

Fractures of the Proximal Femur

Anatomy and Classification

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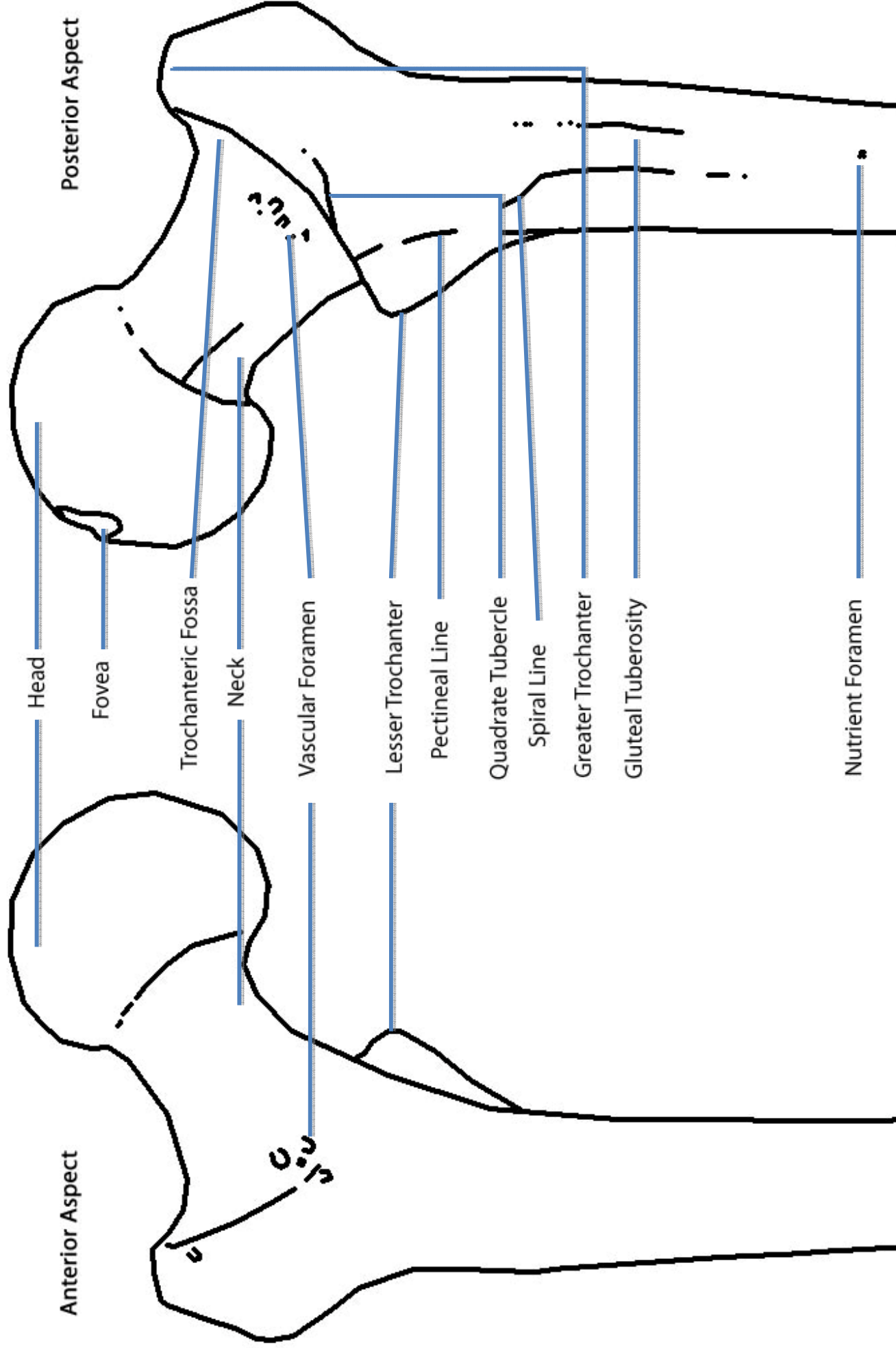
- Osteology of the proximal femur.
- Blood supply to the femoral head.
- Muscle attachments around the proximal femur.
- Fracture classification

