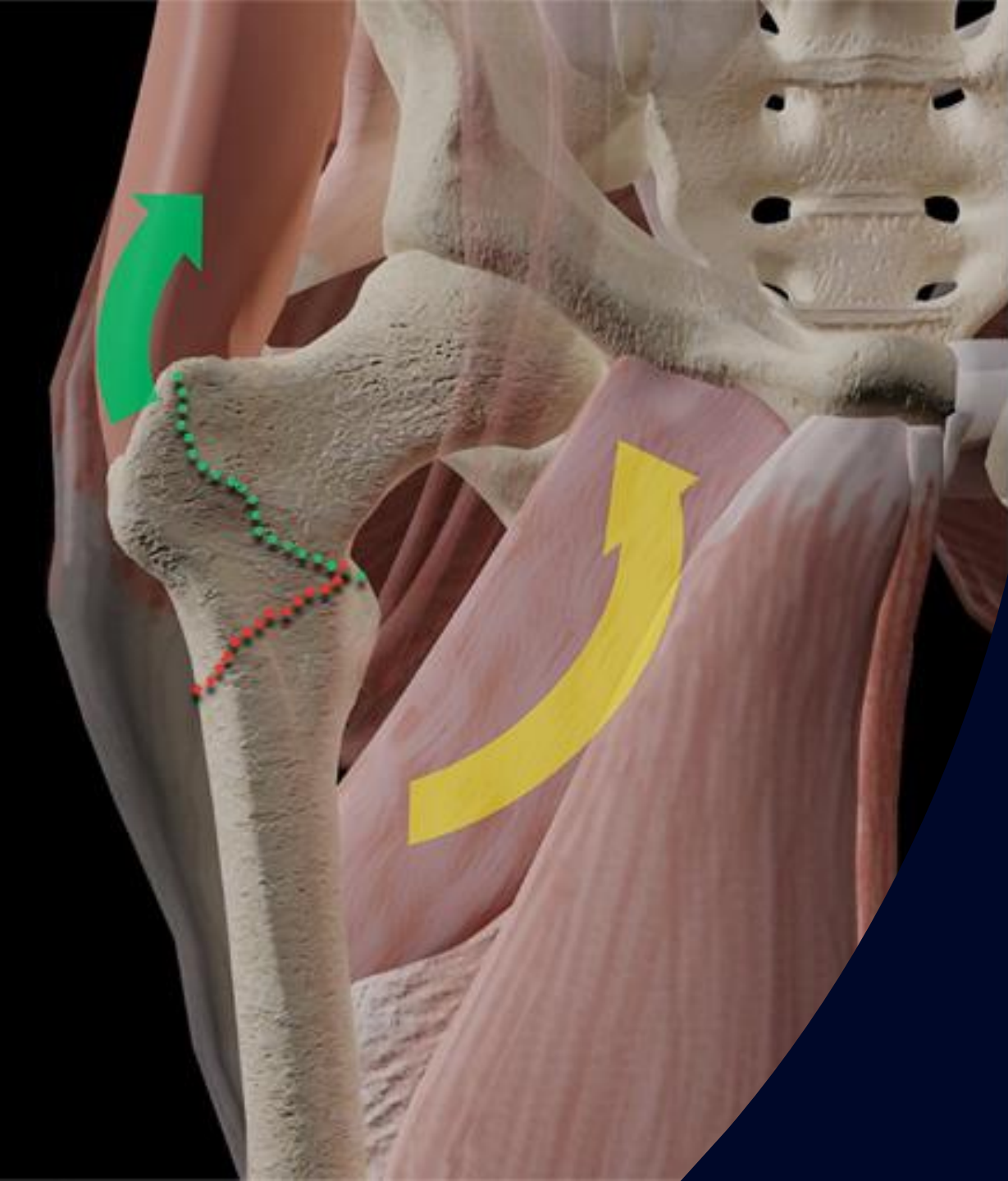


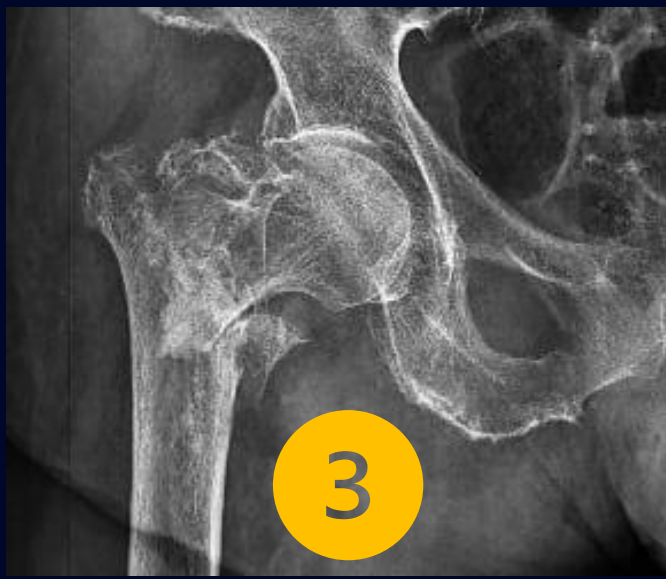


Peritrochantric Fractures

Decision Making

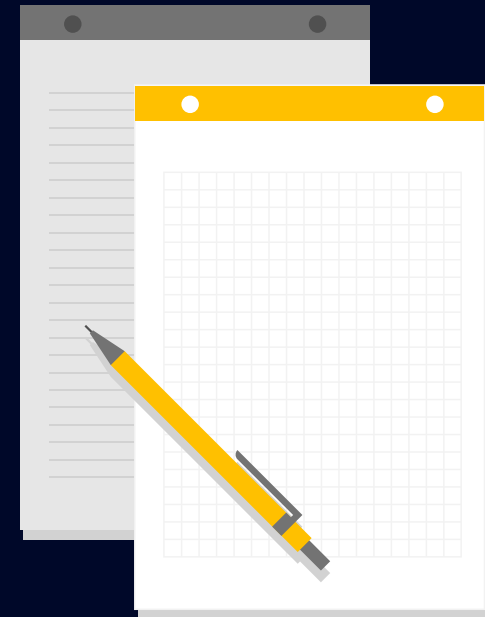
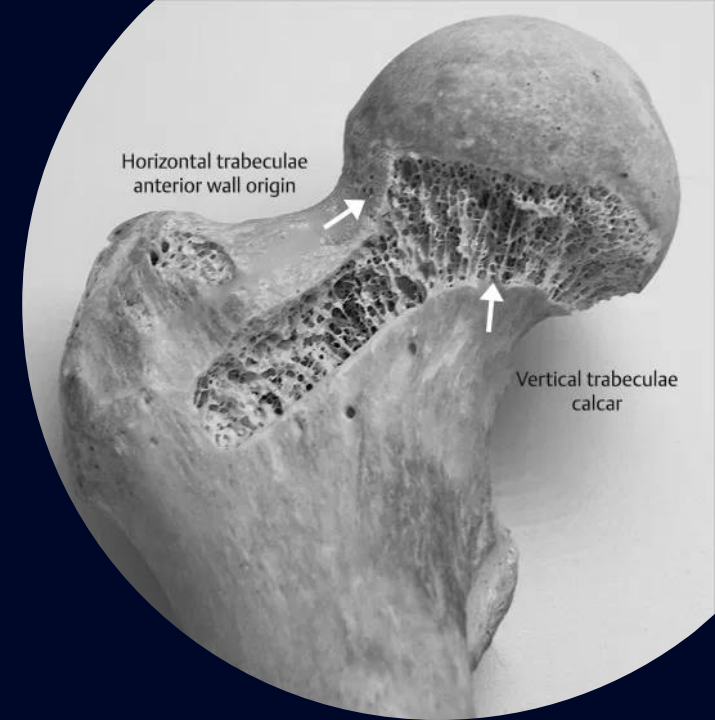
Mahlisa Kazemi, MD
Hip Surgeon
TUMS

Sep 2021



Outlines

- Timing of Surgery
- Imaging
- Implant of Choice
- Weight Bearing



Timing of surgery

Perform surgery on the day of, or the day after, admission (NICE)

Accelerated surgery versus standard care in hip fracture (HIP ATTACK): an international, randomised, controlled trial

The HIP ATTACK Investigators*

Accelerated surgery

did not have a significant effect on :

- Mortality
- Major complications

did demonstrate a reduction in :

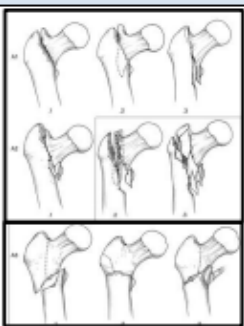
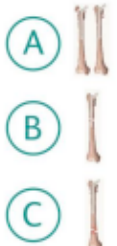
- Delirium
- Urinary Tract Infection
- Moderate-to-severe Pain On Days 4–7
- Mortality in patients with high Troponin

National Hip Fracture Database

Dataset specification v13.0 (2020)

(Applicable to patients with any form of hip/femoral fracture admitted from 1 Jan 2020)

Theatre Data Collection Sheet - Only for use in operating theatre – Only to be completed by theatre staff

Date & time of primary surgery	Side of fracture (For bilateral fractures complete two forms)
___ / ___ / ____ :__ :__	☐ Left ☐ Right
☐ No operation performed	
Type of fracture (Please note that selecting the correct fracture type affects the measurement of compliance with NICE guidance)	
Hip Fracture ☐ Intracapsular - displaced ☐ Intracapsular - undisplaced ☐ Trochanteric - grade A1/A2 ☐ Trochanteric - grade A3 (including reverse oblique) ☐ Subtrochanteric	
Femoral shaft fractures <i>Definition: A fracture 5cm or more below the lesser trochanter and 5cm or more above the knee joint</i> ☐ Femoral shaft	
Distal femoral fracture <i>Definition: Fracture involving within 5cm above knee joint (=1 Muller square)</i> ☐ Distal femoral – Extra-articular ☐ Distal femoral – Intra-articular	
Peri-prosthetic femoral fracture <i>Definition: Do not include acetabular/ pelvic or tibial fractures</i> ☐ Peri-prosthetic, around a hip replacement – A (trochanteric) ☐ Peri-prosthetic, around a hip replacement – B (around the stem) ☐ Peri-prosthetic, around a hip replacement – C (distal to stem/ cement) ☐ Peri-prosthetic, around a knee replacement – A (epicondyles) ☐ Peri-prosthetic, around a knee replacement – B (involving implant/ cement) ☐ Peri-prosthetic, around a knee replacement – C (proximal to implant/cement) ☐ Peri-prosthetic, between a THR and a TKR – D (inter-prosthetic) ☐ Peri-prosthetic, around previous fixation device – plate ☐ Peri-prosthetic, around previous fixation device – nail	
Pathological ☐ Atypical bisphosphonate type subtrochanteric fracture ☐ Malignancy ☐ No	

