INTERTROCHANTERIC FRACTURES: DON'T SPARE THE ROD

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DISCLOSURE

I have NO financial disclosure or conflicts of interest with the presented material in this presentation.

INTRODUCTION

- Intertrochanteric fractures occur between the greater and lesser trochanters outside of the hip joint capsule
- The incidence of intertrochanteric fractures is increasing as the proportion of population over 65 years old rises
- As bones naturally weaken with age there is an increased incidence of these fractures
- These fractures are typically the result of falls

EPIDEMIOLOGY

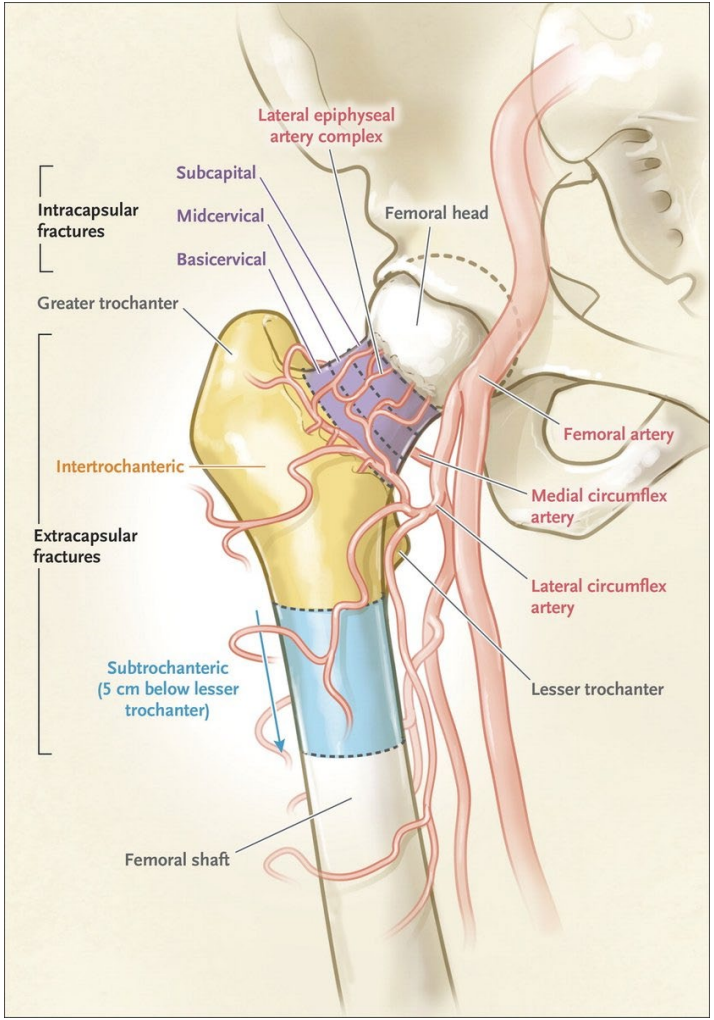
Incidence

- Intertrochanteric fractures account for about 50% of all hip fractures
- There are approximately 150,000 intertrochanteric fractures per year in the US
- 500 per 100,000 population per year for elderly females
- 200 per 100,000 population per year for elderly males

The average age for intertrochanteric fractures is about 80 years old, which is older than the average for most femoral neck fractures

ANATOMY

The main blood supply comes from the retinal vessels, which are branches of an extracapsular arterial ring. This is supplied by the medial and lateral circumflex vessels. Since the blood supply is intact, most intertrochanteric fractures can be treated by open reduction internal fixation.



CLASSIFICATION - AO/OTA

This is a standard classification system.

It is difficult for communication due to so many subtexts.

Concern is stable vs unstable fracture type.

