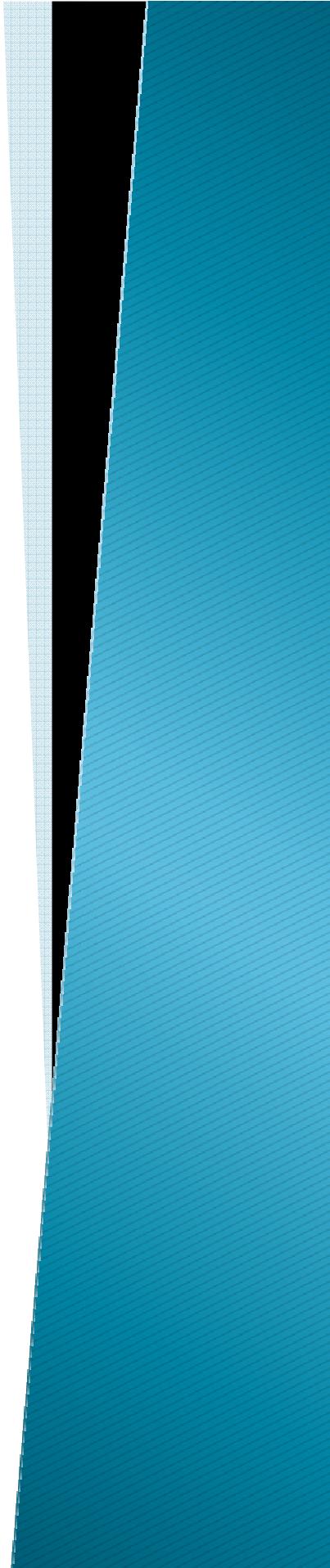


Subtrochanteric fractures

Feras Yaish

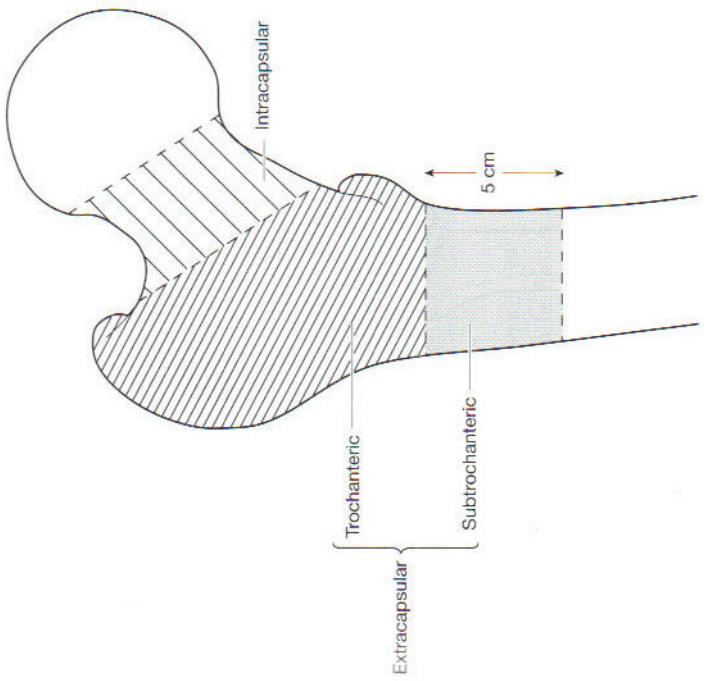
Dominic Inman



- ▶ Definition
- ▶ Epidemiology
- ▶ Anatomy
- ▶ Biomechanics
- ▶ Classifications

Definition

- ▶ Fracture between lesser trochanter and femoral isthmus
- ▶ Fracture between lesser trochanter and 5 cm distal.



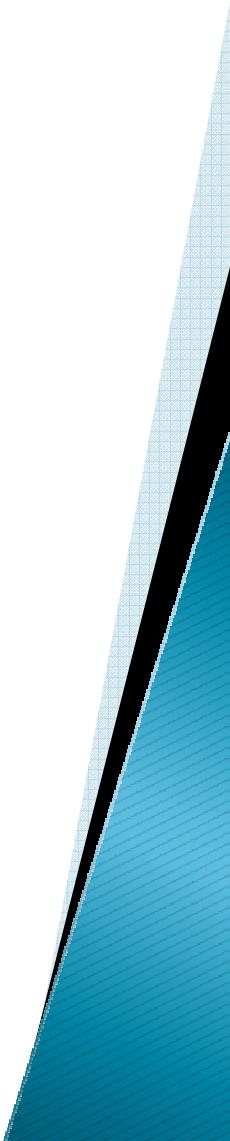
Epidemiology

- ▶ 10–34% of all hip fractures
- ▶ Velasco and Comfort
 - 63% of subtrochanteric fractures in 51 – 70 year olds
 - Only 24% in those 17 – 50 years old
- ▶ Michelson et al
 - 14% of hip fractures in patients older than 50 are subtrochanteric fractures

