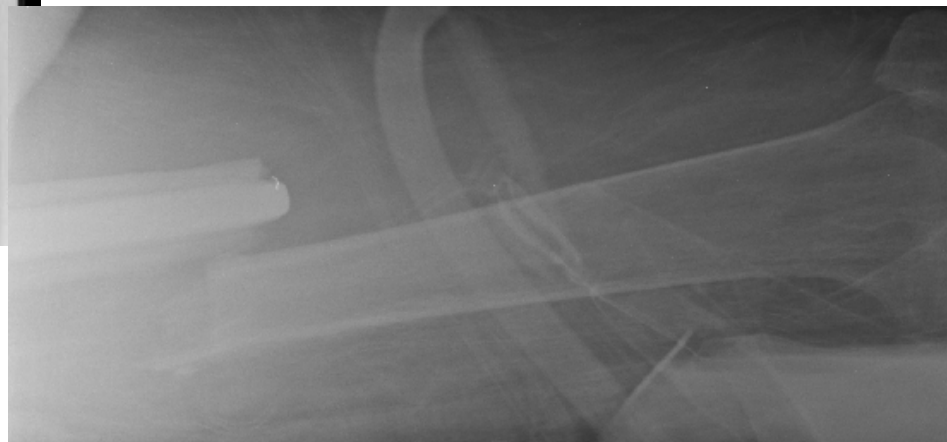
Be wary...

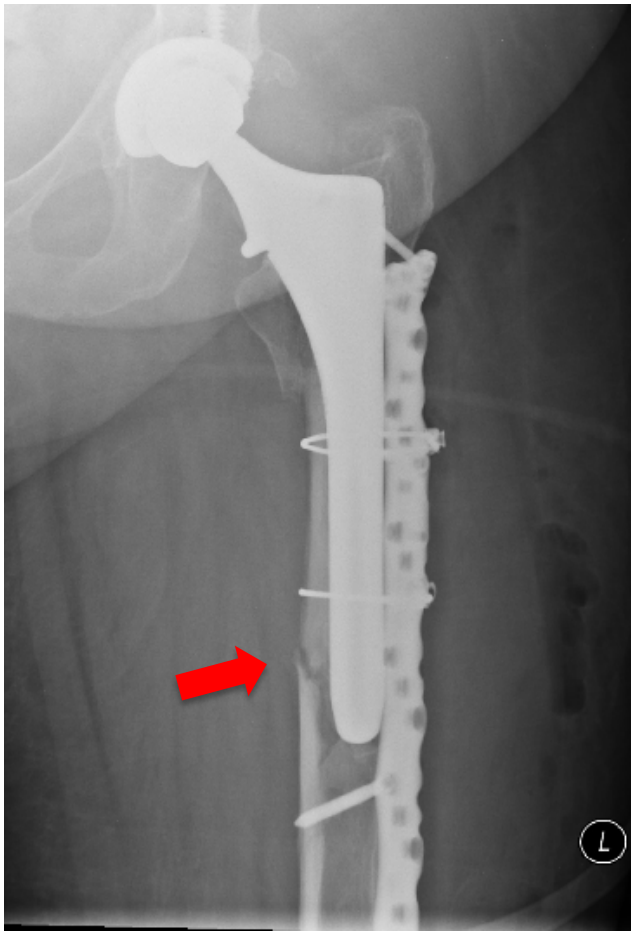
- There are instances when fractures are slow to heal, and early WB may be problematic
 - large canal filling stem, transverse / short oblique #s, no medial contact, obesity, atypical fractures



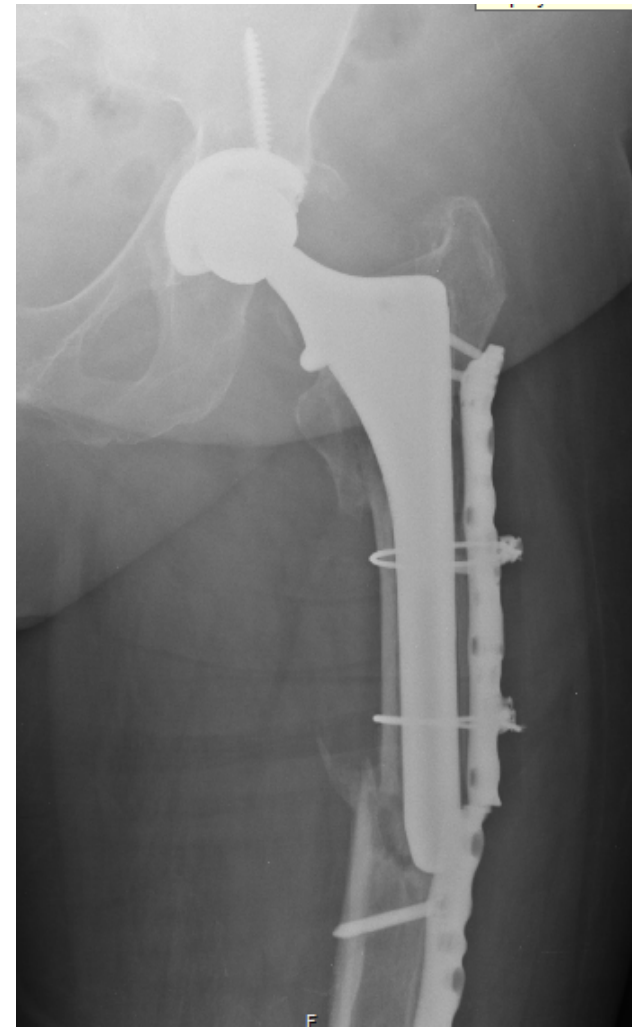


B1 fractures: Must consider potential delays in healing and need to weight bear





B1 fracture fixation: Must consider adequacy of fixation and need to weight bear





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journal homepage: www.arthroplastyjournal.org



Complications - Other

Periprosthetic Femur Fractures After Total Hip Arthroplasty: Does the Mode of Failure Correlate With Classification?