Femur, proximal, pertrochanteric simple (only 2 fragments) (31-A1)

1. **Along intertrochanteric line** (31-A1.3)

2. **Through the greater trochanter** (31-A1.1)
   (1) nonimpacted
   (2) impacted

3. **Below lesser trochanter** (31-A1.2)

Femur, proximal, trochanteric fracture, pertrochanteric multifragmentary (always have posteromedial fragment with lessor trochanter and adjacent medial cortex (31-A2)

1. **With 1 intermediate fragment** (31-A2.1)

2. **With several intermediate fragments** (31-A2.2)

3. **Extending more than 1 cm below lessor trochanter** (31-A2.3)

Femur, proximal, trochanteric area, intertrochanteric fracture (31-A3)

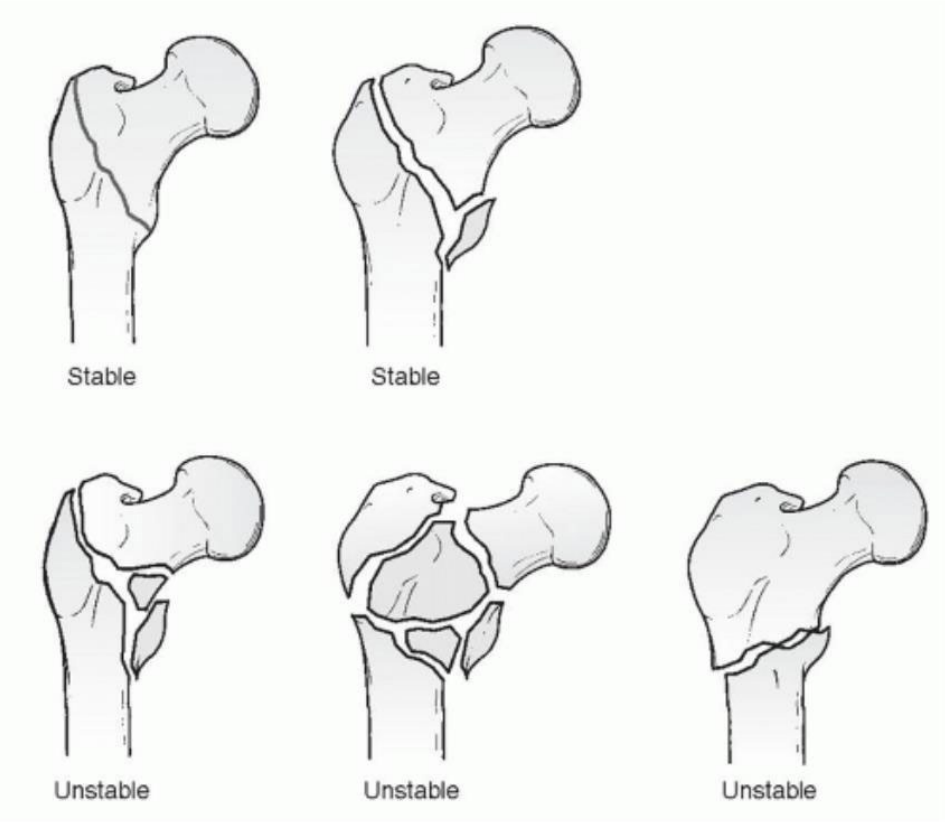
1. **Simple oblique** (31-A3.1)

2. **Simple transverse** (31-A3.2)

3. **Multifragmentary** (31-A3.3)
   (1) extending to greater trochanter
   (2) extending to neck

FEATURES OF INSTABILITY

- Medial or posteromedial comminution
- Large lesser trochanter fragment
- Incompetent ‘lateral wall’
- Transverse fracture above the lesser trochanter
- Reverse obliquity fracture
- Extension to the subtrochanteric region



IMPLANT CHOICES FOR ORIF

- Dynamic/Compression/Sliding hip screw
- Cephalomedullary/Intramedullary nail - short vs long
- 95 degree blade plate (rarely used)

Sliding hip screws and cephalomedullary nails allow for fixed angled controlled collapse (shortening at the fracture site)

ADVANTAGES OF INTRAMEDULLARY FIXATION

- Load sharing device
- Intramedullary Buttress
  - Nail resists excessive fracture collapse and medialization
- Nail more closely located to the axis of weight-bearing than sliding hip screw
  - Less chance for cutout of the screw or helical blade from the femoral head

AAOS RECOMMENDATIONS

- Stable intertrochanteric fractures
  - Sliding hip screw of intramedullary device
- Subtrochanteric or reverse obliquity fractures
  - Intramedullary nail provides better fixation
- Unstable intertrochanteric fractures
  - Moderate evidence for intramedullary device over sliding hip screw

SHORT NAIL

ADVANTAGES

- Easier to use due to targeted distal locking through the insertion jig
- Decreased operative time (and blood loss)
- Cheaper?