Epidemiology

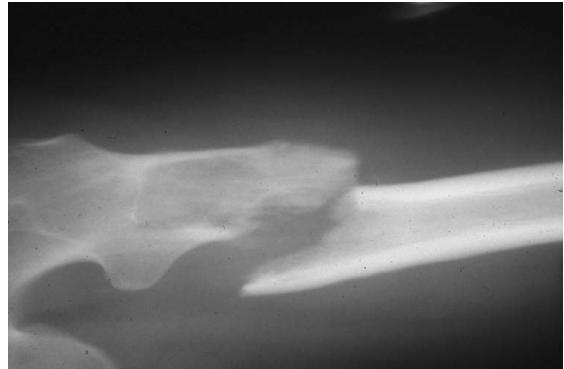
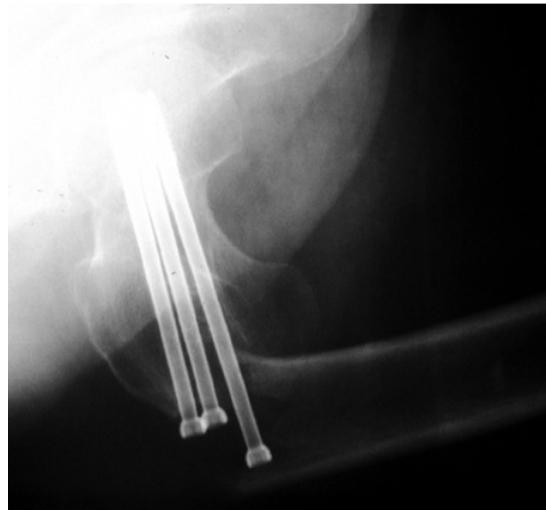
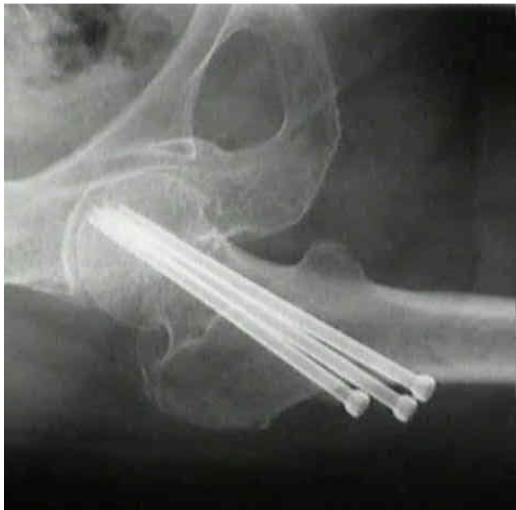
► Bimodal distribution:

- Old ... Low energy
 - Osteoporotic
 - Isolated injury
- Young High energy
 - Comminution
 - other injuries



Epidemiology

- ▶ Other mechanisms:
 - Iatrogenic.... Cannulated screws
 - Entry point above lesser troch
 - Apex inferior
 - Pathological
 - Bisphosphonates related



Anatomy

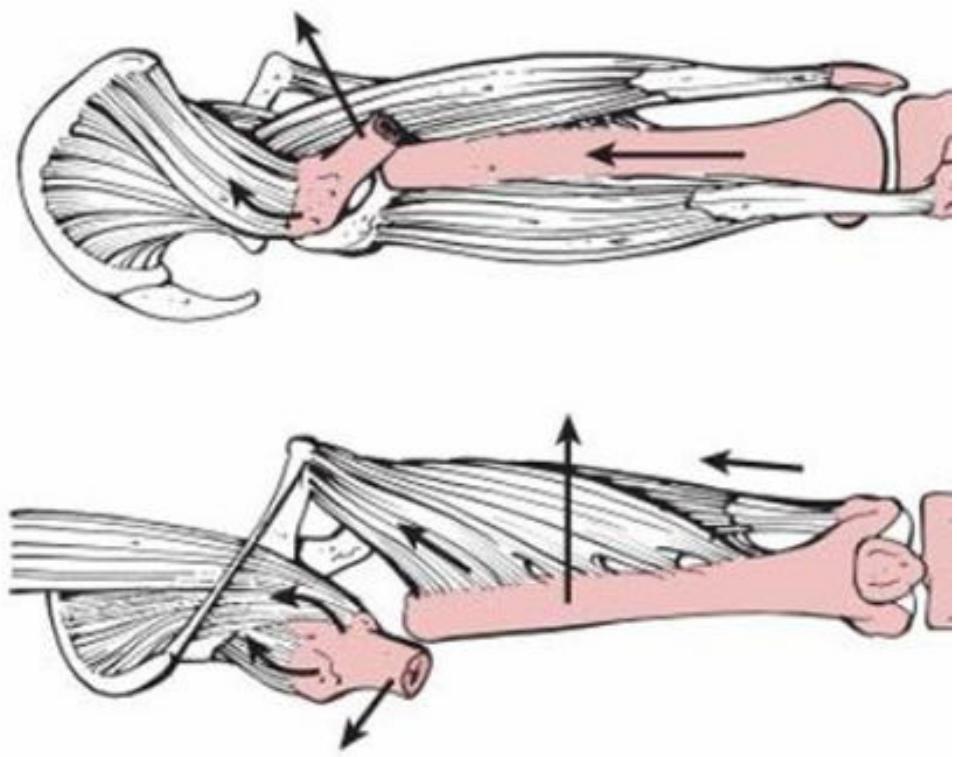
Muscle forces:

Proximal fragment:

- Abductors
- Iliopsoas

Distal fragment:

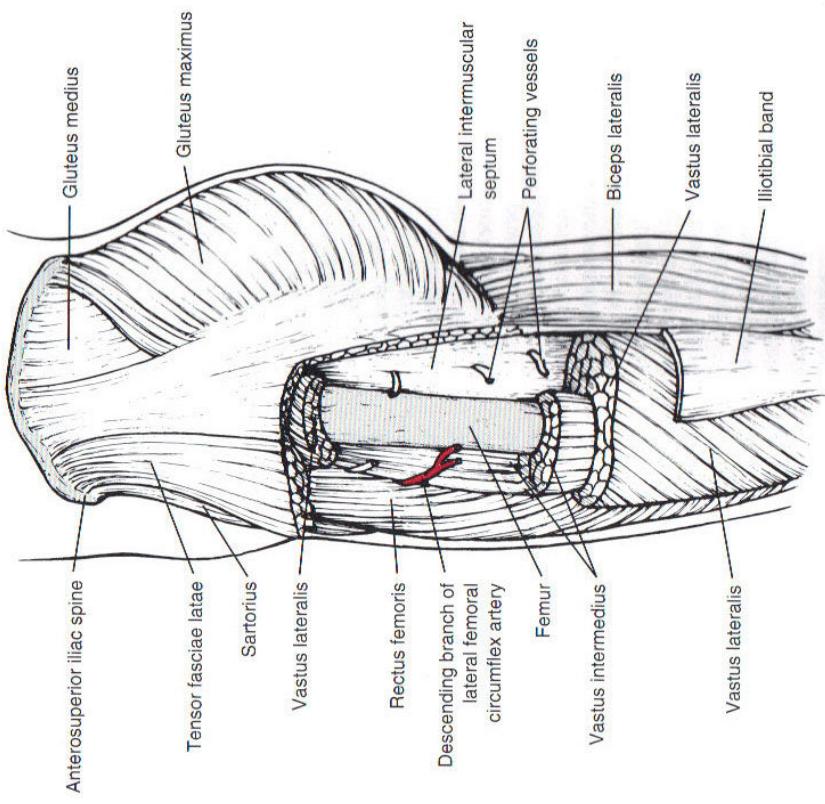
- Adductors
- Quadriceps



Anatomy

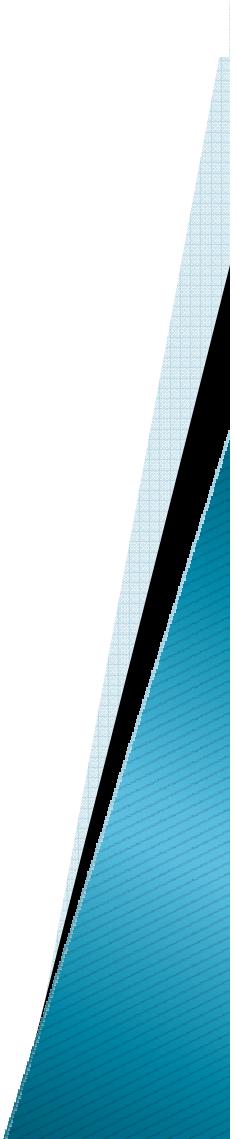
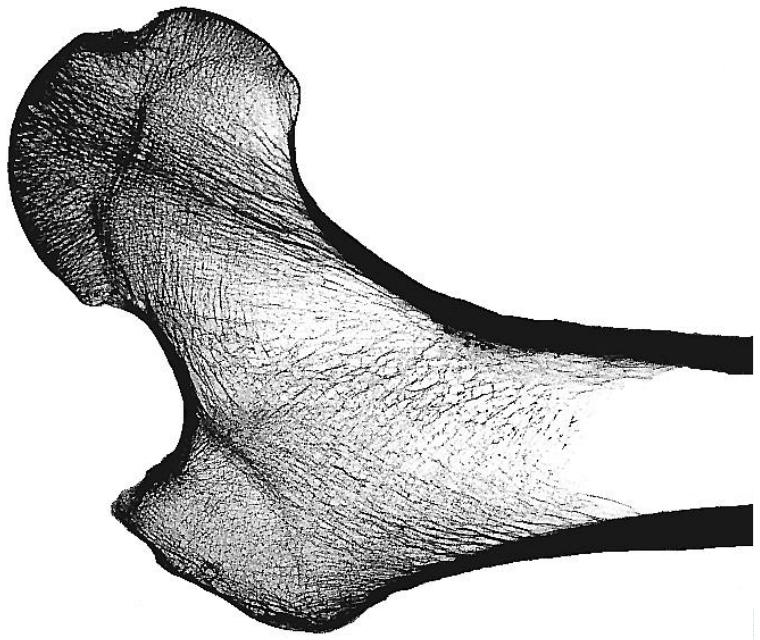
- Perforators:
 - Subvastus approach

- Nerves:
 - Rarely involved in closed injuries



Anatomy

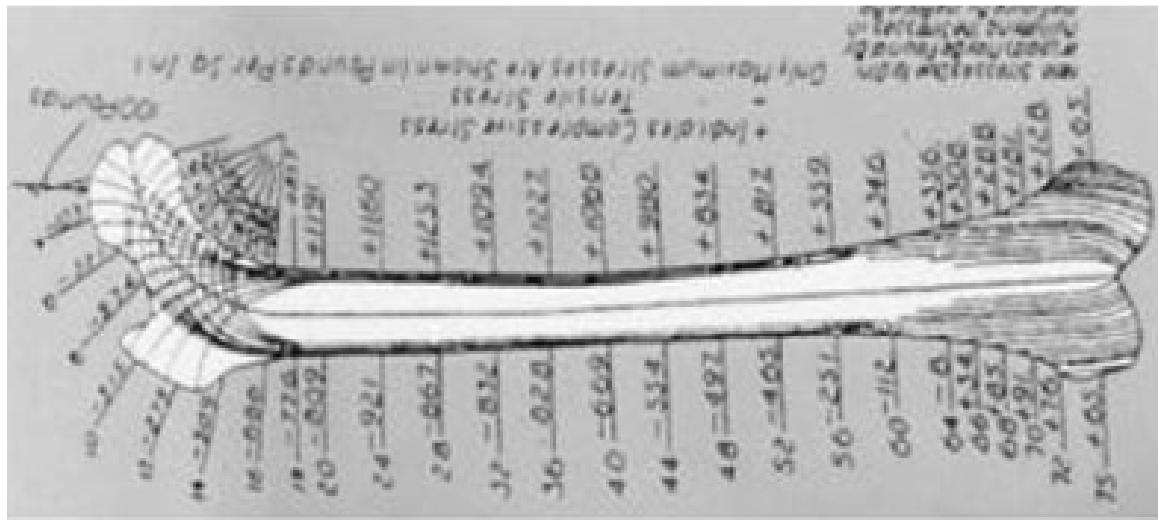
- ▶ Transition to cortical bone:
 - Bone contact is only cortical... Thin (Vs Mid shaft)
 - Less blood supply (Vs inter troch.)... Slower!!