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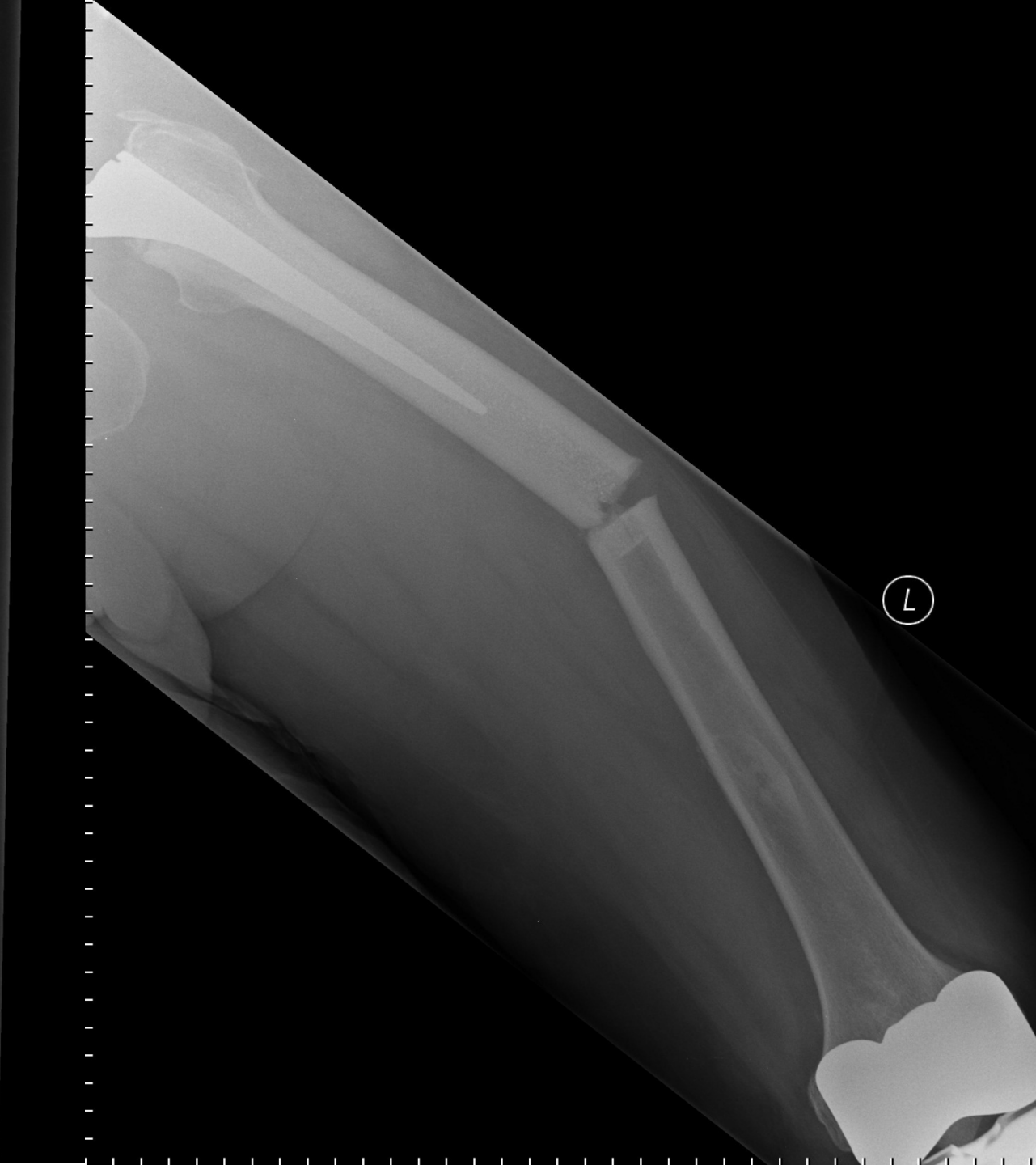
^c Department of Orthopaedic Surgery, University of Southern California, Los Angeles, CA

- The 2-year probability of any reoperation was 19%
- For B1 fractures augmenting fixation with orthogonal plating, spanning the entire femur, or revising the stem in cases of poor proximal bone should be considered

Case

- 75 year old female
- Osteoporosis
- On bisphosphonates long term
- Left thigh pain
- Previous THA and TKA