DISADVANTAGES

- Older designs had a high rate of periprosthetic fracture due to large diameter, rigid, stainless steel implants with large locking bolts (stress riser)

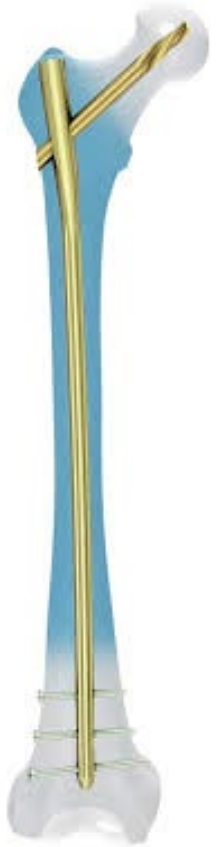
LONG NAIL

ADVANTAGES

- Protection of the entire femoral shaft
- Ideal for diaphyseal fractures

DISADVANTAGES

- Possible mismatch of femoral bowing
- Longer operative time due to distal freehand locking
- Increased blood loss?
- Increased cost?



LAG SCREW PLACEMENT

- Caudal placement of the lag screw on the AP radiograph and central placement on the lateral radiograph is recommended
- Tip to apex distance (TAD) should be less than 25mm

ADVANTAGES OF HELICAL BLADE OVER LAG SCREW

- Less risk of femoral head rotation during insertion
- Better rotational control of the femoral head
- No need for bone removal prior to helical blade insertion
- Better fixation in osteoporotic bone
- Possibility for use of bone cement augmentation

ADVANTAGES OF CEMENT AUGMENTATION

- Improved fixation via interdigitation of cement in bone
- Better resistance to cut-out
- Biomechanically superior to screw fixation or helical blade in osteoporotic bone
- Cement augmentation is distant from the fracture site
- Avoid risk of femoral head penetration by guide pin

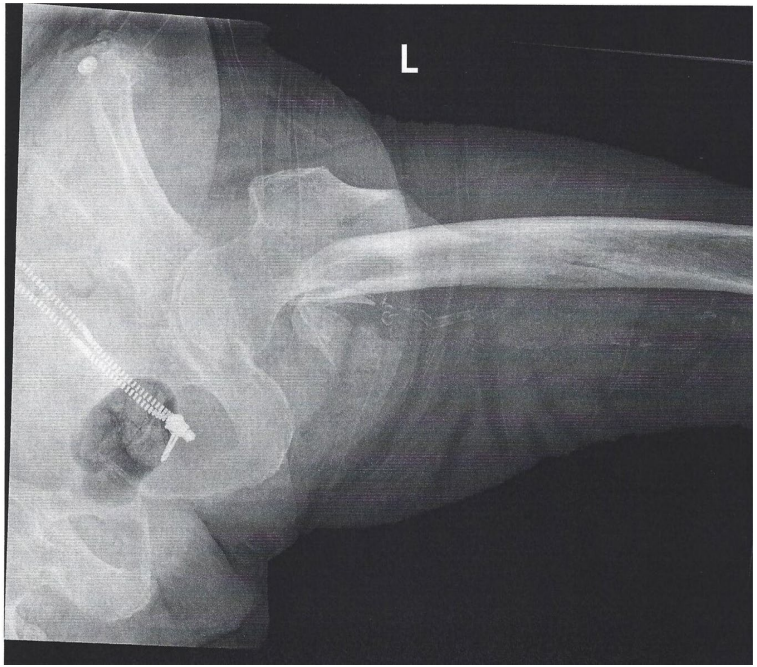
ADVANTAGES/DISADVANTAGES OF DISTAL LOCKING SCREW