Biomechanics

1917: Koch biomechanical study on cadaveric bones:

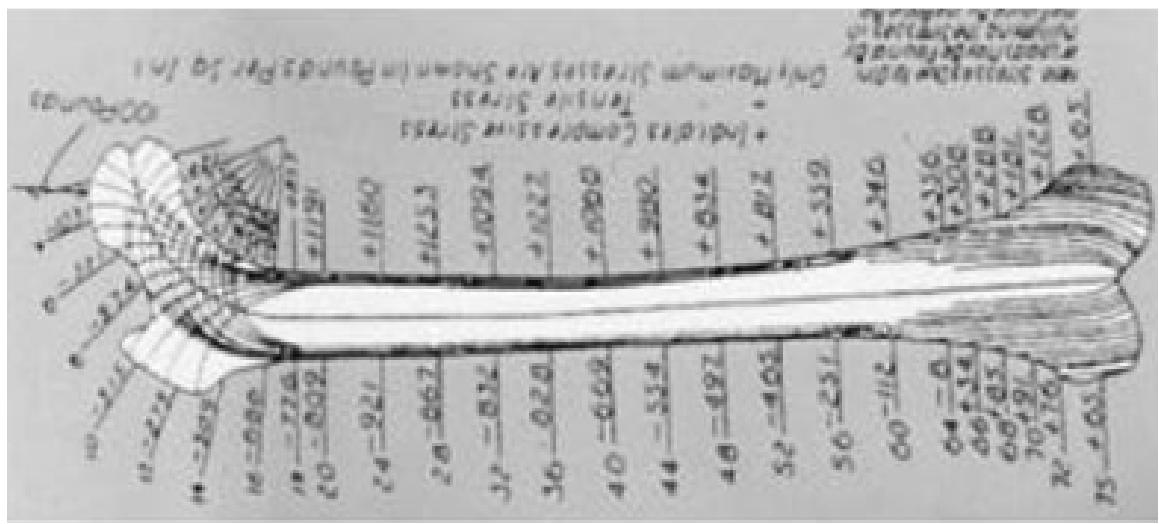
- Did not include forces by soft tissues
- 200 lb person: 1200 lb / square inch medial compression
.... 6 times body weight / square inch
- Lateral side... 25% less, in tension



Biomechanics

Importance of:

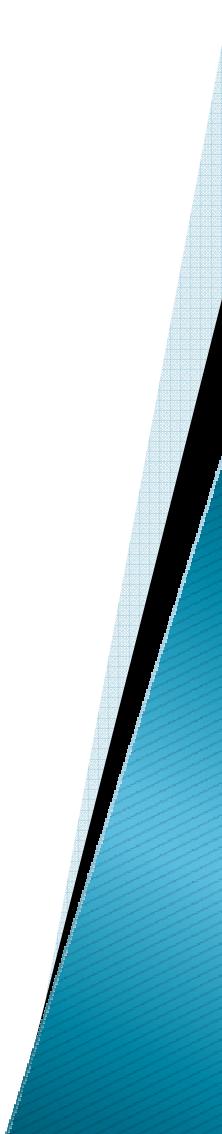
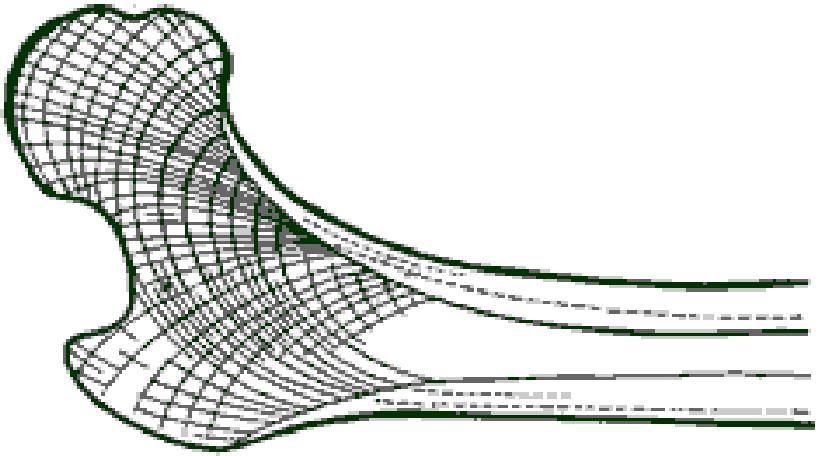
- Integrity of the medial cortex
 - anatomical reduction
 - Choice of implant