☐ Unknown					
ASA grade	Type of anaesthesia (Tick all which apply in this case)				
☐ 1. A normal healthy patient ☐ 2. A patient with mild systemic disease ☐ 3. A patient with severe systemic disease ☐ 4. A patient with severe systemic disease that is a constant threat to life ☐ 5. A moribund patient who is not expected to survive without the operation ☐ Unknown	☐ GA ☐ Spinal ☐ Epidural ☐ Intra-operative sedation ☐ Intra-operative nerve-block ☐ High volume peri-articular LA infiltration (by surgeon)				
Operation performed	Reason if delay > 36 Hours				
☐ Internal fixation - Sliding Hip Screw ☐ Internal fixation - Cannulated screws ☐ Internal fixation - IM nail (long) ☐ Internal fixation - IM nail (short) ☐ Arthroplasty – Unipolar hemi (uncemented – uncoated/ monoblock) ☐ Arthroplasty – Unipolar hemi (uncemented – uncoated/ modular) ☐ Arthroplasty – Unipolar hemi (uncemented - HA coated/ monoblock) ☐ Arthroplasty – Unipolar hemi (uncemented - HA coated/ modular) ☐ Arthroplasty – Unipolar hemi (cemented/ monoblock) ☐ Arthroplasty – Unipolar hemi (cemented/ modular) ☐ Arthroplasty – Bipolar hemi (uncemented - HA coated) ☐ Arthroplasty – Bipolar hemi (cemented) ☐ Arthroplasty – THR (uncemented - HA coated) ☐ Arthroplasty – THR (cemented) ☐ Arthroplasty – THR hybrid ☐ Other	☐ No delay - surgery < 36hrs ☐ Awaiting orthopaedic diagnosis/investigation ☐ Awaiting medical review/investigation or stabilisation ☐ Delayed for reversal of warfarin ☐ Delayed for reversal of DOAC* ☐ Administrative/logistic - awaiting space on theatre list ☐ Administrative/logistic - cancelled due to theatre over-run ☐ Other ☐ Unknown <i>* Direct oral anticoagulants (DOAC) are apixaban, edoxaban, rivaroxaban and dabigatran (Do not record clopidogrel or prasugrel - they are antiplatelet drugs not DOACs)</i>				
Femoral fracture at sites other than the hip may be coded using operations from the list above, or using one of the following additional options: (these additional options are not to be used for patients with hip fracture) ☐ Plate and screws/cables ☐ Arthroplasty – revision TKR ☐ Arthroplasty – revision THR (cemented) ☐ Arthroplasty – revision THR (uncemented) ☐ Arthroplasty – revision THR (Hybrid) ☐ Arthroplasty – revision THR (reverse Hybrid) ☐ Arthroplasty – primary TKR ☐ Arthroplasty – excision	<table border="1"> <tr> <td>Grade of senior surgeon present in operating room</td> <td>Grade of senior anaesthetist present in operating room</td> </tr> <tr> <td> ☐ Consultant ☐ Associate specialist ☐ Staff grade/specialty doctor ☐ ST3+ ☐ Below ST3 ☐ Unknown </td> <td> ☐ Consultant ☐ Associate specialist ☐ Staff grade/specialty doctor ☐ ST3+ ☐ Below ST3 ☐ Unknown </td> </tr> </table>	Grade of senior surgeon present in operating room	Grade of senior anaesthetist present in operating room	☐ Consultant ☐ Associate specialist ☐ Staff grade/specialty doctor ☐ ST3+ ☐ Below ST3 ☐ Unknown	☐ Consultant ☐ Associate specialist ☐ Staff grade/specialty doctor ☐ ST3+ ☐ Below ST3 ☐ Unknown
Grade of senior surgeon present in operating room	Grade of senior anaesthetist present in operating room				
☐ Consultant ☐ Associate specialist ☐ Staff grade/specialty doctor ☐ ST3+ ☐ Below ST3 ☐ Unknown	☐ Consultant ☐ Associate specialist ☐ Staff grade/specialty doctor ☐ ST3+ ☐ Below ST3 ☐ Unknown				

Reason if delay > 36 Hours

- ☐ No delay - surgery < 36hrs
- ☐ Awaiting orthopaedic diagnosis/investigation
- ☐ Awaiting medical review/investigation or stabilisation
- ☐ Delayed for reversal of warfarin
- ☐ Delayed for reversal of DOAC*
- ☐ Administrative/logistic - awaiting space on theatre list
- ☐ Administrative/logistic - cancelled due to theatre over-run
- ☐ Other
- ☐ Unknown

** Direct oral anticoagulants (DOACs) are apixaban, edoxaban, rivaroxaban and dabigatran*

(Do not record clopidogrel or prasugrel - they are antiplatelet drugs not DOACs)

Lateral X-ray

→ Yes

→ No



Traction

→ Yes

→ No



Considerations

Especial considerations:

- Sever hip osteoarthritis
- Pathologic Fractures

Unstable Fractures:

- Basicervical fractures (B2.1)
- The presence of a subtrochanteric extension to the fracture
- Loss of the lateral cortical support
- Posteromedial Commiunation
- Medialization of the femur
- Severe displacement or angulation of the fracture on the lateral radiograph



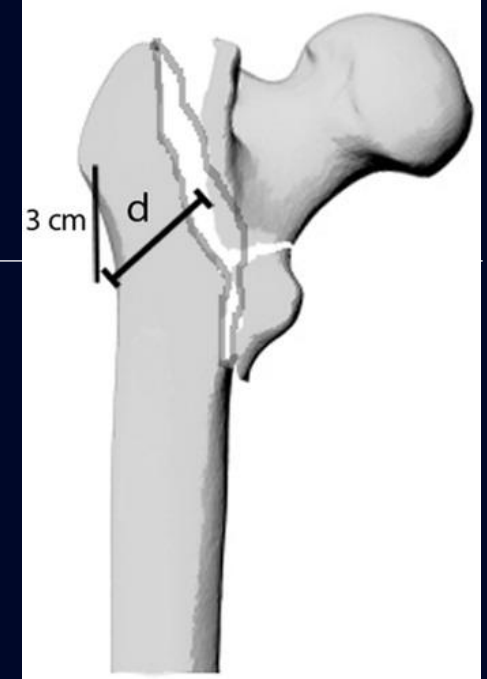
■ TRAUMA

Lateral femoral wall thickness

A RELIABLE PREDICTOR OF POST-OPERATIVE LATERAL WALL FRACTURE IN INTERTROCHANTERIC FRACTURES

C-E. Hsu,
C-M. Shih,
C-C. Wang,
K-C. Huang

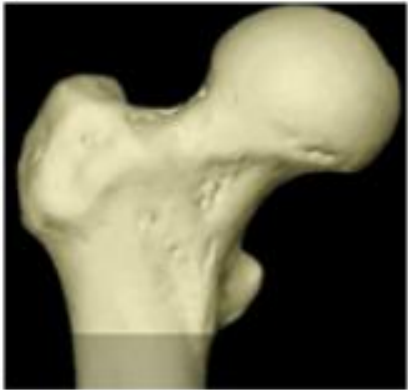
*From Taichung
Veterans General
Hospital, Taichung,
Taiwan*



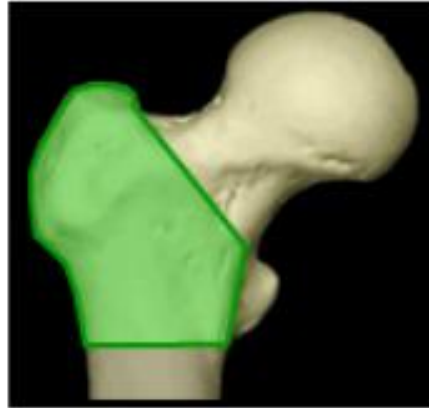
To our knowledge, this is the first study to investigate the risk factors of post-operative lateral wall fracture in intertrochanteric fracture. We found that lateral wall thickness was a reliable predictor of post-operative lateral wall fracture and conclude that intertrochanteric fractures with a lateral wall thickness < 20.5 mm should not be treated with DHS alone.

Classification

31-



A



*Intertrochanteric
hip fractures*

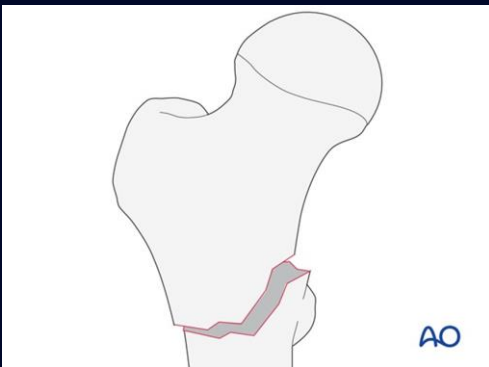
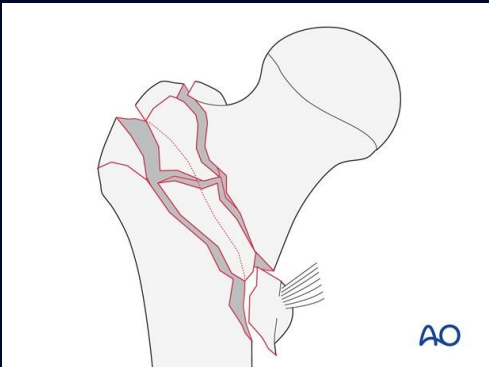
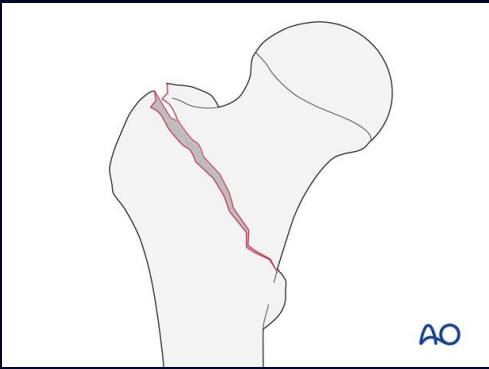
B



C



*Neck and head
fractures*



Classification

New AO

31A1 / 31A2 / 31A3

Stable

Unstable

Potentially Unstable

31A

Type: Femur, proximal end segment, **trochanteric region fracture** 31A

Group: Femur, proximal end segment, trochanteric region, **simple pertrochanteric fracture** 31A1

Subgroups:

Isolated single trochanter fracture
31A1.1*



*Qualifications:
n **Greater trochanter**
o Lesser trochanter

Two-part fracture
31A1.2



Lateral wall intact (>20.5 mm) fracture
31A1.3



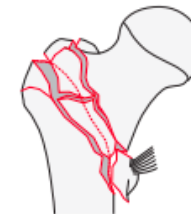
Group: Femur, proximal end segment, trochanteric region, **multifragmentary pertrochanteric, lateral wall incompetent (≤ 20.5 mm) fracture** 31A2

Subgroups:

With 1 intermediate fragment
31A2.2



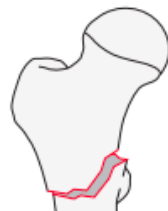
With 2 or more intermediate fragments
31A2.3



→ For more information about calculating the lateral wall thickness, please refer to the Appendix.

Group: Femur, proximal end segment, trochanteric region, **intertrochanteric (reverse obliquity) fracture** 31A3

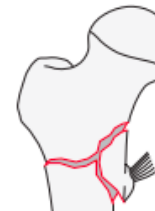
Subgroups:
Simple oblique fracture
31A3.1