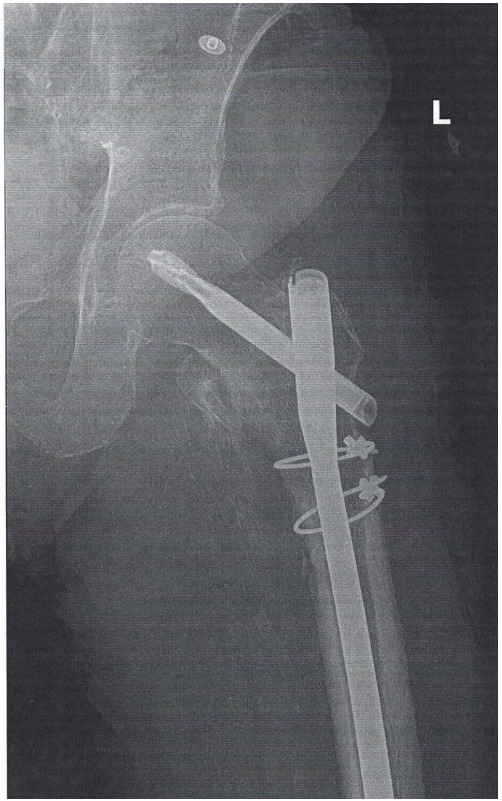
ADVANTAGES

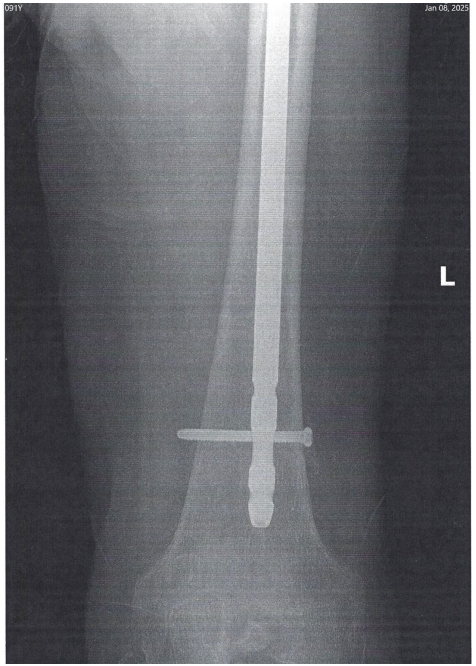
- Biomechanically more rigid construct
- Improved rotational control of distal fragment especially in osteoporotic bone

DISADVANTAGES

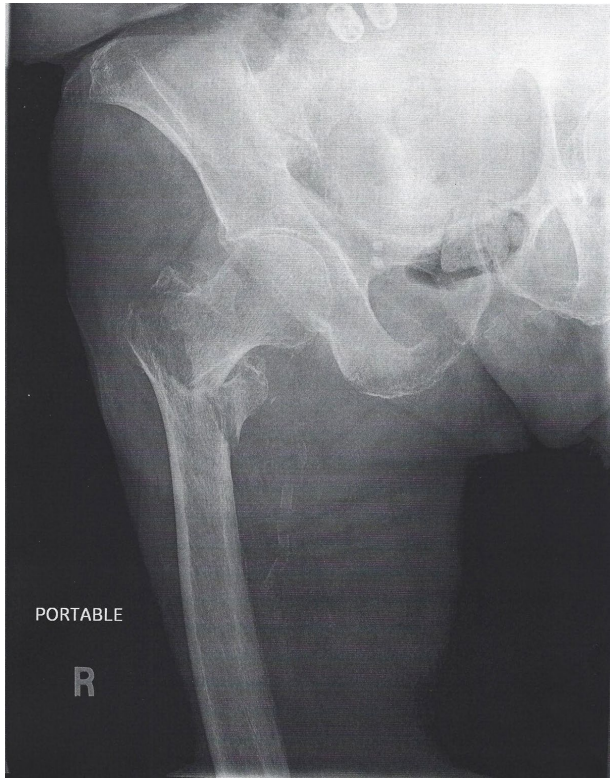
- Increased operating time and blood loss (?) due to freehand insertion of distal locking screws