Biomechanics

- Medial Compression
- Lateral Tension

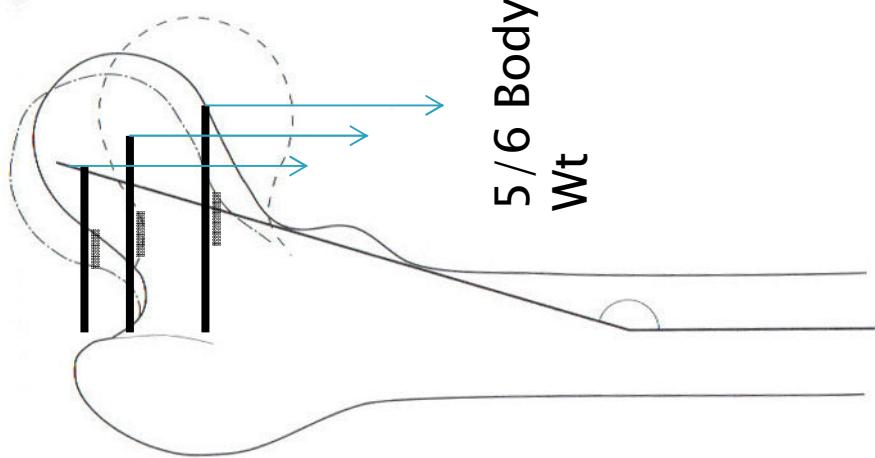
- Plate should be placed on tension side
 - Plate thickness $SMA (W \times H)^3 / 12$
- Nail bending and torsional rigidity
 - SMA / PMA affected by (radius)⁴



Biomechanics

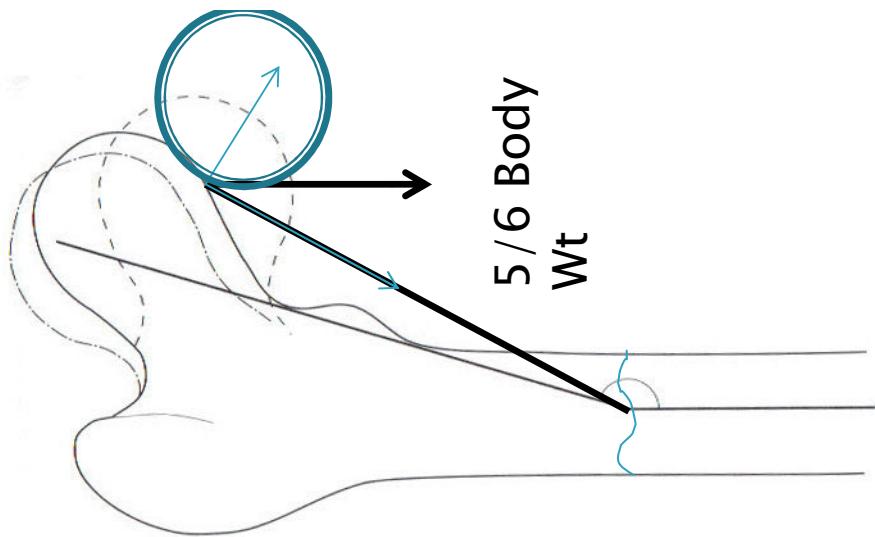
► Effect of varus fixation

- Increases horizontal lever arm on the fixation device.