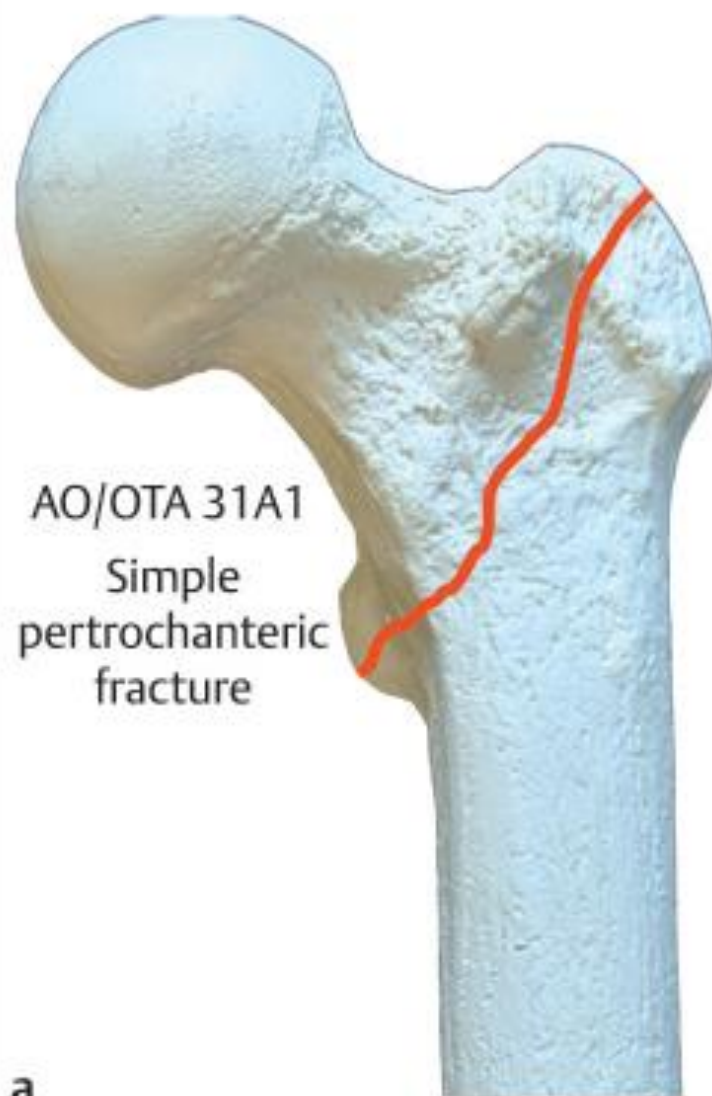


Simple transverse fracture
31A3.2



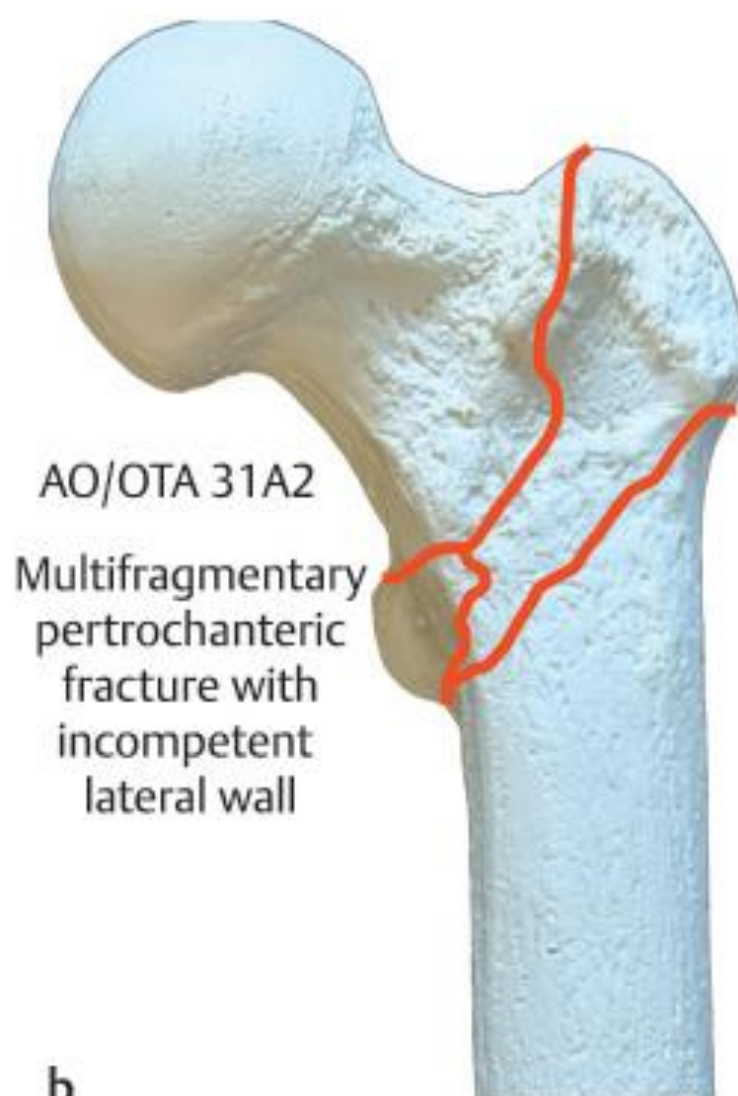
Wedge or multifragmentary fracture
31A3.3





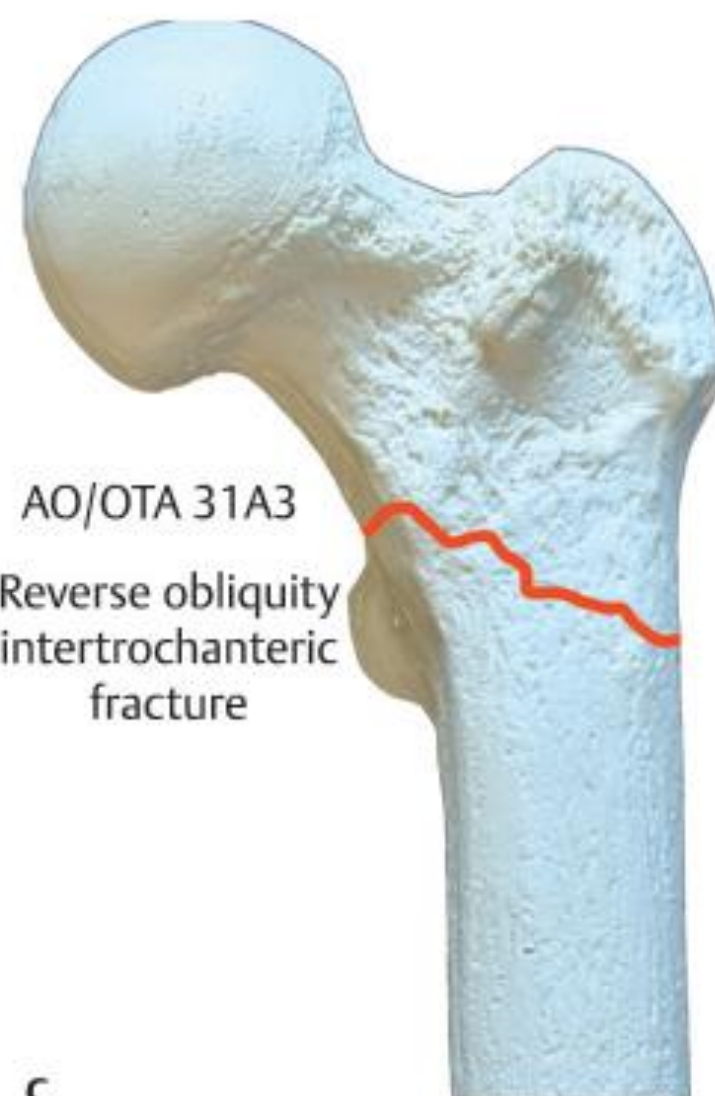
AO/OTA 31A1
Simple
pertrochanteric
fracture

a



AO/OTA 31A2
Multifragmentary
pertrochanteric
fracture with
incompetent
lateral wall

b



AO/OTA 31A3
Reverse obliquity
intertrochanteric
fracture

c

Femoral medialization

- Reduced area of bone to bone contact
- Delayed fracture healing
- An increased risk of fracture-healing complications
- Reduction in function from loss of femoral offset and moment arm



Femoral medialization

1°medialization => 1% increase in the risk of fixation failure

greater than 50% medialization has been found to be associated with a lower regain of function

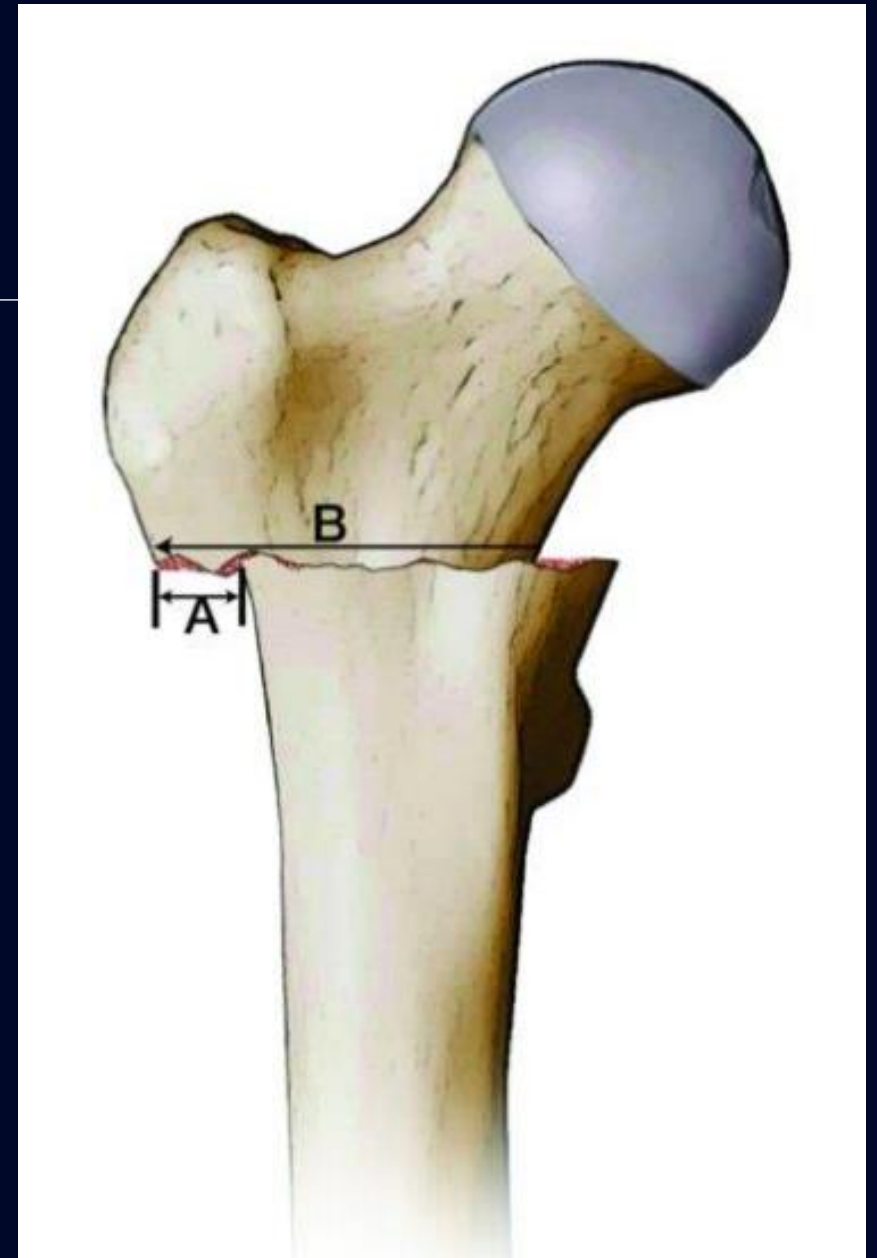
DHS : 10%

CMN : 2%

Medialization > 50% :