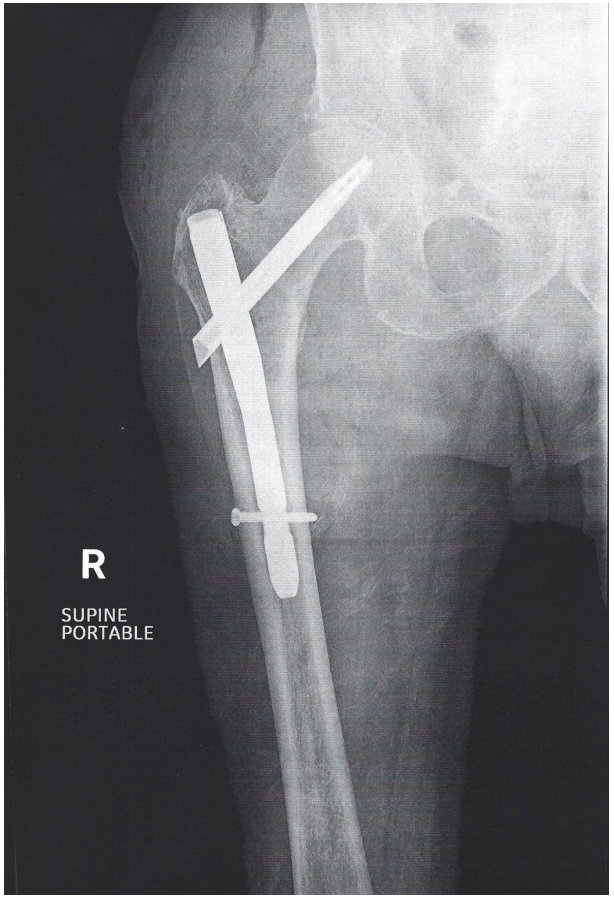




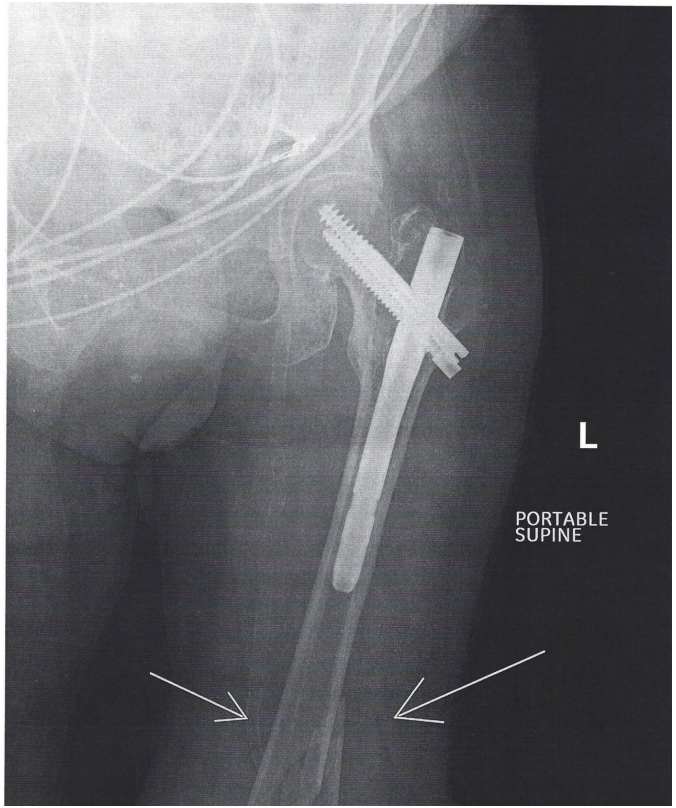


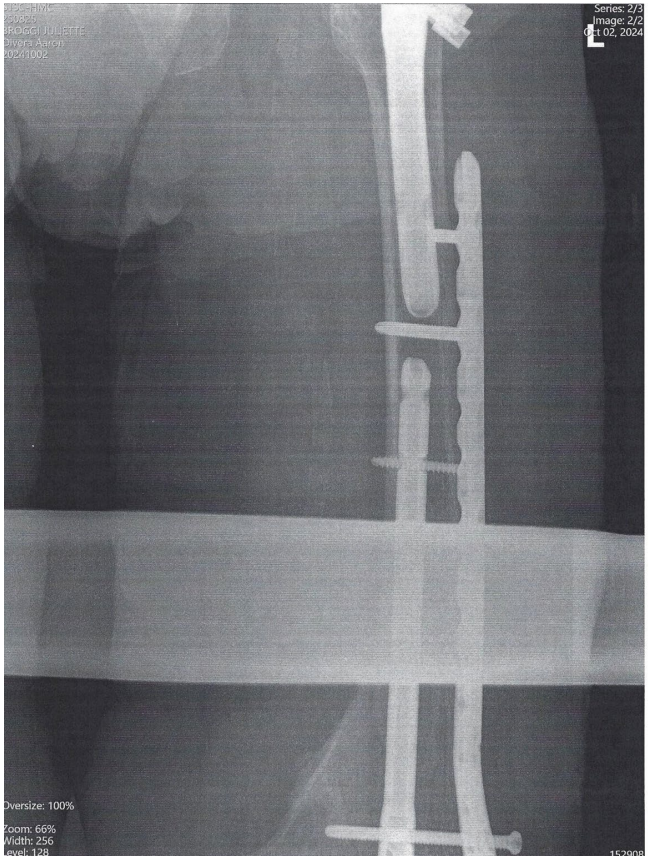
Subtrochanteric fracture with long nail fixation



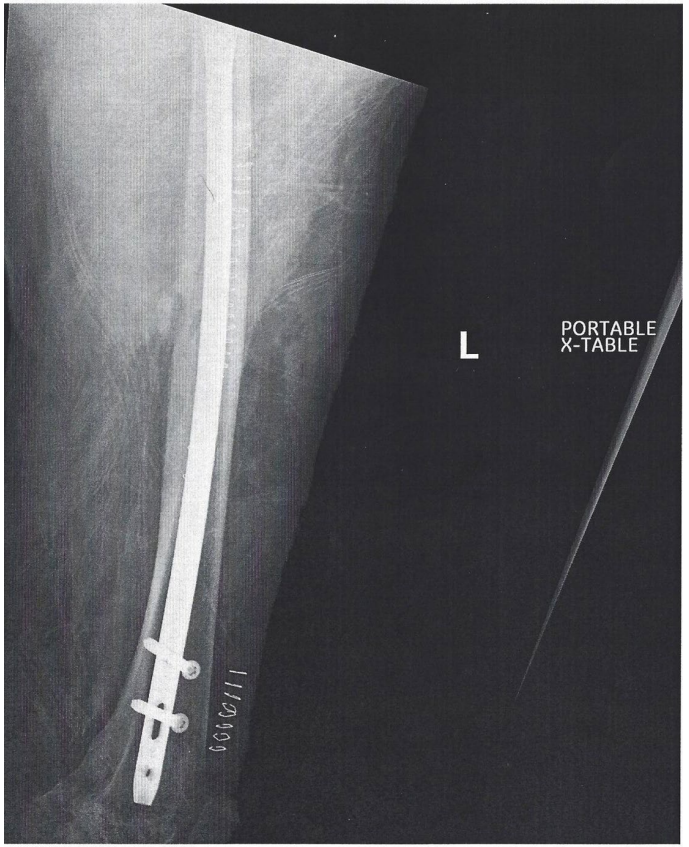


Stable fixation with short nail





Fracture below short nail with subsequent fixation



Fracture below short nail and rescue with long nail

CONCLUSIONS

- Long rods rather than short rods especially in geriatric patients
- Largest diameter rod without distal reaming
- Distal locking screw, especially in porotic bone
- 130 degree rod angle rather than 125 degree
- Cement augmentation in the femoral head in osteoporotic bone
- Ensure rod length to the top of the patella (Küntschner)

Preoperative length measurement will decrease operative time in the use of long rods