Biomechanics

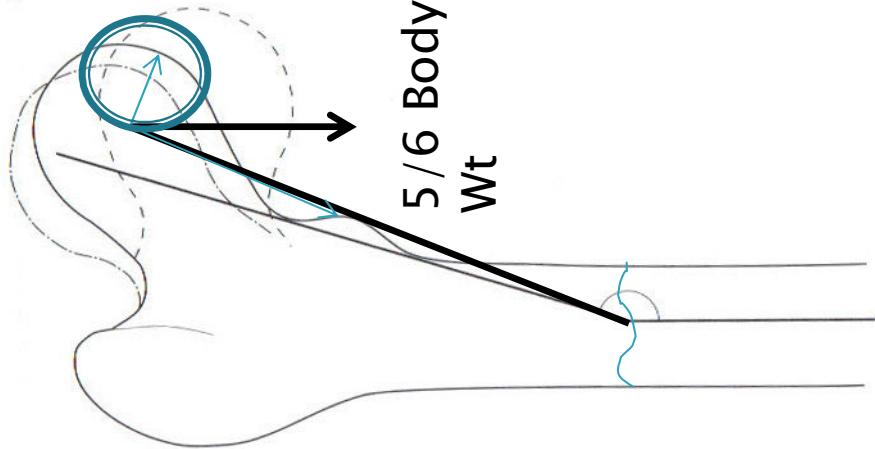
► Effect of varus fixation



- Increases the proportion of torque forces on the hip/fixation device

Biomechanics

► Effect of varus fixation

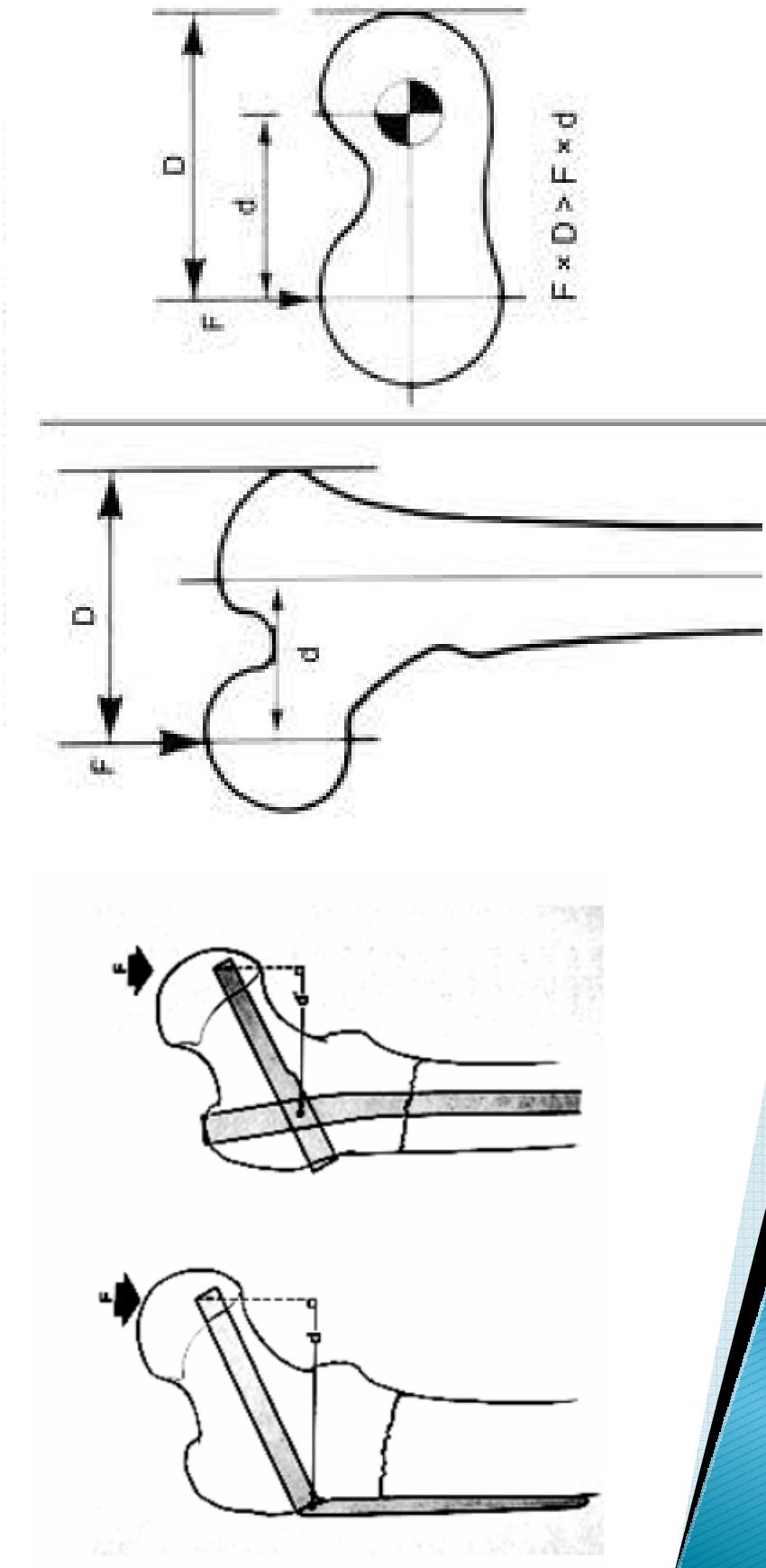


- Increases the proportion of torque forces on the hip/fixation device

Always aim to restore neck shaft angle, or even slight valgus.

Biomechanics

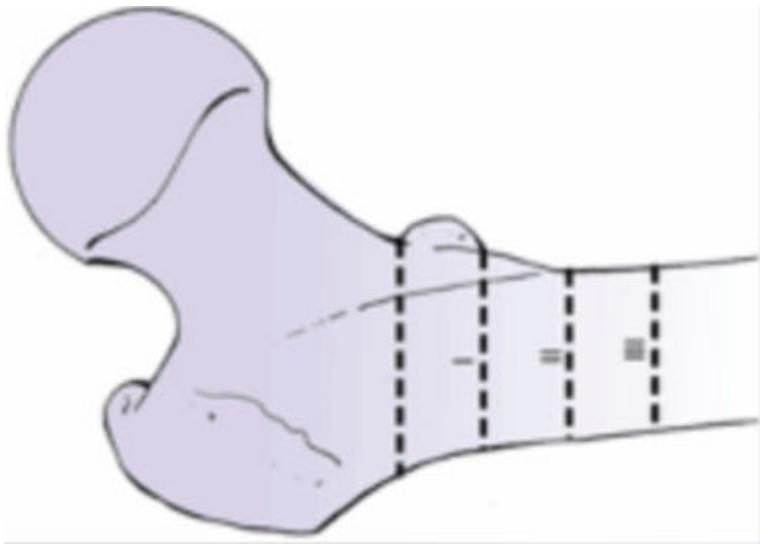
► Plate Vs Nail



Classification

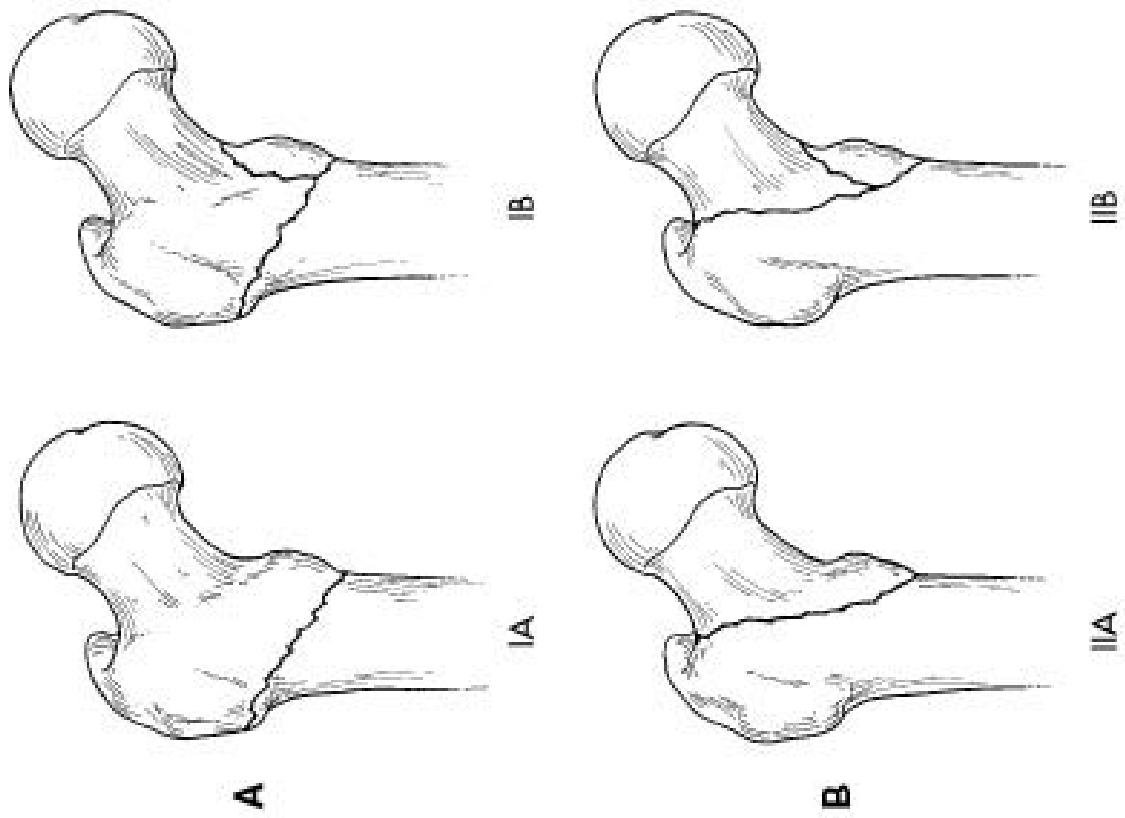
- ▶ Fielding Classification
(1966)