7% DHS

1% CMN



Combat Femoral Medialization

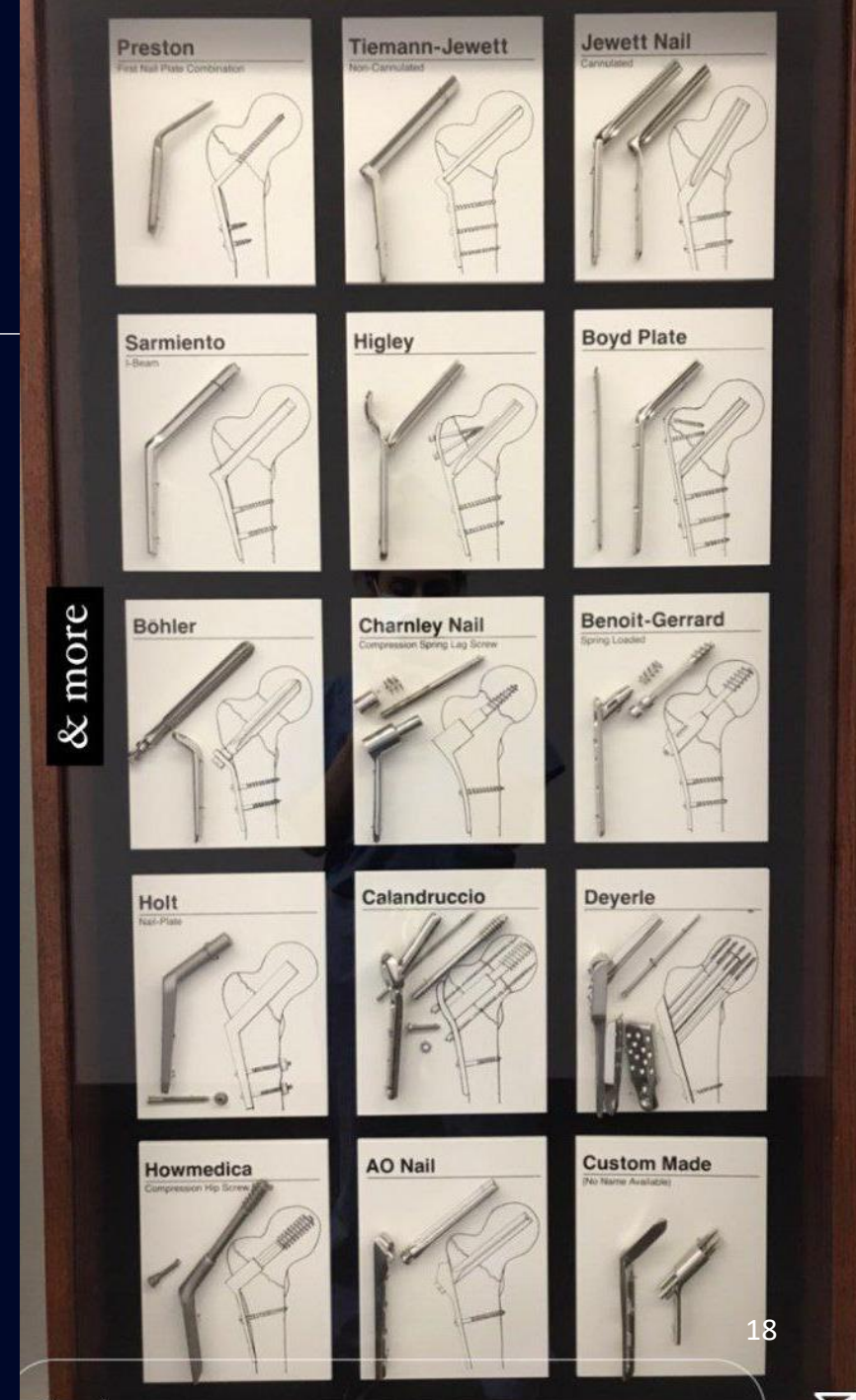
DCS – ABP

DHS+TSP

CMN

Implant Selection

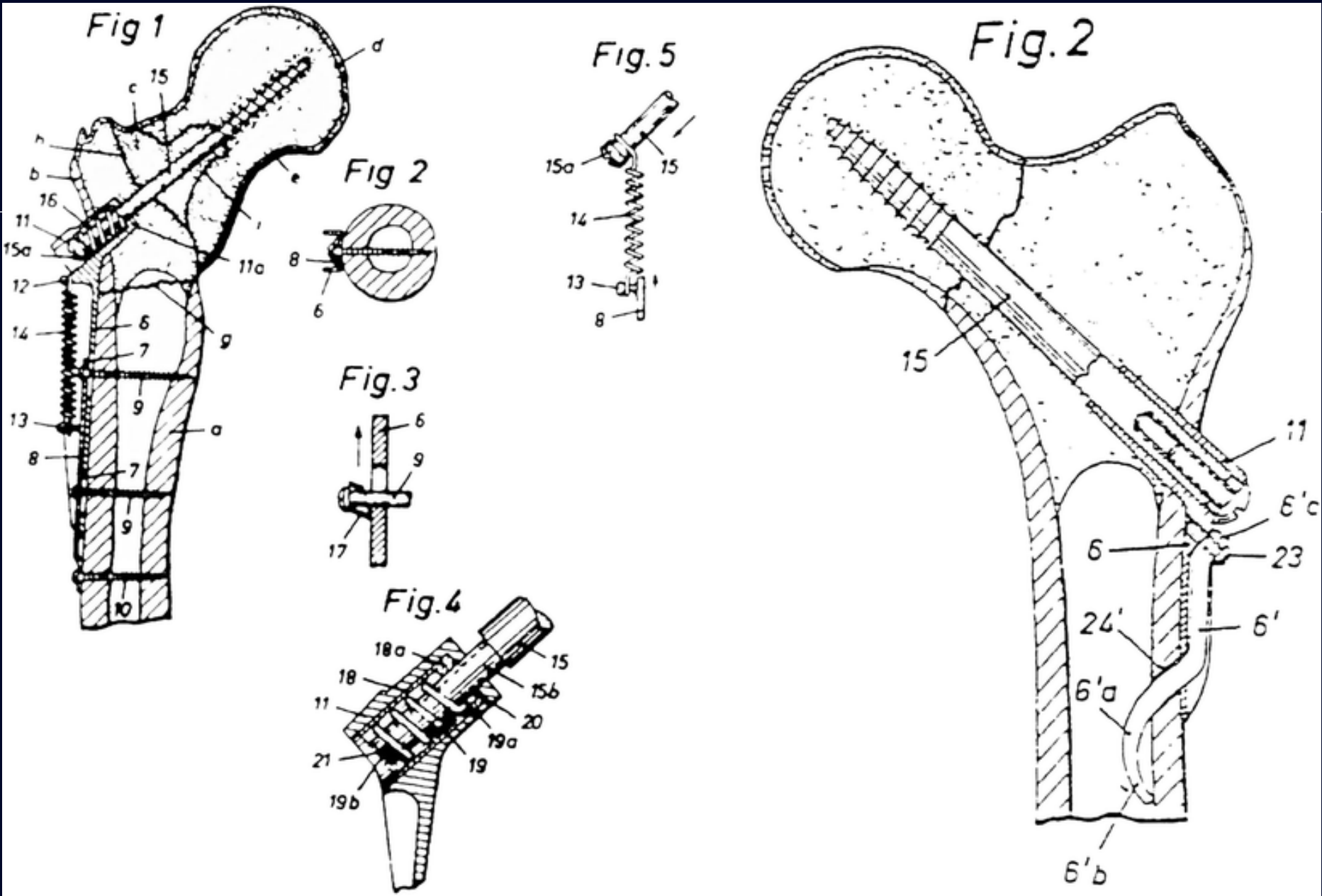
- Extramedullary
- Intramedullary
- External fixation
- Replacement arthroplasty





Ernst Pohl (1876–1962)

1951



Pohl's patent of the "Pohlsche Lasche" in Germany

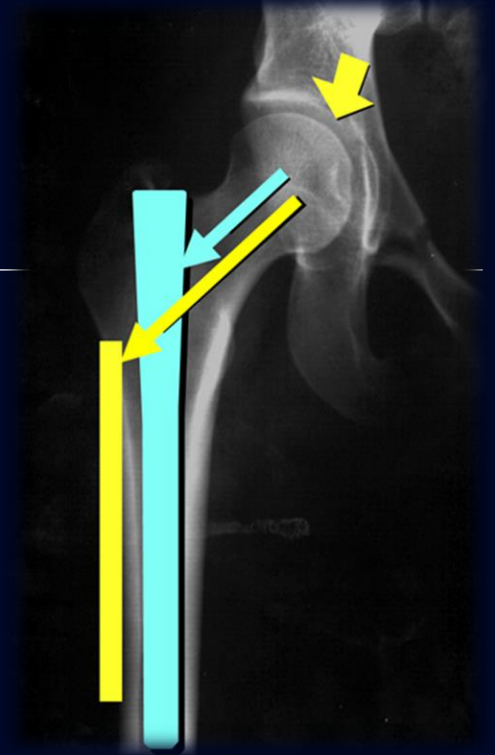
Evidence for Implant Selection

Biomechanical Studies

Case Series

Registries'

Small RCTs'

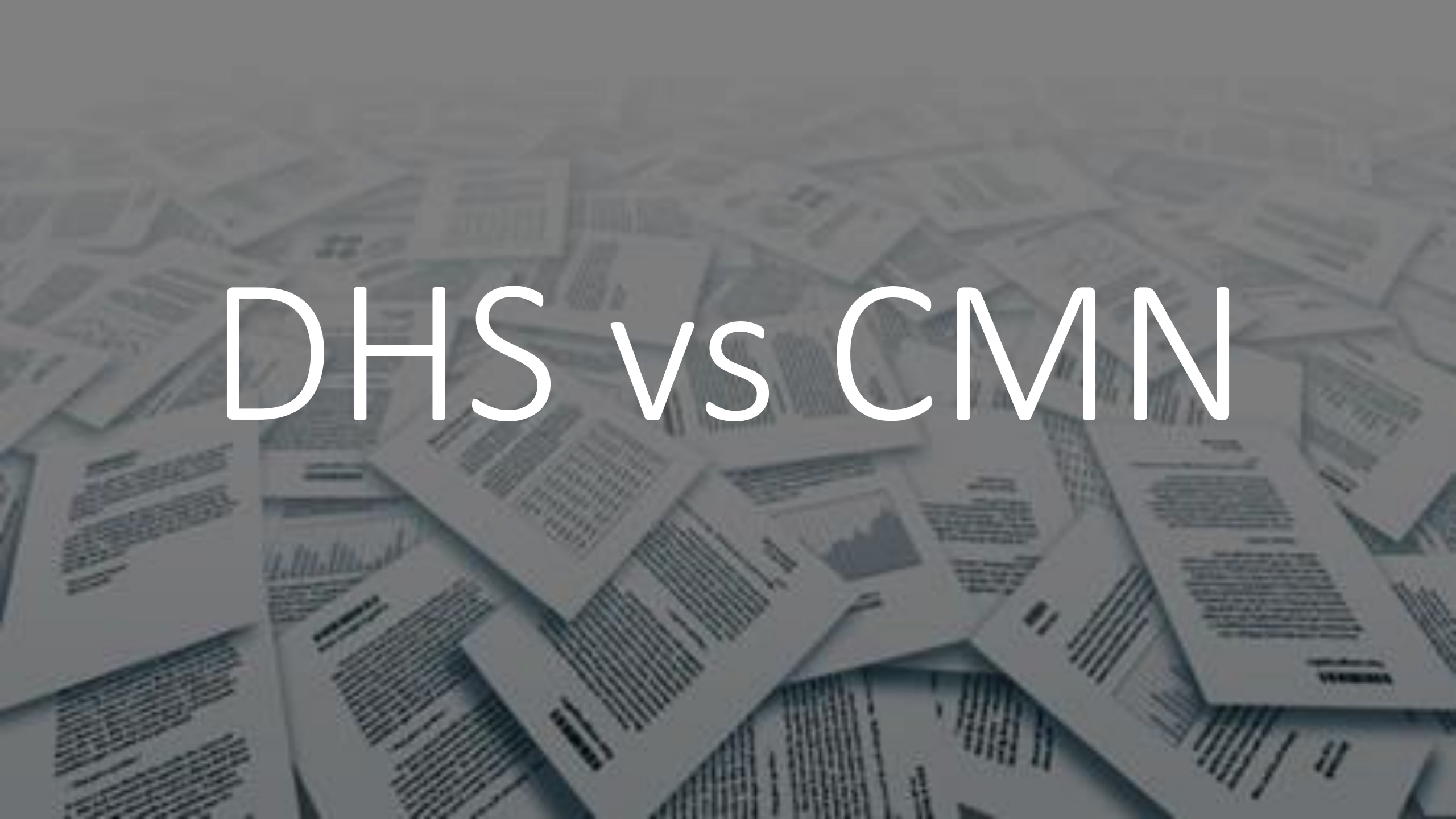


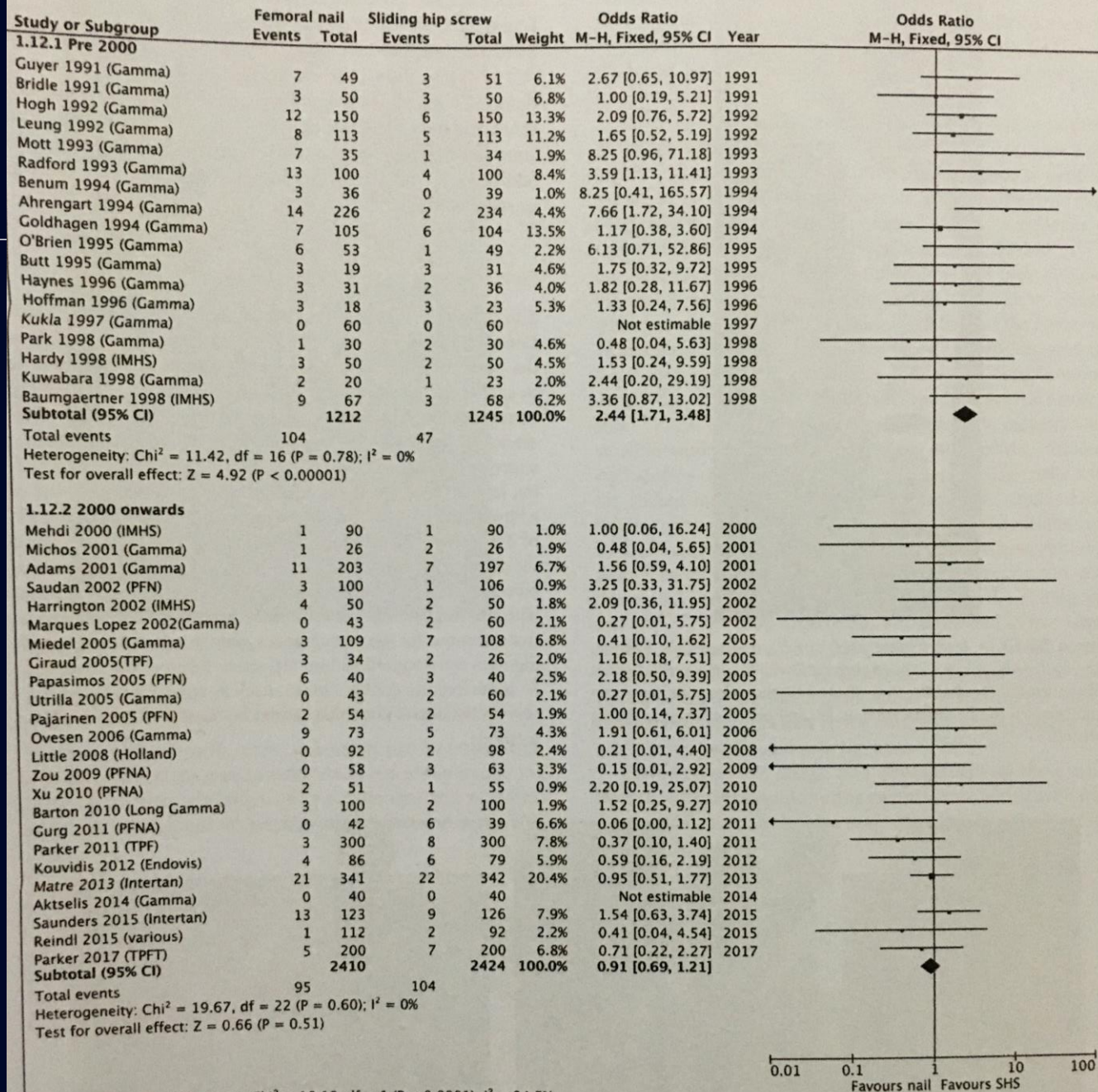
We Need Large RCTs'