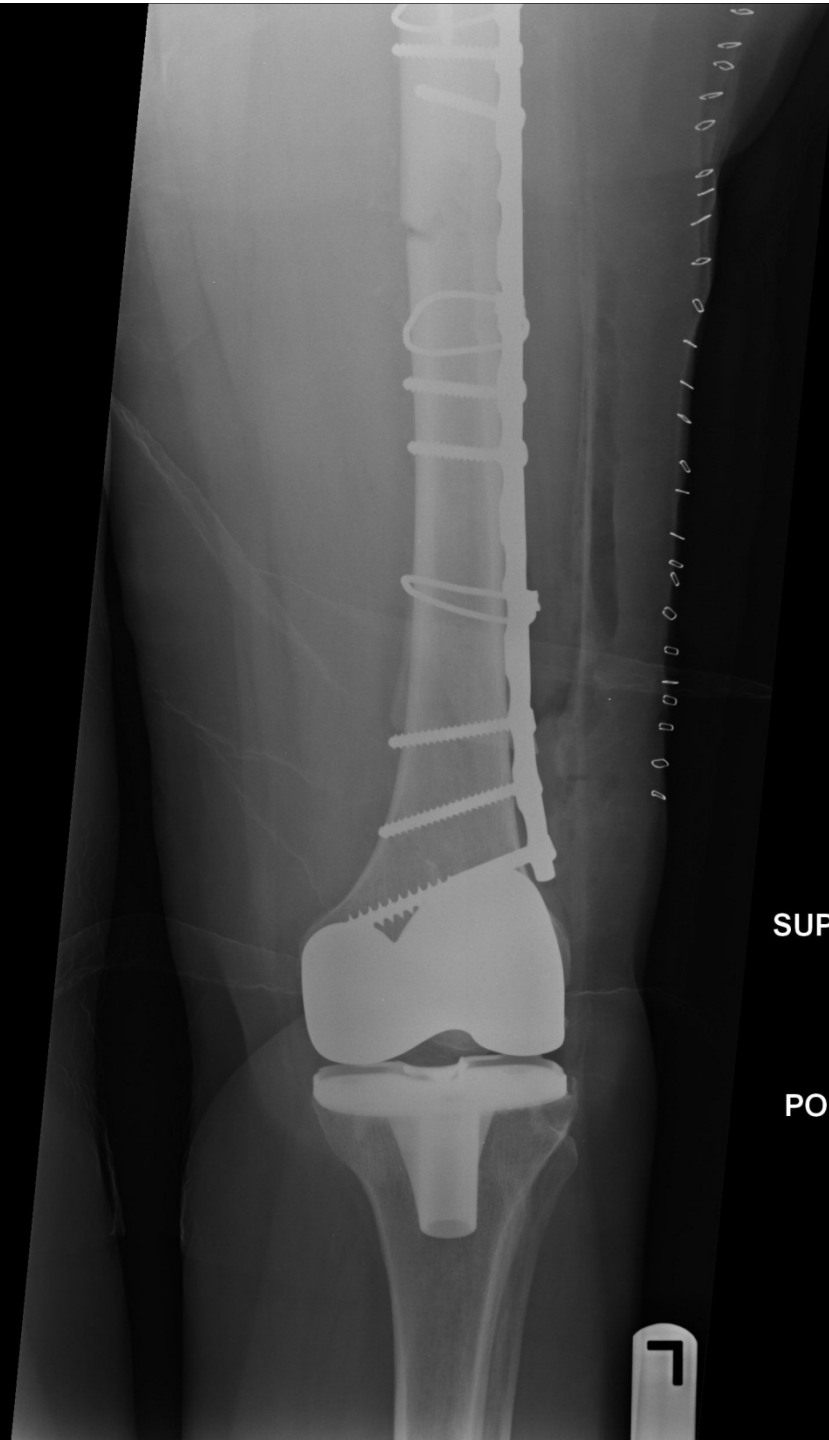






CROSS-TABLE

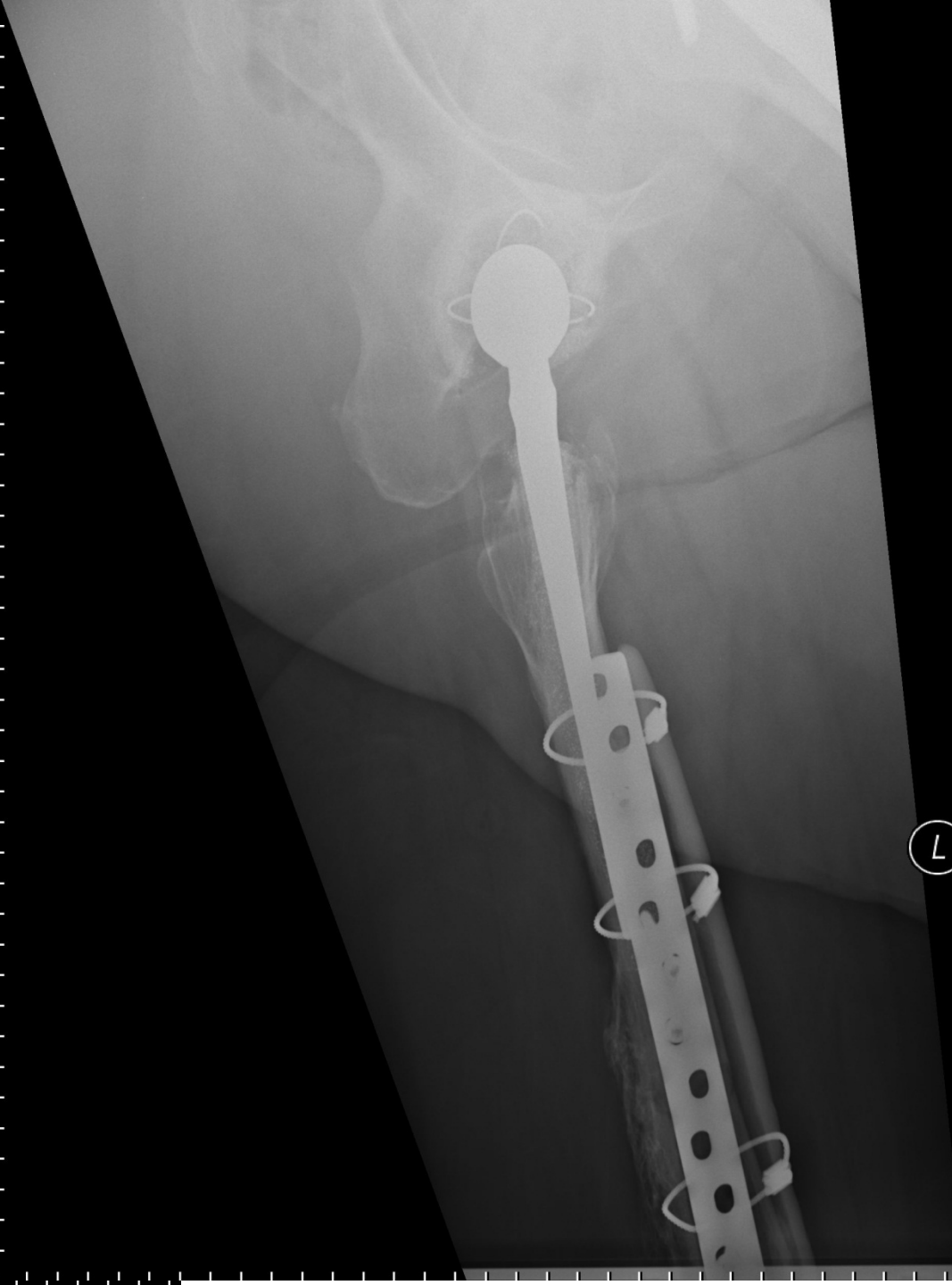
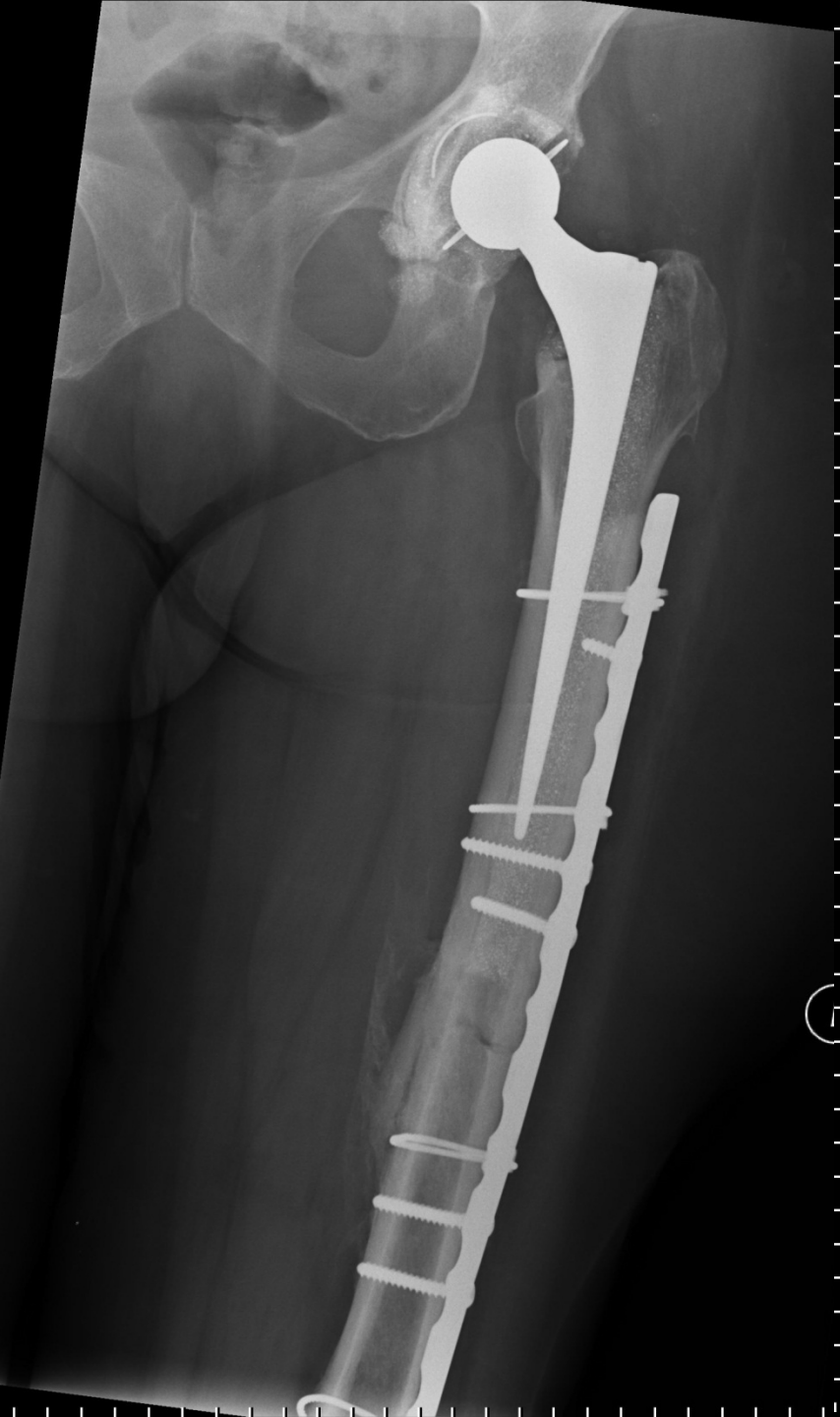
(L)