- Based on location of the primary fracture line in relation to the lesser trochanter



Classification

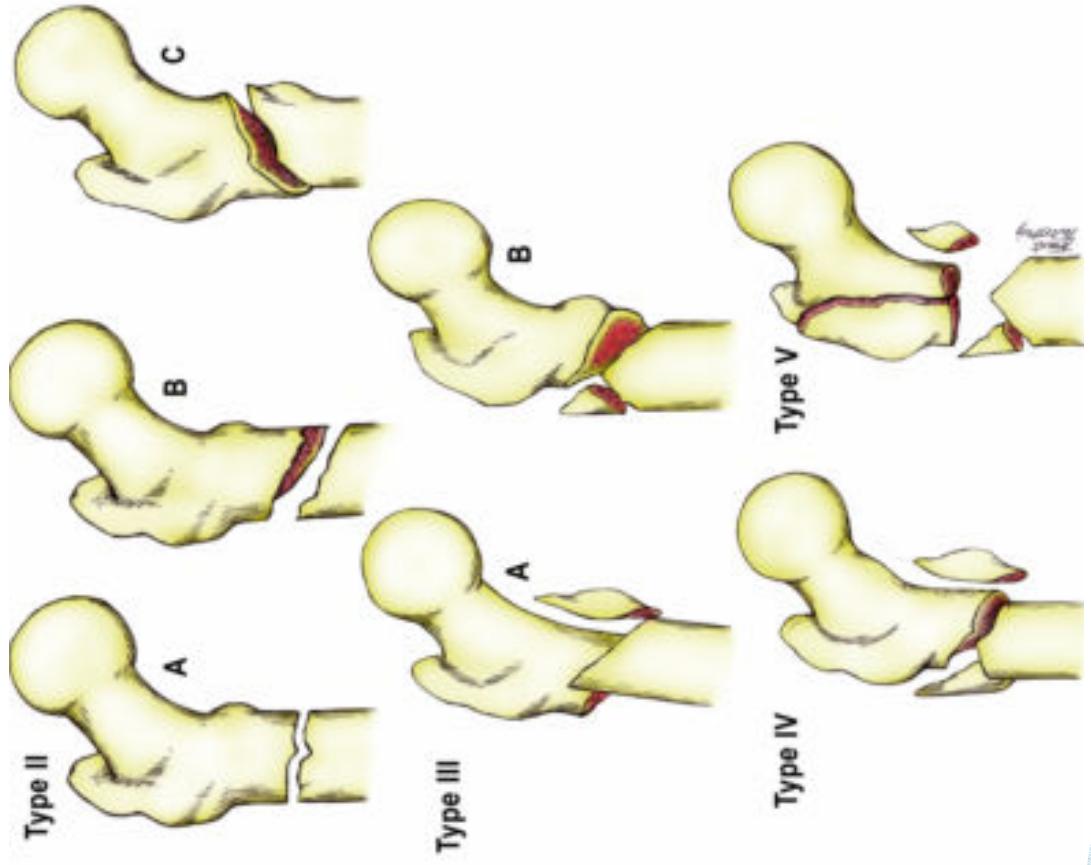
- Russell-Taylor
 - involvement of piriformis fossa, and calcar.