functional outcomes : > 500 patients

fracture-related complications : > 1,000 patients

DHS vs CMN





Stable



CMN=DHS



DHS is Cheaper

Unstable



CMN may be
better than DHS



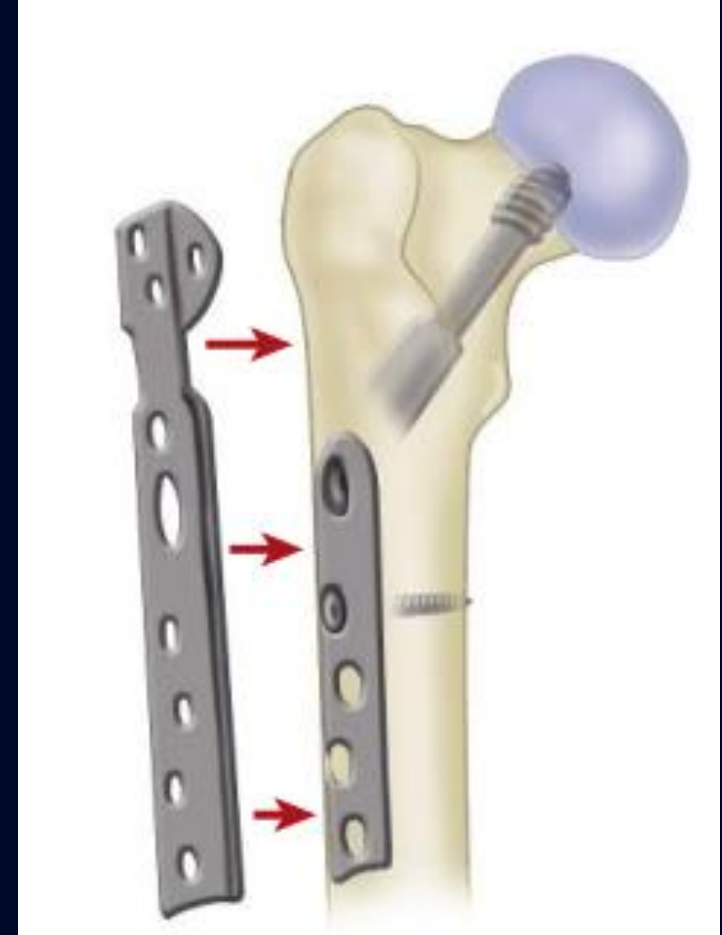
CMN



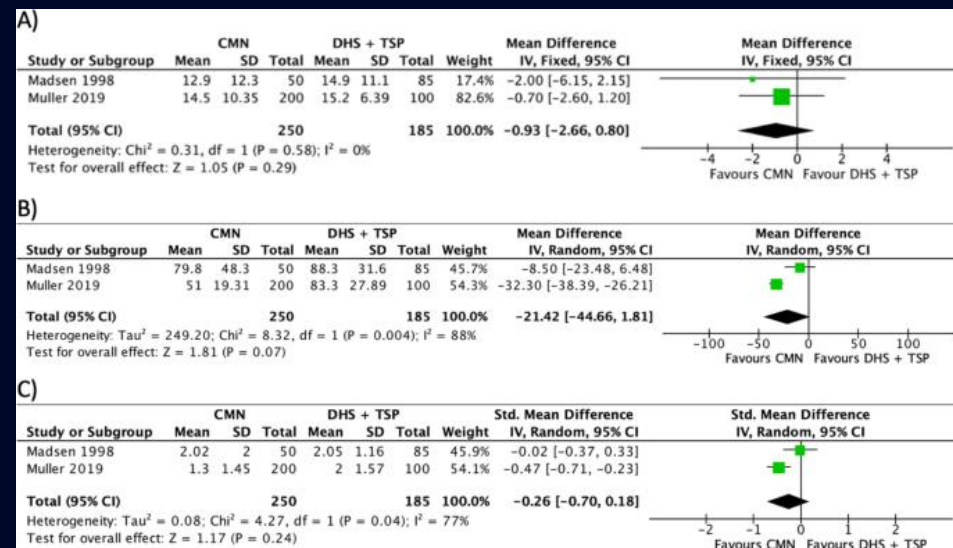
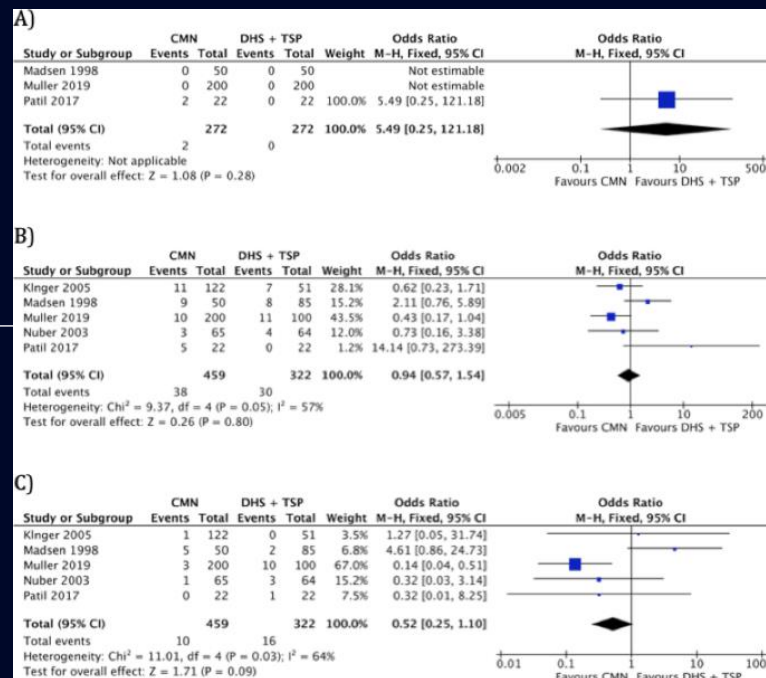
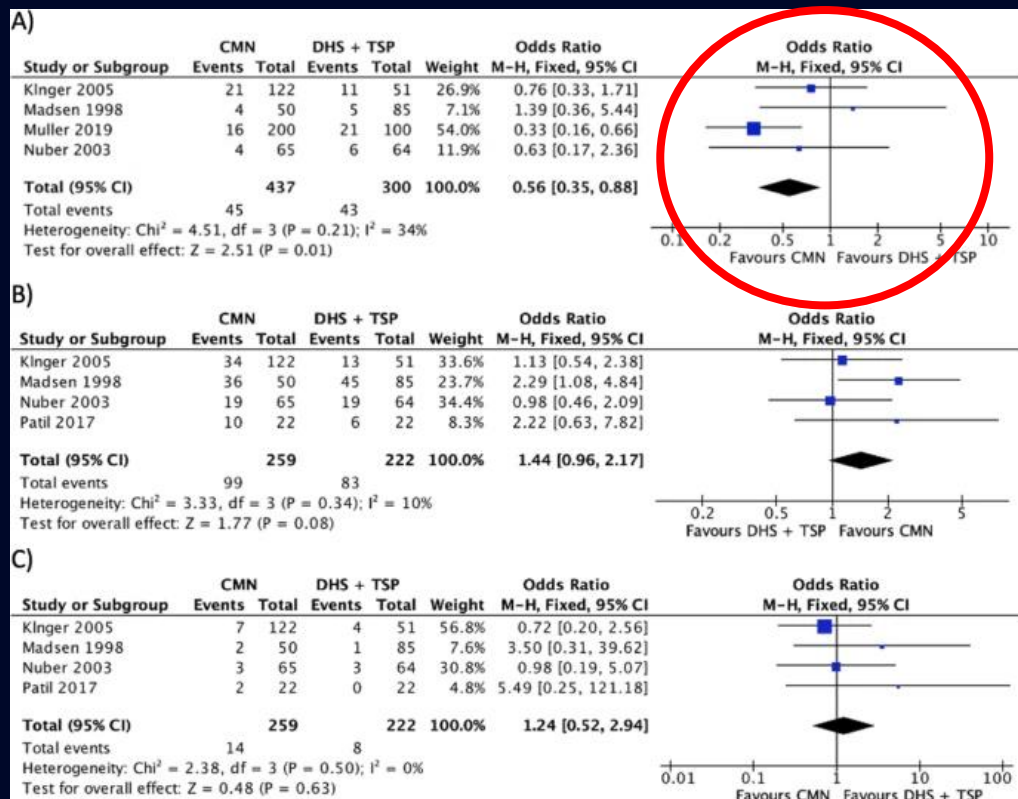
Lateral cortical disruption (preoperative or occurring during surgery)

Sliding hip screw with plate

CMN



CMN vs DHS+TSP



Nailing may not be possible

- Bone deformity or previous surgery that prevents nailing
- Previous Intramedullary Device

SHORT OR LONG NAILS FOR INTERTROCHANTERIC FEMORAL FRACTURES

Without Subtrochanteric Extension

No Difference







Weigh Bearing After Surgery

Delayed weightbearing negatively impacts function, particularly with gait

Campbell :

POSTOPERATIVE CARE Patients with intertrochanteric femoral fractures treated with a compression hip screw are allowed to bear weight as tolerated in most circumstances because this device is used in more stable fracture patterns.

POSTOPERATIVE CARE Patients with intertrochanteric femoral fractures treated with an intramedullary device are allowed to bear weight as tolerated in most circumstances; however, this device may be used in more unstable fracture patterns and occasionally weight-bearing status needs to be modified based on these fracture patterns.

Rockwood :

Postoperative Care

Following surgery with the appropriate surgical management, it should be possible to mobilize all patients with a trochanteric fracture **fully weight bearing** with no restrictions on hip movement or function. In practice, because of the pain associated with the fracture, patients will in effect weight bear as tolerated and then, as the fracture consolidates and becomes less painful, they will be able to put more weight through the injured limb.