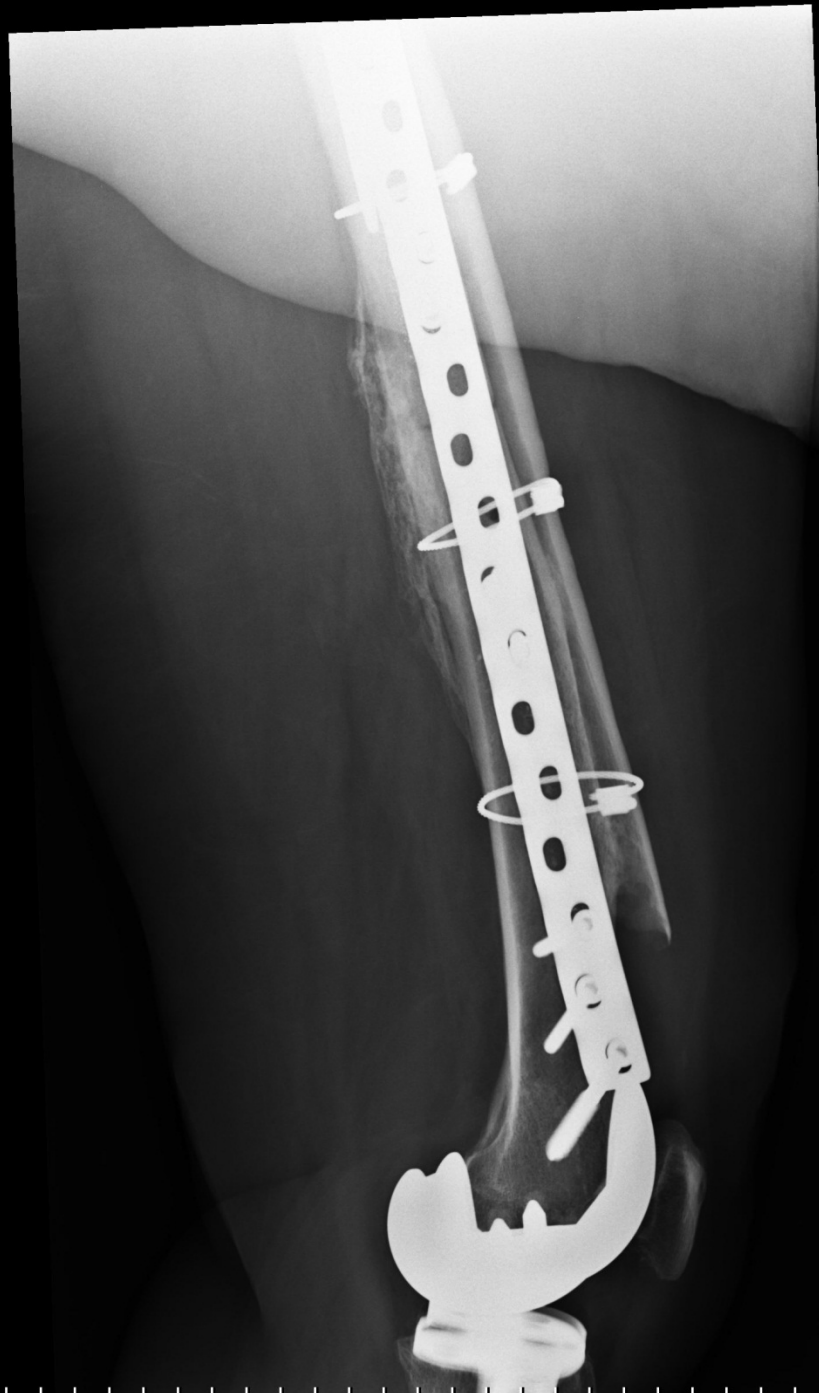
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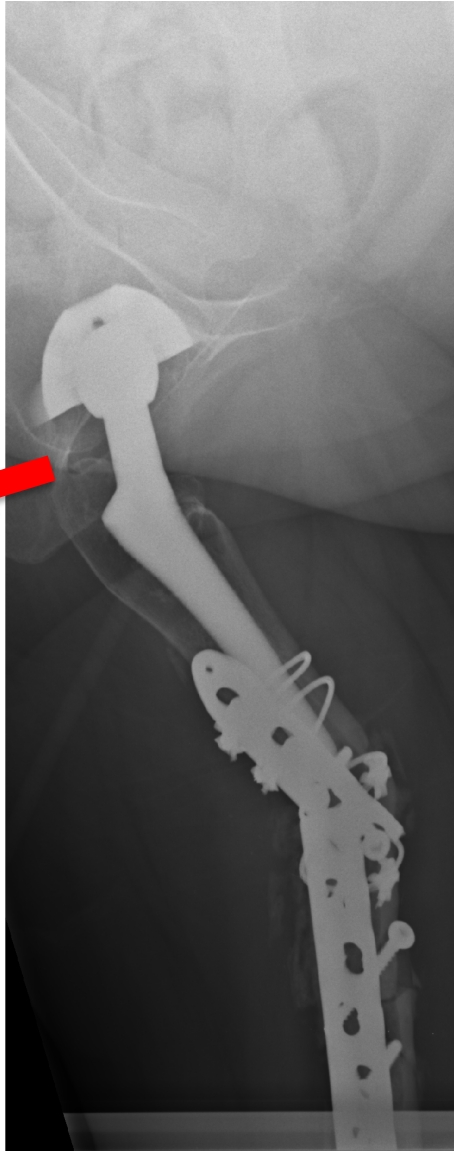
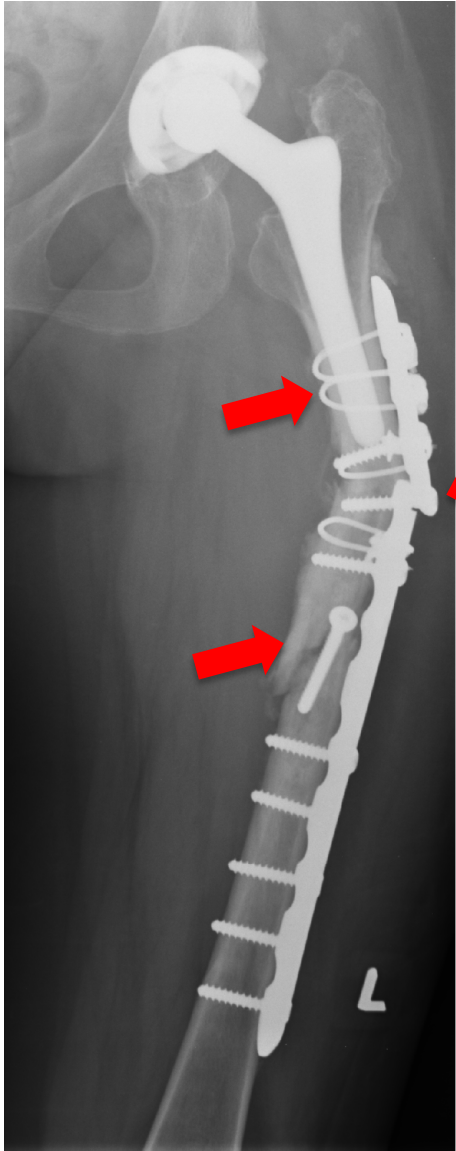
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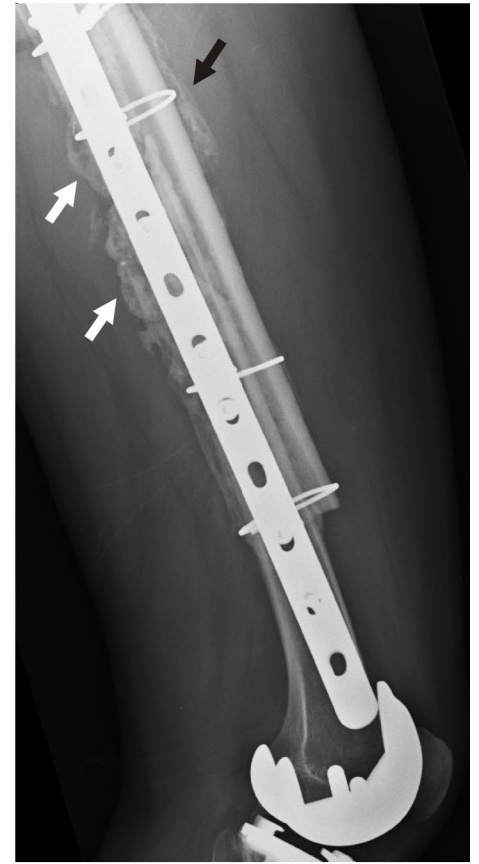
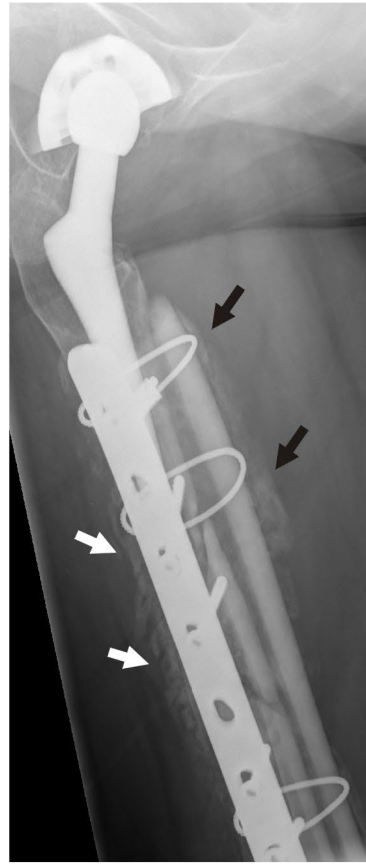
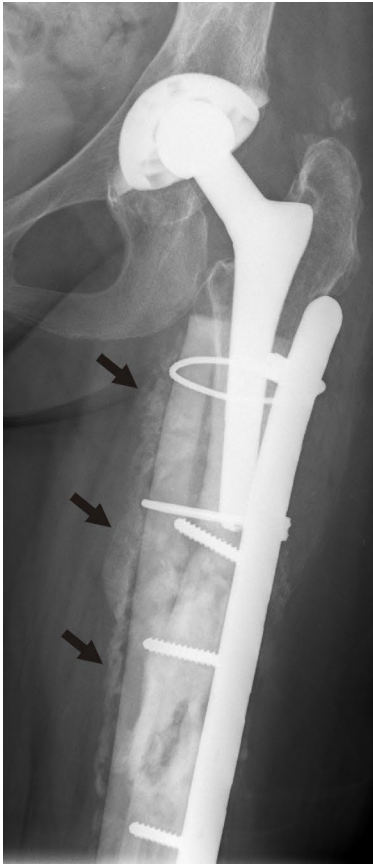