Classification

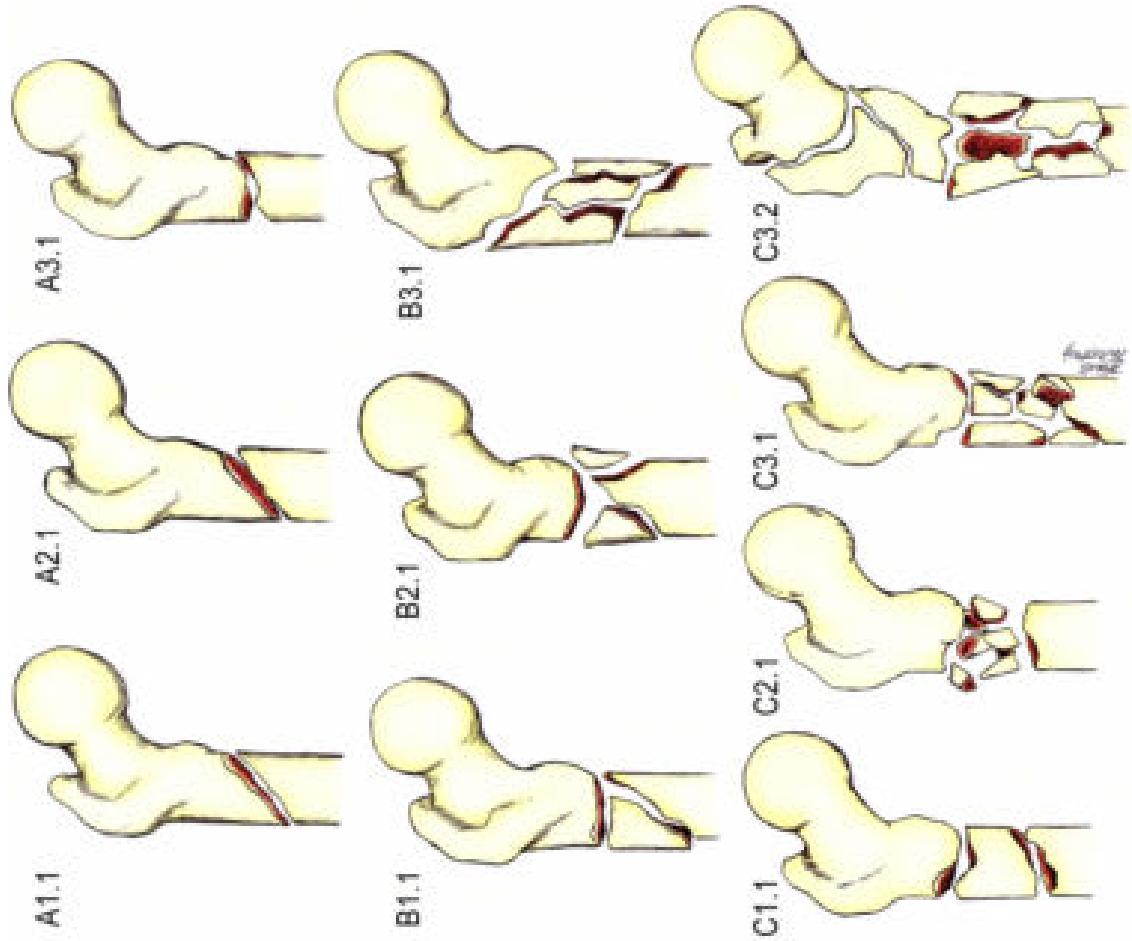
► Seinsheimer Classification

- Based on number of major bone fragments and the location and shape of fracture lines



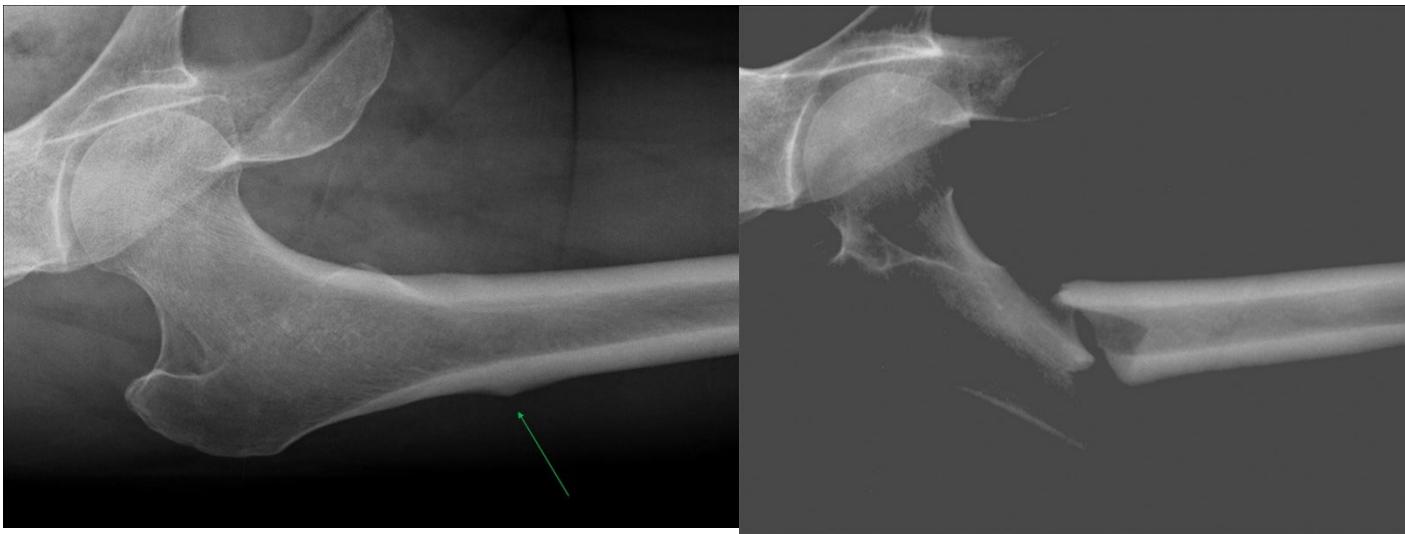
Classification

- AO-ASIF
 - Based on fracture pattern and comminution



Bisphosphonates

- Characteristics:
 - Long term alendronate... 5yrs
 - Transverse fracture, cortical thickening
 - May present with mid-thigh pain and normal x-ray..... Investigate further.
 - Observe contra-lateral femur



Bisphosphonates

- NEJM. Meta-analysis 2010
 - Rare even in long term use (10 years)
 - Relative risk 1.03 - 1.33 %
 - 0.3% risk within 3 years
 - Confidence intervals: wide, but didn't cross zero
 - Further studies needed

Points to remember

- ▶ Anatomical reduction, open if needed
- ▶ Don't fix it in varus or flexion
- ▶ Use large diameter nail if possible