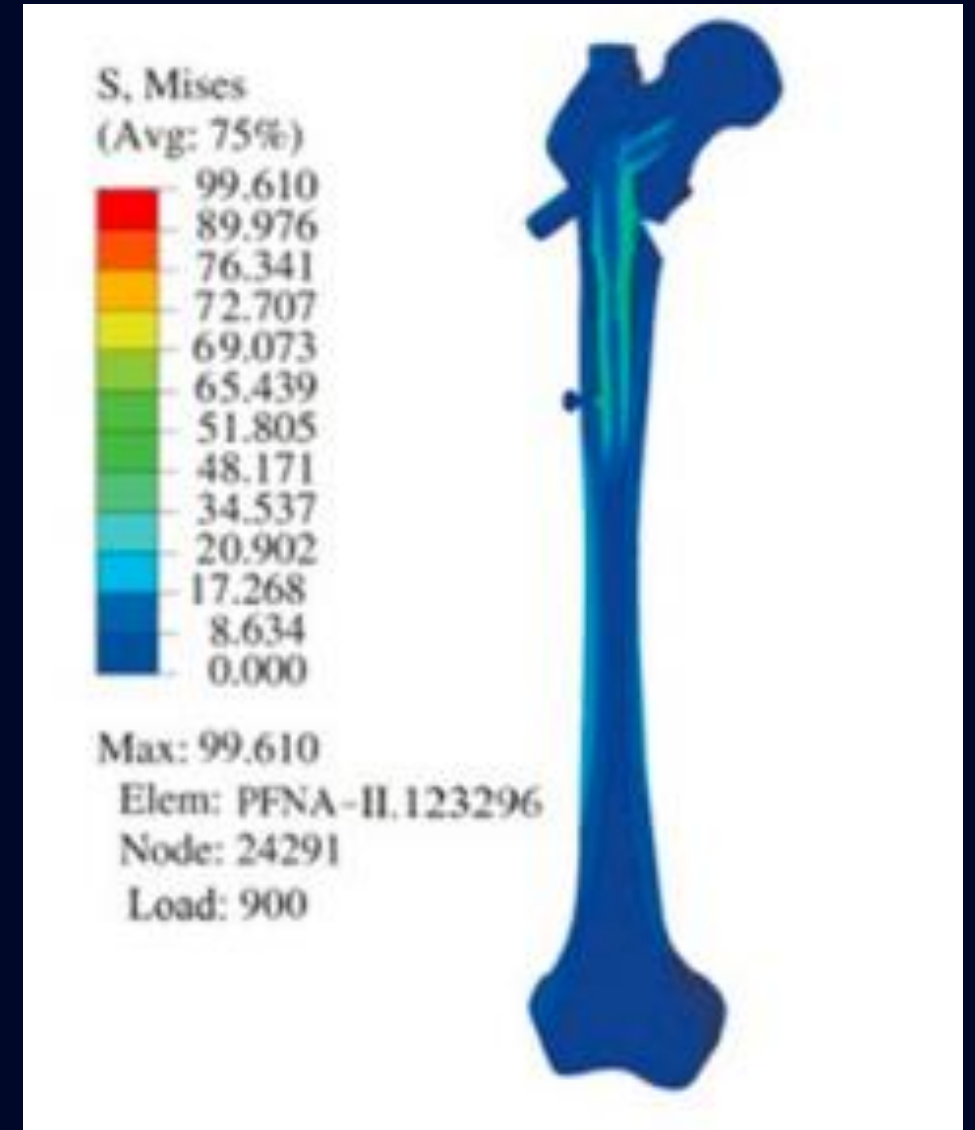
Weigh Bearing After Surgery

Antromedial Cortex

- ✓ No Communion
- ✓ Well Reduced

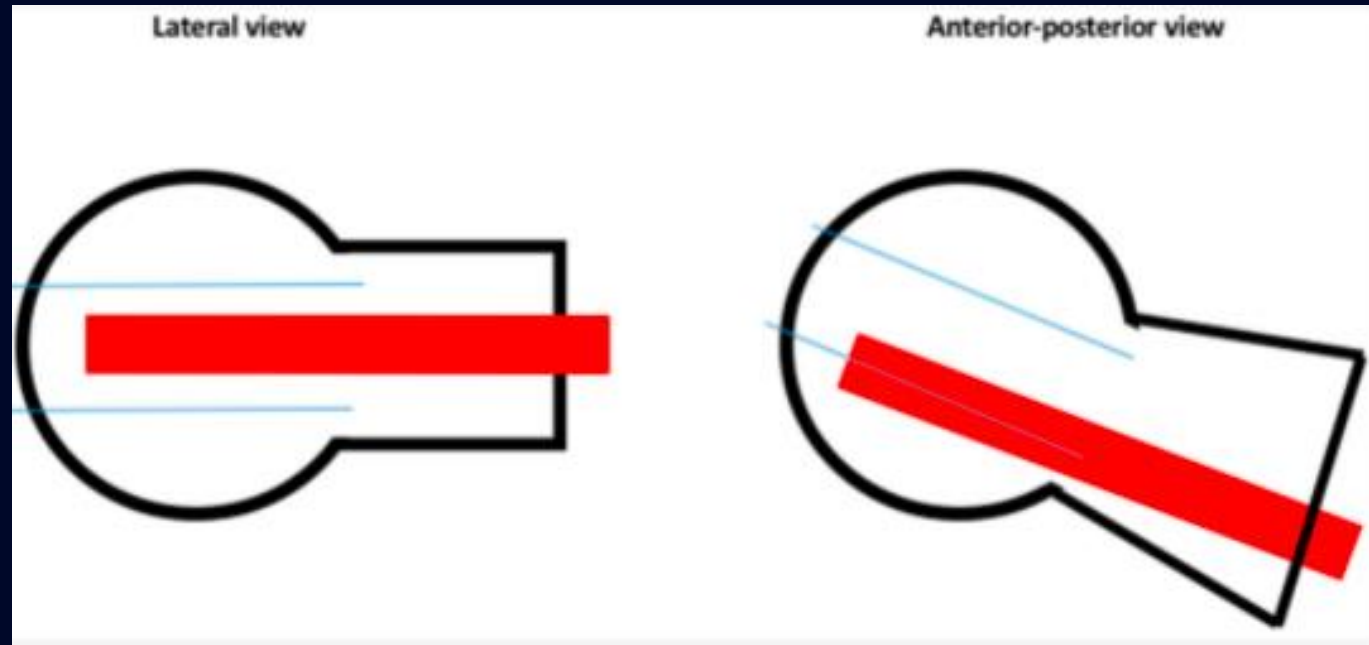


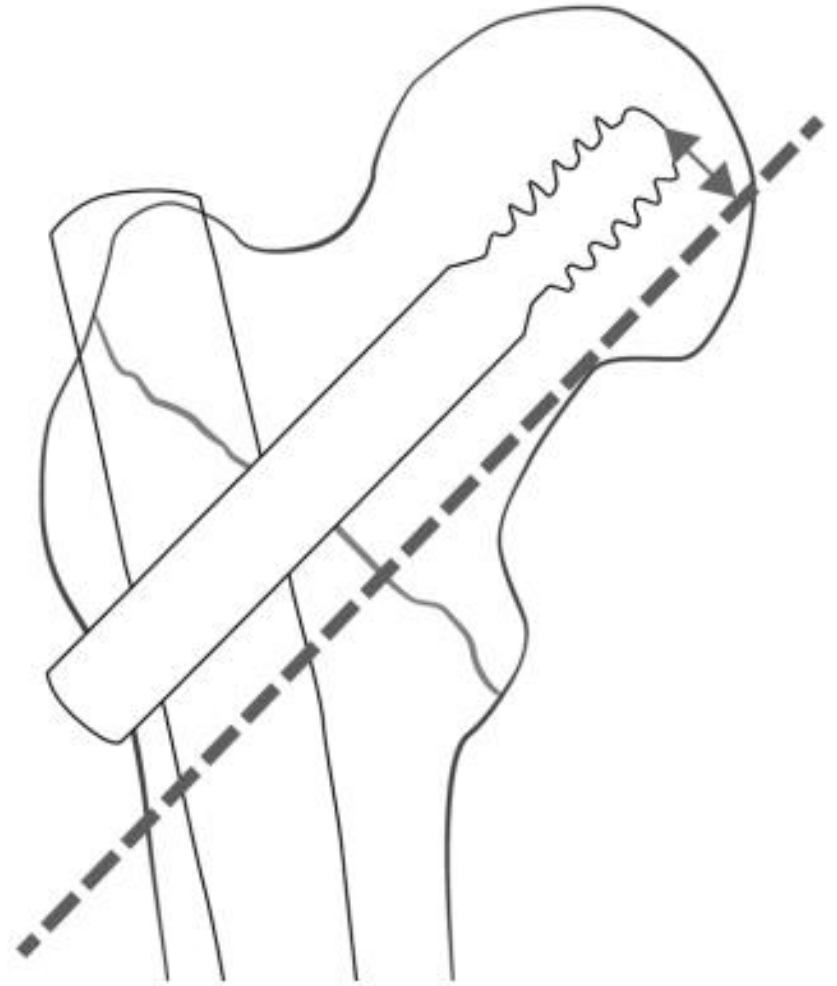
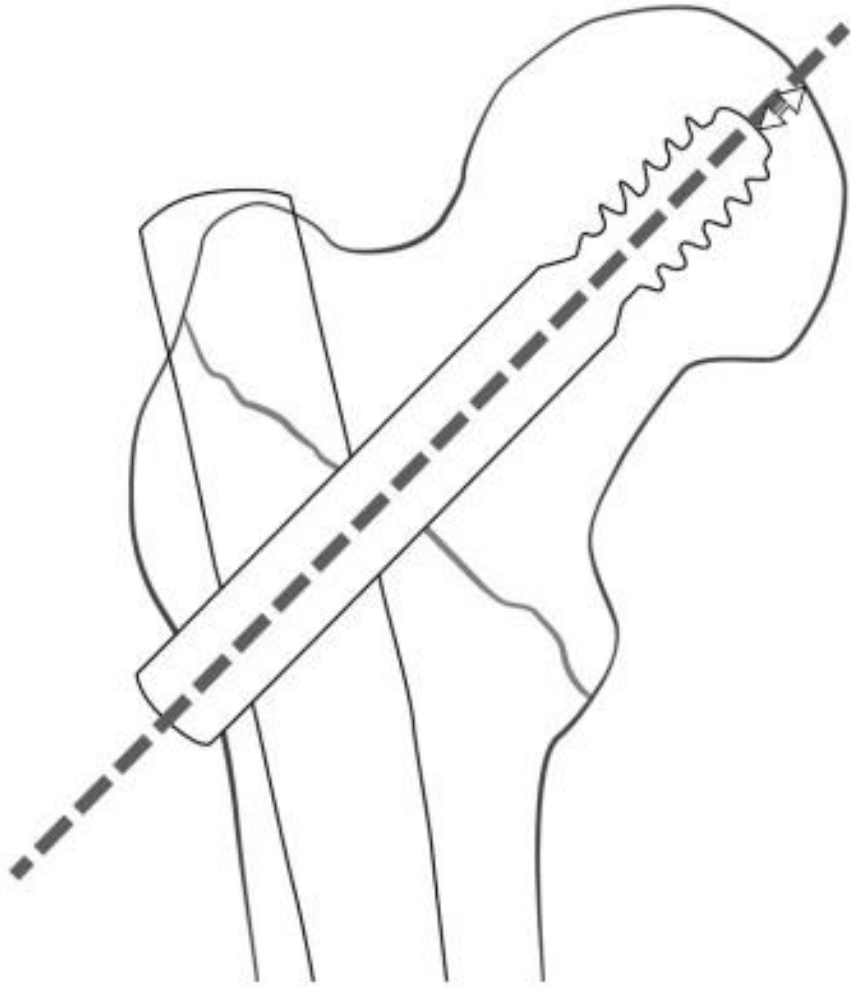
early weightbearing load of **900 N**
(**1.45 times body weight**)
can be recommended for postoperative
rehabilitation



Li S, Sun GX, Chang SM, Yang CS, Li Y, Niu W, Zhang LZ, Zhang C. Simulated postoperative weight-bearing after fixation of a severe osteoporotic intertrochanteric fracture. *Int J Clin Exp Med*. 2017 Jan 1;10(5):8438-48.

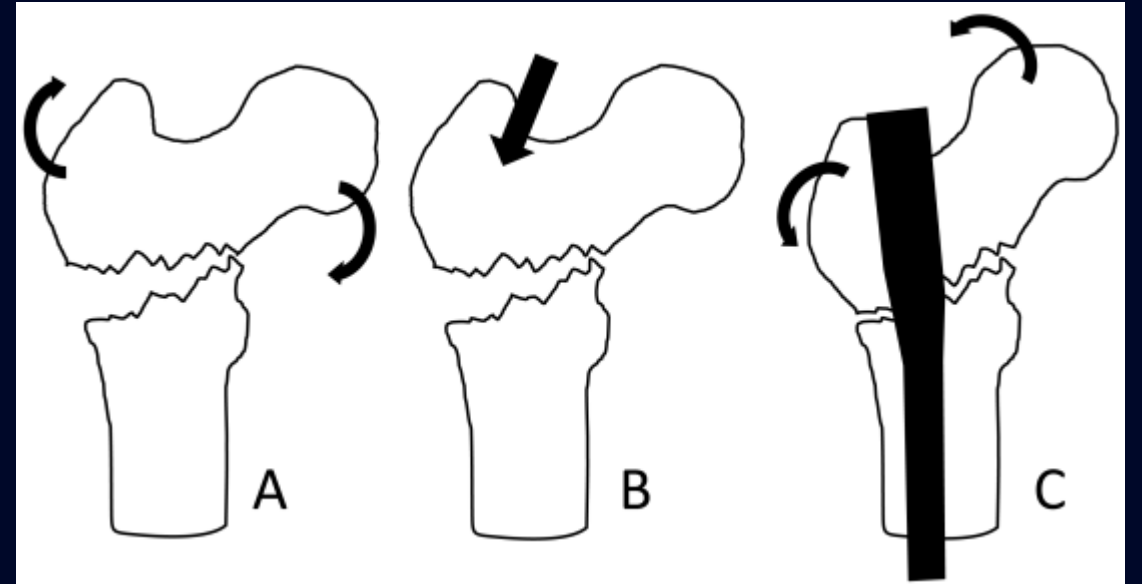
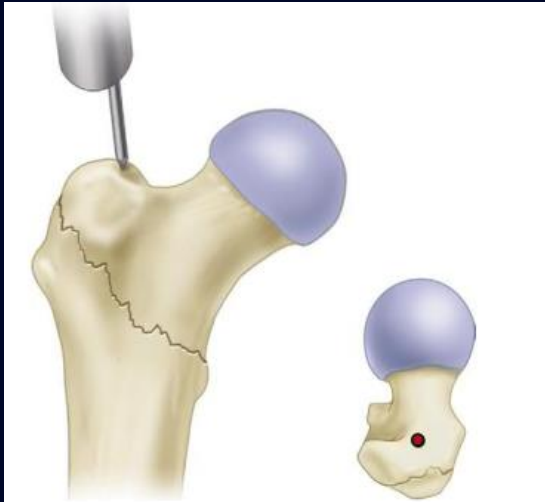
Few Tips