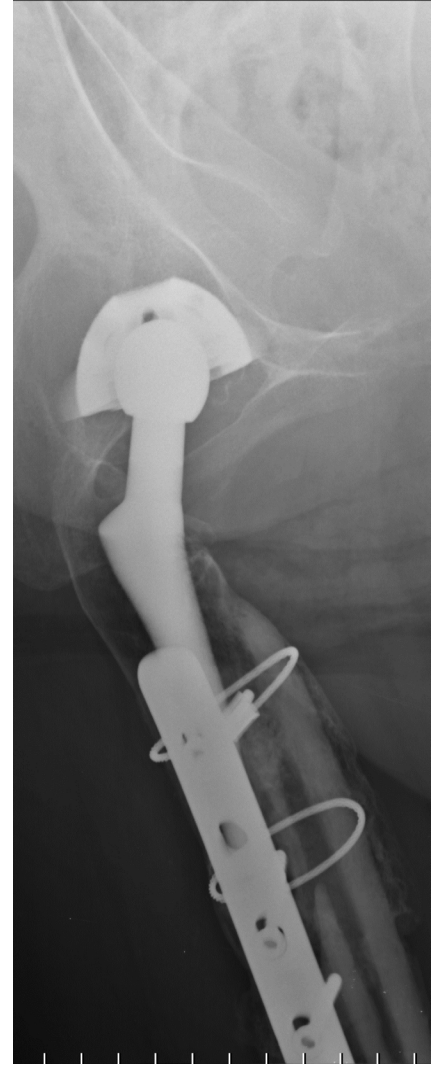
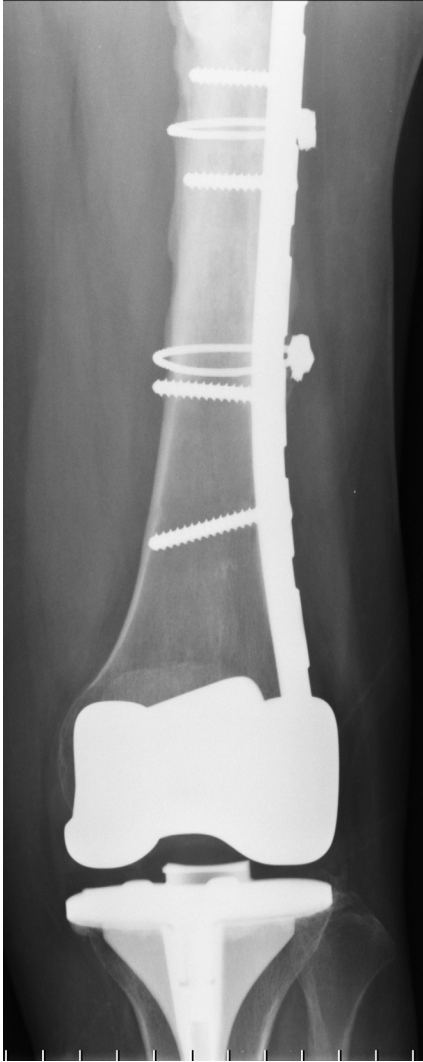


L










Clinical Outcomes for 90/90 fixation vs Lateral plating

- Few comparative series
- Less failures: 0/10 vs 5/11
 - Khashan et al 2013
- Strut vs 2nd plate
- ? Earlier weight-bearing with dual implants
 - Khwaja et al 2021

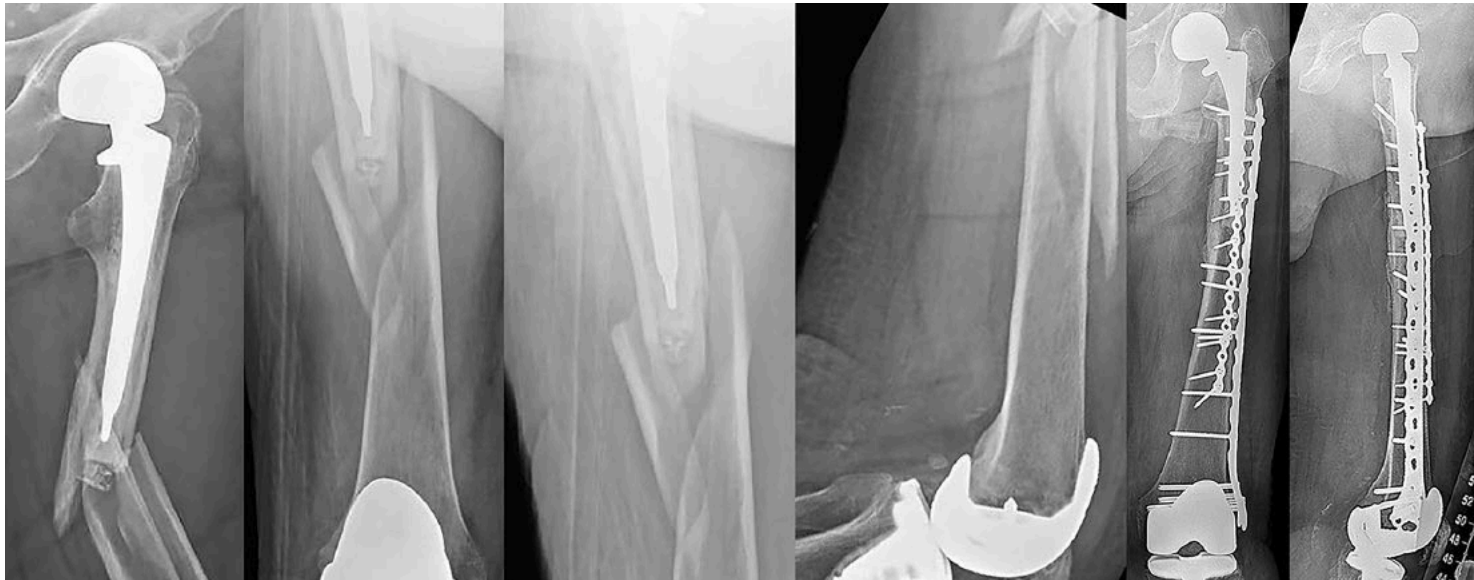




Surgical outcomes of dual-plate fixation for periprosthetic femur fractures around a stable hip arthroplasty stem

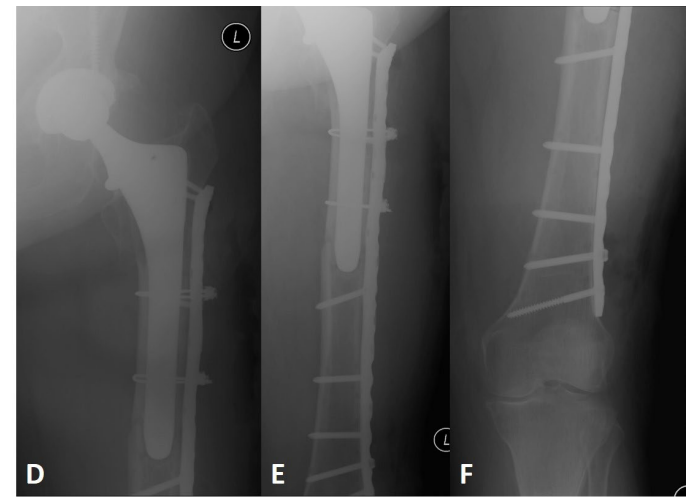
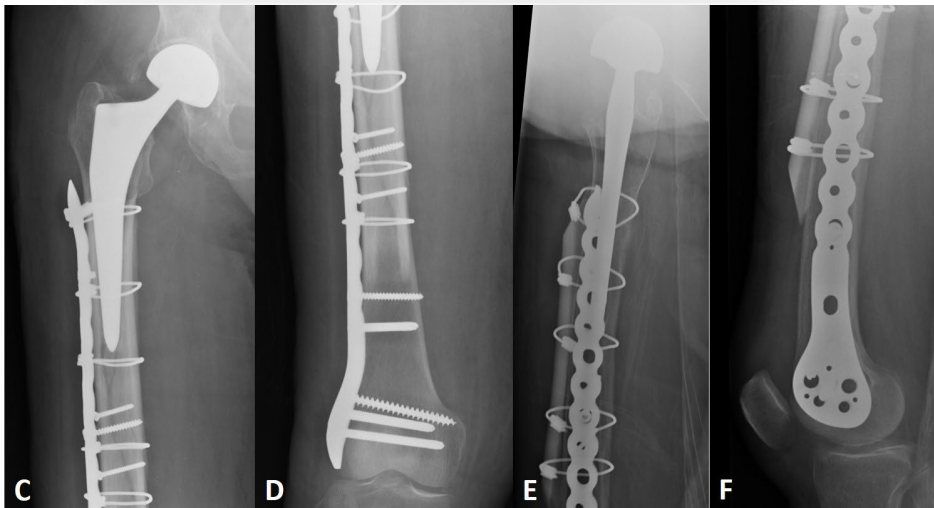
Jeremy F. Kubik¹ · Troy D. Bornes¹ · Elizabeth B. Gausden² · Craig E. Klinger¹ · David S. Wellman³ · David L. Helfet¹ 

- Avg f/u 2 years
- 92% union rate



“Isolated locked compression plating versus cable plating and strut allografts for Vancouver B1 periprosthetic femoral fractures: A Randomized Controlled Trial”

Aaron Nauth and Emil H. Schemitsch



Periprosthetic Femoral Fractures: Treatment

Type B-1 (stem well fixed):

ORIF vs Revise?