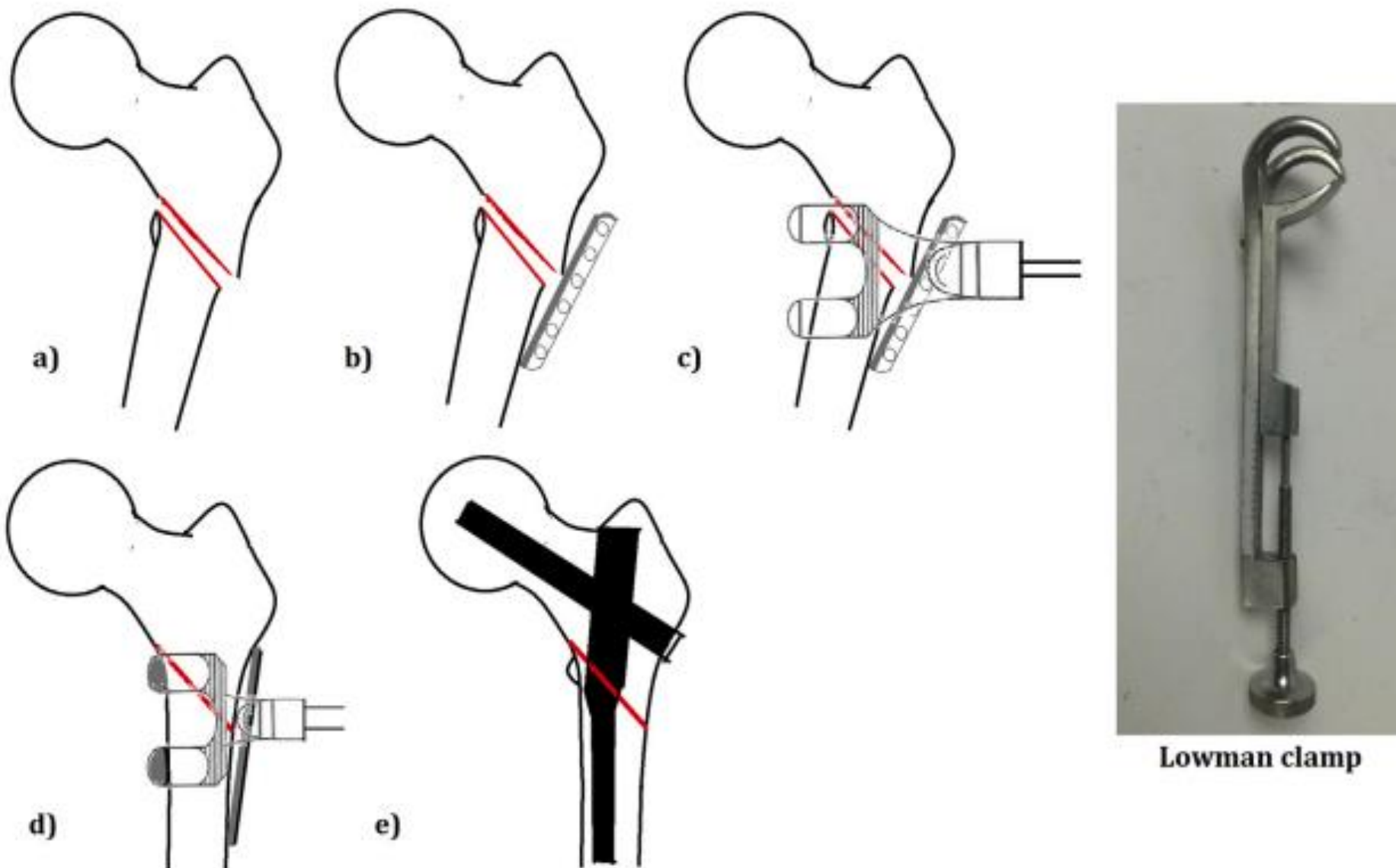


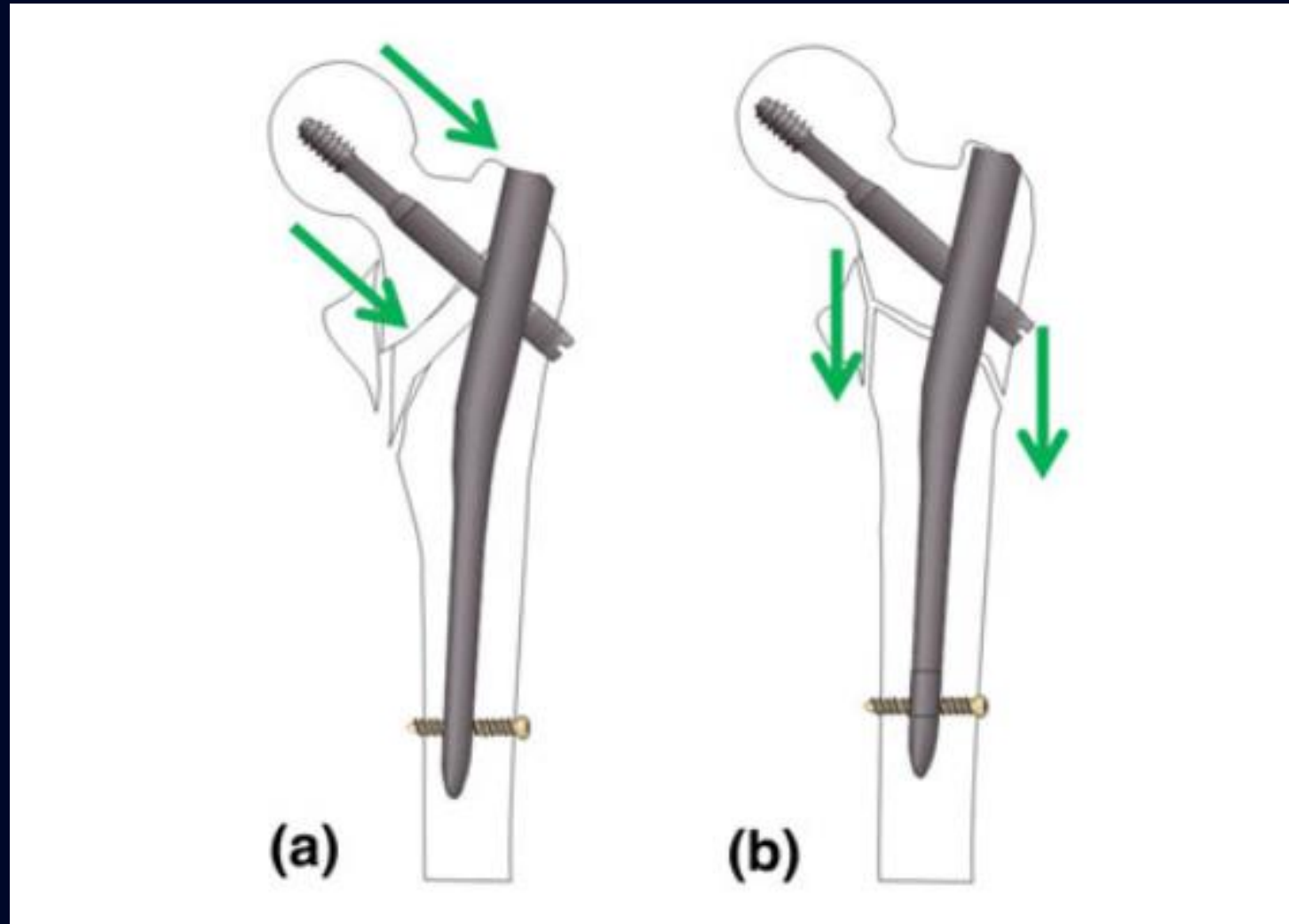


Avoid Varus

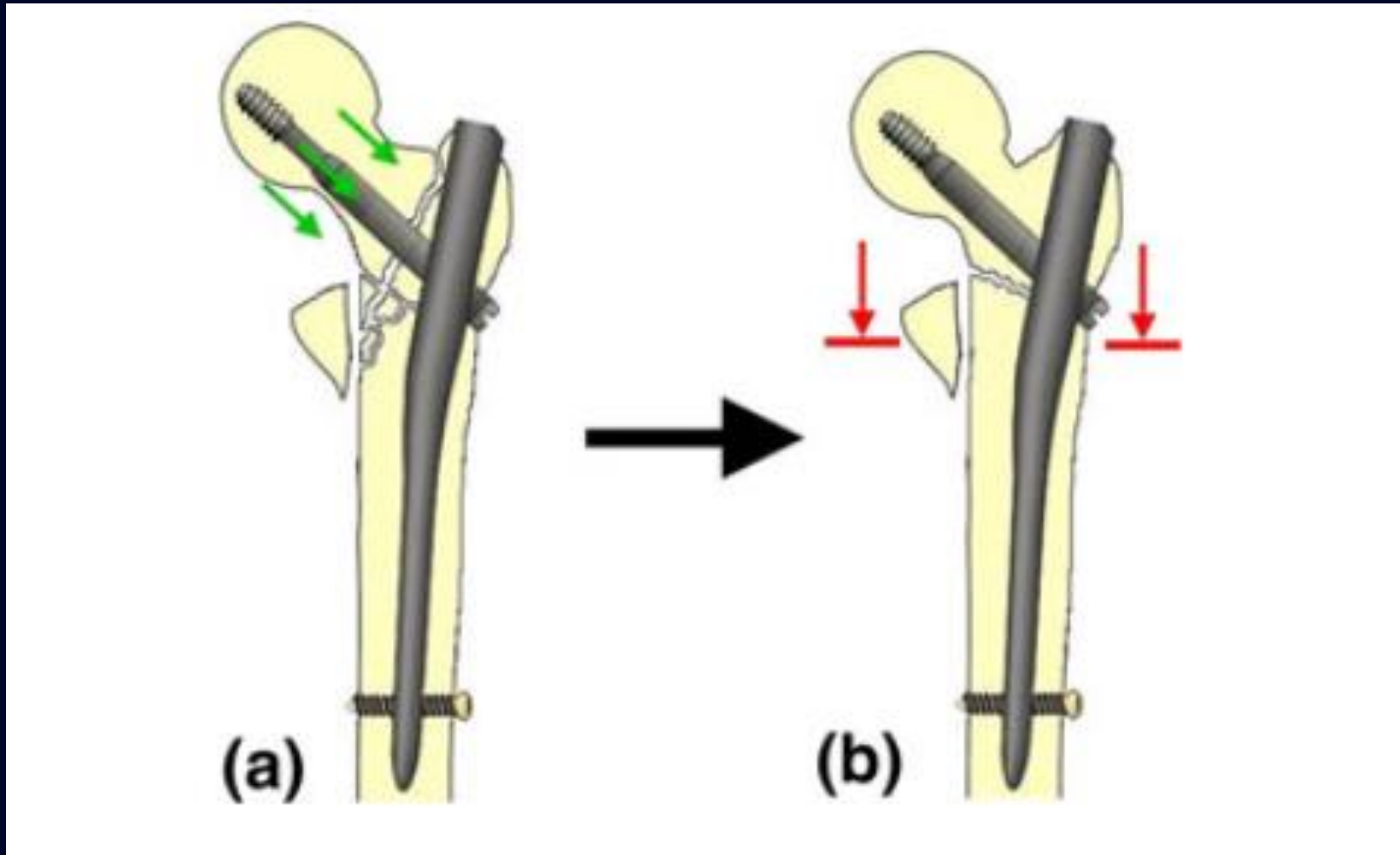
- Entry point : medial to the tip of the greater trochanter
- Avoid over-reaming the entry
- Proximal reaming : towards a slightly lateral direction distally
- Maintain the reduction