- **Early vs. Late**
- **If I can easily remove stem → Revise**
- **Well-fixed stem → ORIF**

Periprosthetic Femoral Fractures: Treatment

Type B-2 (loose stem):

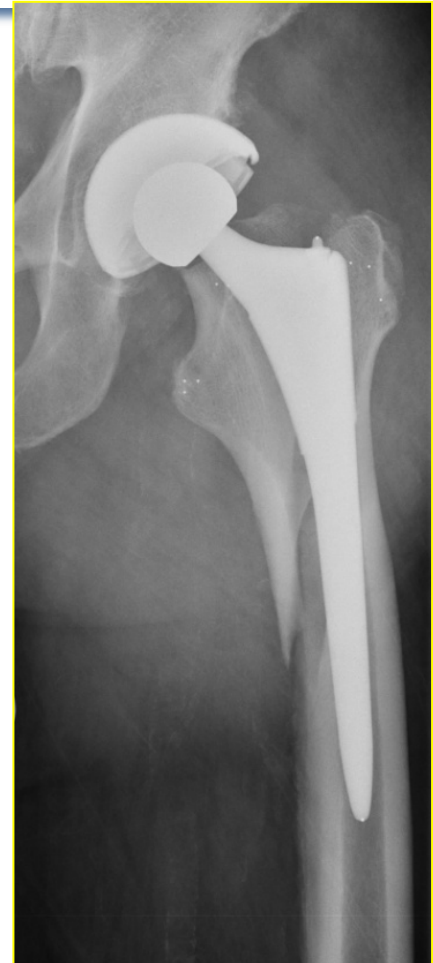
Treatment



Revision with long TFT

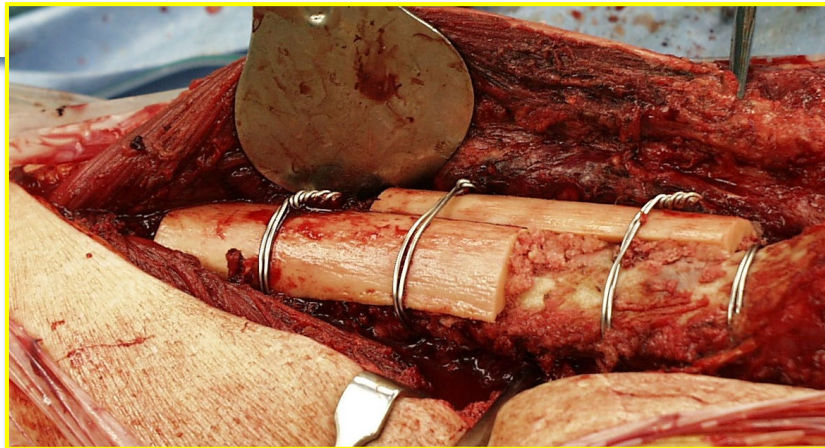
stem

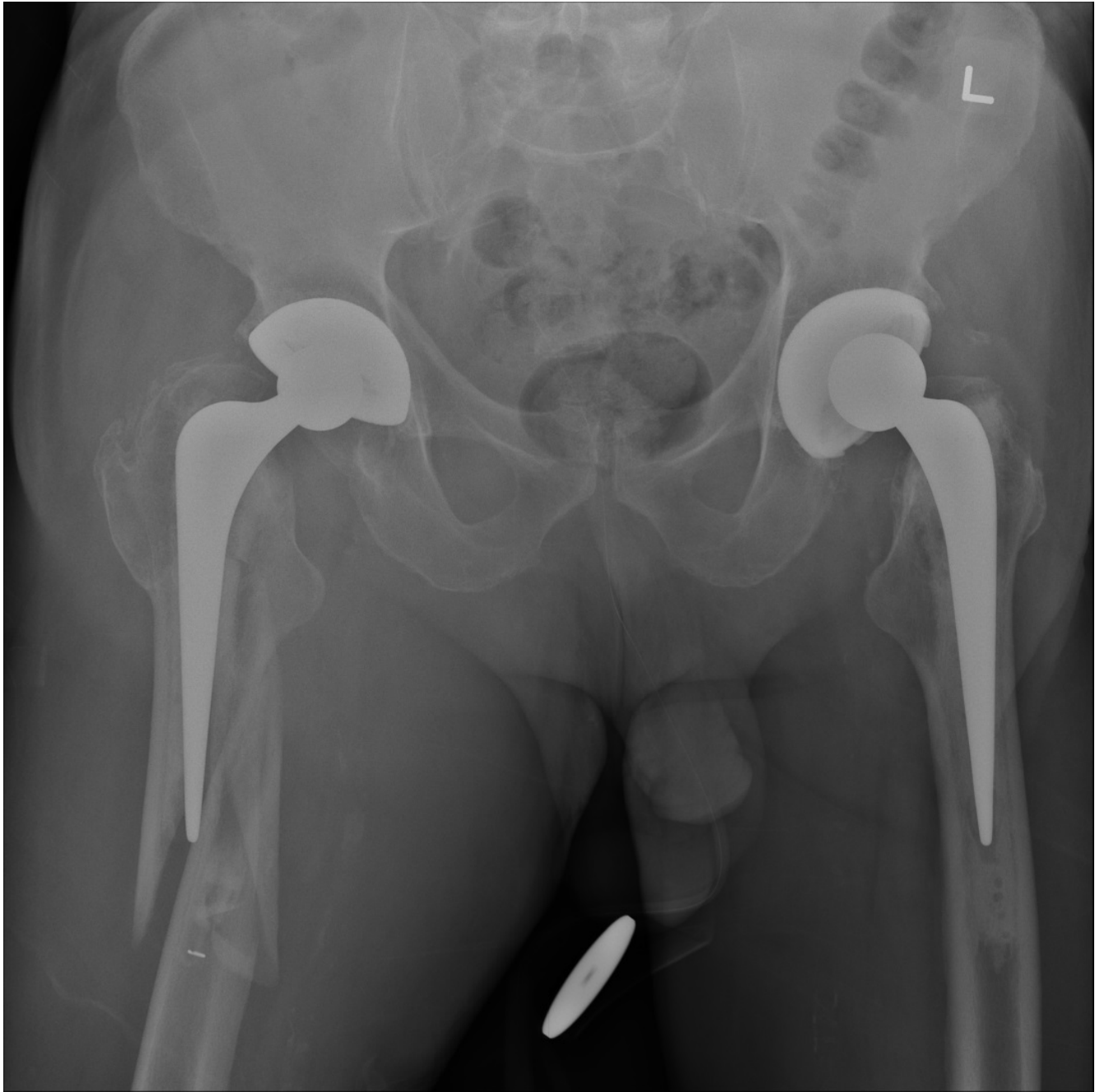
(+/- cortical strut graft)

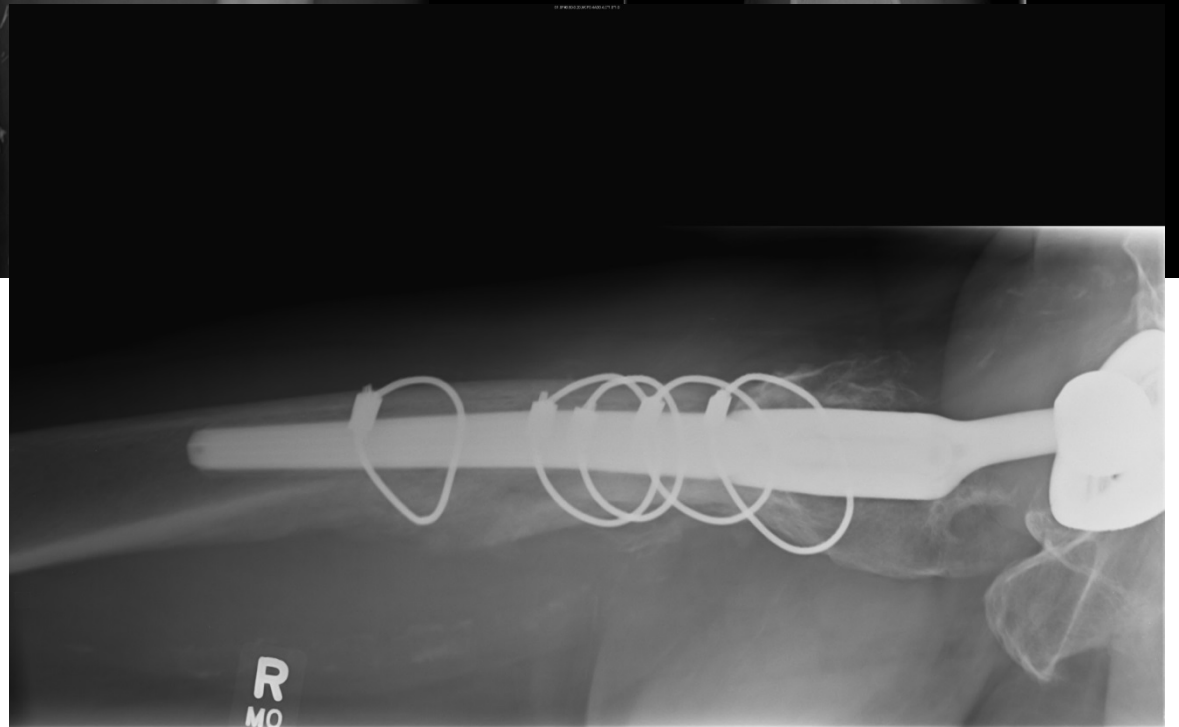
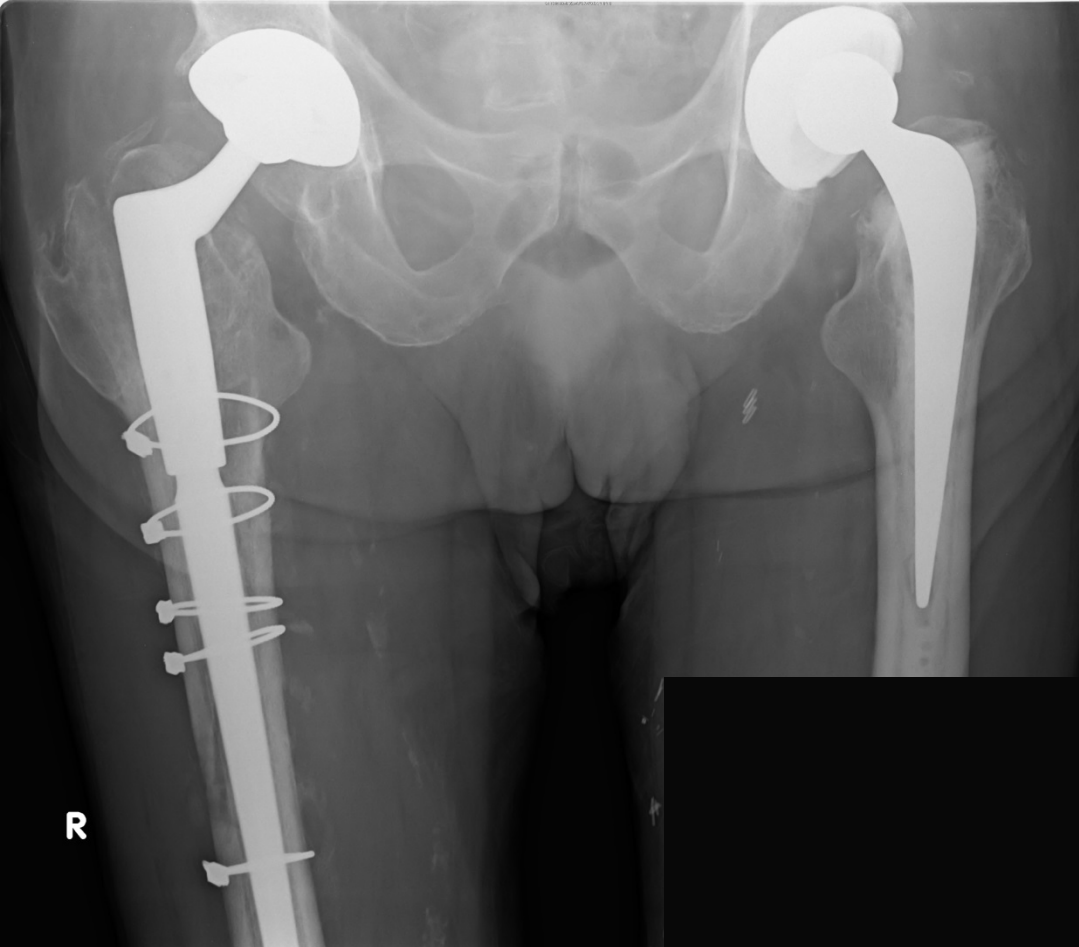


Technical Points (B2)

- **Work through #**
- **Use prophylactic cable on distal segment**
- **Prepare distal segment**
- **Insert stem and reduce fracture**
- **Apply strut bone graft? (less common than before)**







Immediate weight bearing allowed

Keys to Success and Early Weight Bearing

- Optimize medical management
- Revision arthroplasty plays an important role
- Best mechanics with dual fixation
- Prefer 90/90: large canal filling stem, transverse / short oblique #s, no medial contact, obesity
- Optimize proximal fixation (4 points)
- Screws better than cables:
 - Bicortical best with monoblock plate
- Follow principles to allow early WB



Thank you