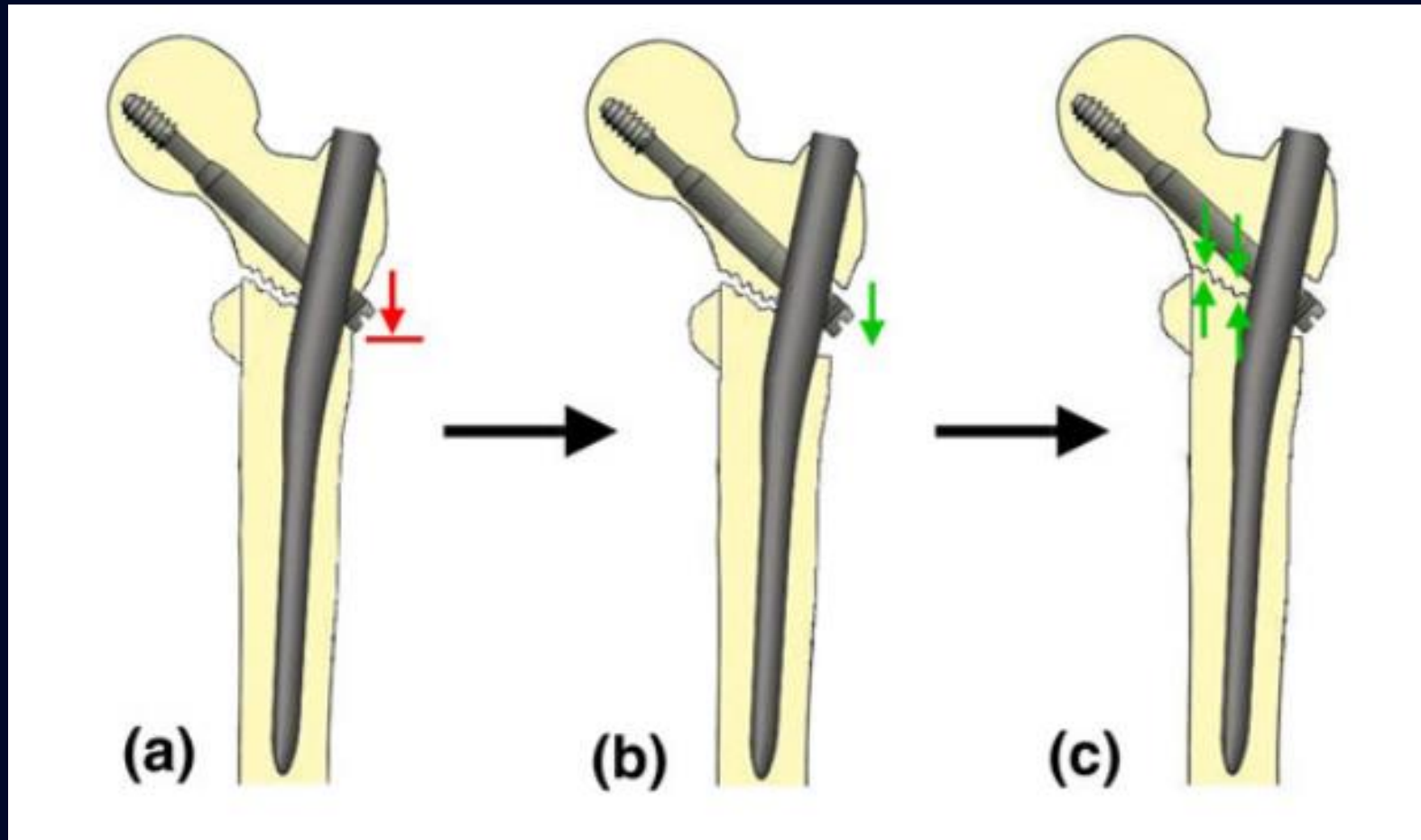


Biber, R., Bail, H.-J., & Stedtfeld, H.-W. (2013). Lateral cortical notching in specific cases of delayed unions or nonunions after intertrochanteric and reversed fractures. *Archives of Orthopaedic and Trauma Surgery*, 133(4), 495–501.



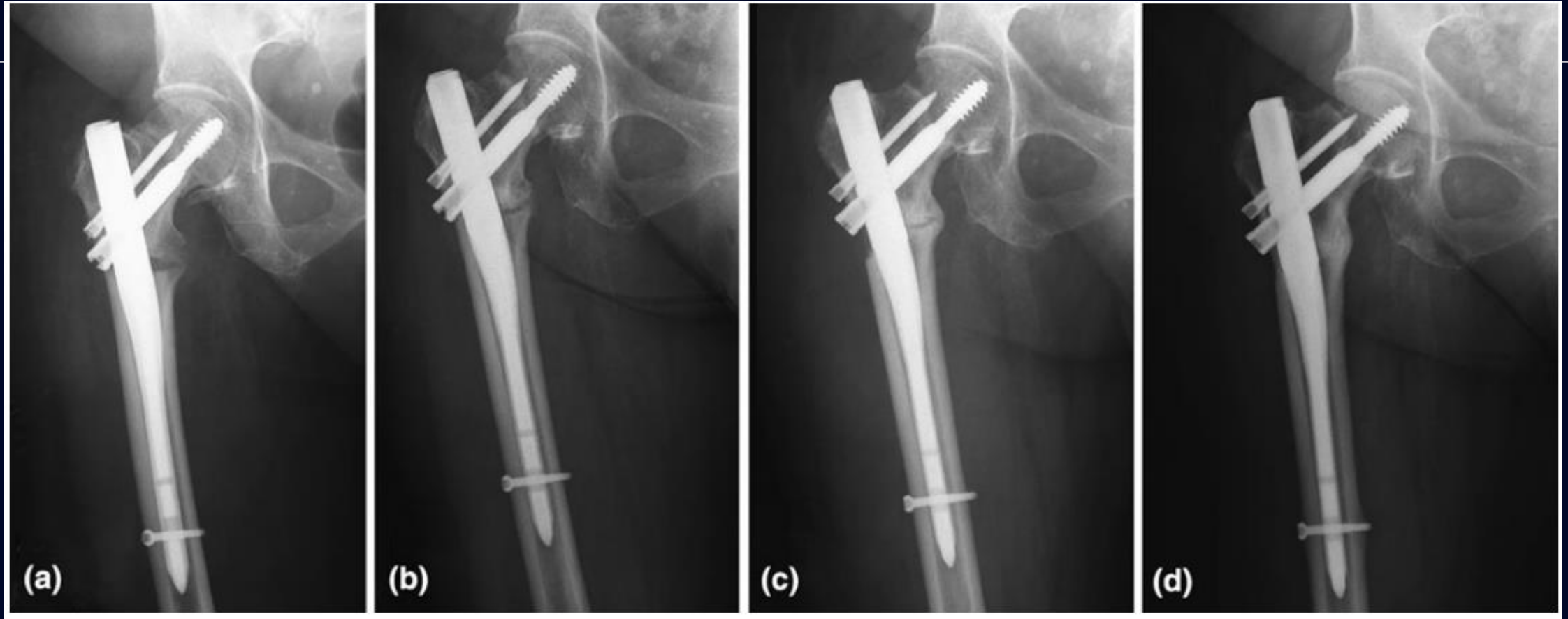
Biber, R., Bail, H.-J., & Stedtfeld, H.-W. (2013). Lateral cortical notching in specific cases of delayed unions or nonunions after intertrochanteric and reversed fractures. *Archives of Orthopaedic and Trauma Surgery*, 133(4), 495–501.

Effective dynamization may require lateral notching of the femur

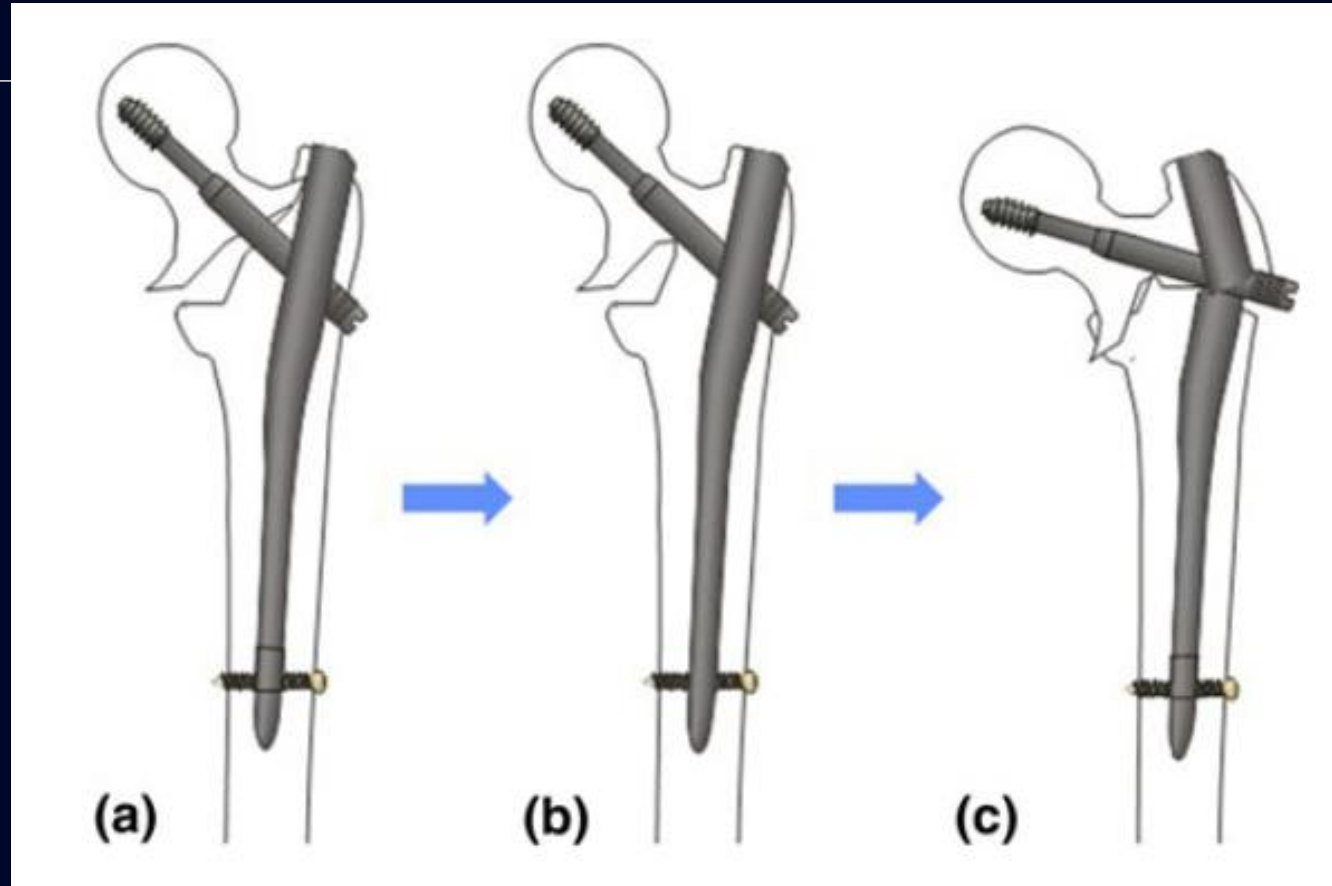


Biber, R., Bail, H.-J., & Stedtfeld, H.-W. (2013). Lateral cortical notching in specific cases of delayed unions or nonunions after intertrochanteric and reversed fractures. *Archives of Orthopaedic and Trauma Surgery*, 133(4), 495–501.

Effective dynamization may require lateral notching of the femur



Biber, R., Bail, H.-J., & Stedtfeld, H.-W. (2013). Lateral cortical notching in specific cases of delayed unions or nonunions after intertrochanteric and reversed fractures. *Archives of Orthopaedic and Trauma Surgery*, 133(4), 495–501.



Biber, R., Bail, H.-J., & Stedtfeld, H.-W. (2013). Lateral cortical notching in specific cases of delayed unions or nonunions after intertrochanteric and reversed fractures. *Archives of Orthopaedic and Trauma Surgery*, 133(4), 495–501.

Take Home Message

- Don not Delay
- Understand the Fracture
- Be Familiar with the device
- Avoid
 - Varus Malreduction
 - Femoral Medialization
- Be familiar with complications