Osteology

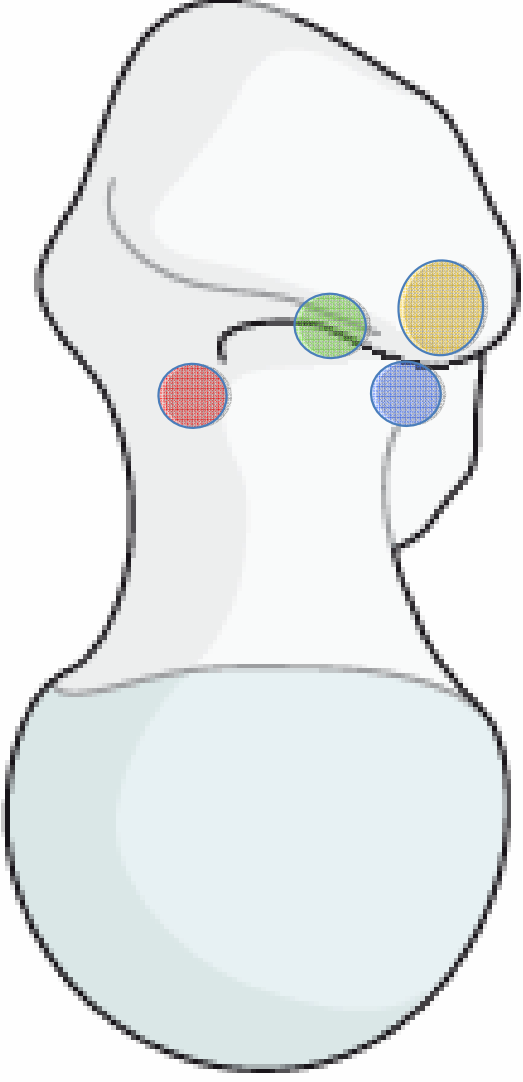
- Head
- Neck
- Intertrochanteric
- Subtrochanteric
- Shaft
- Supracondylar
- Intercondylar



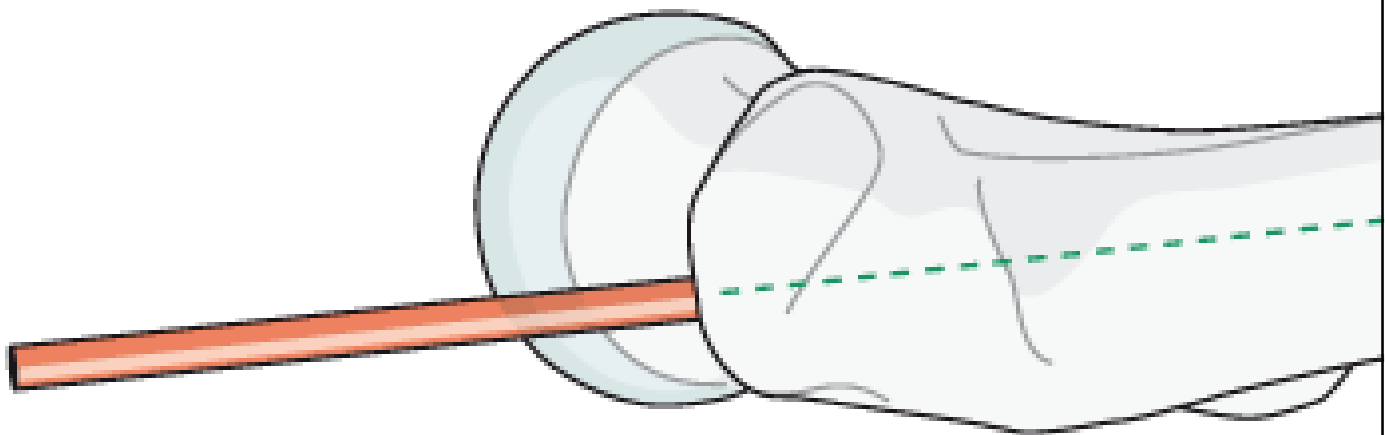
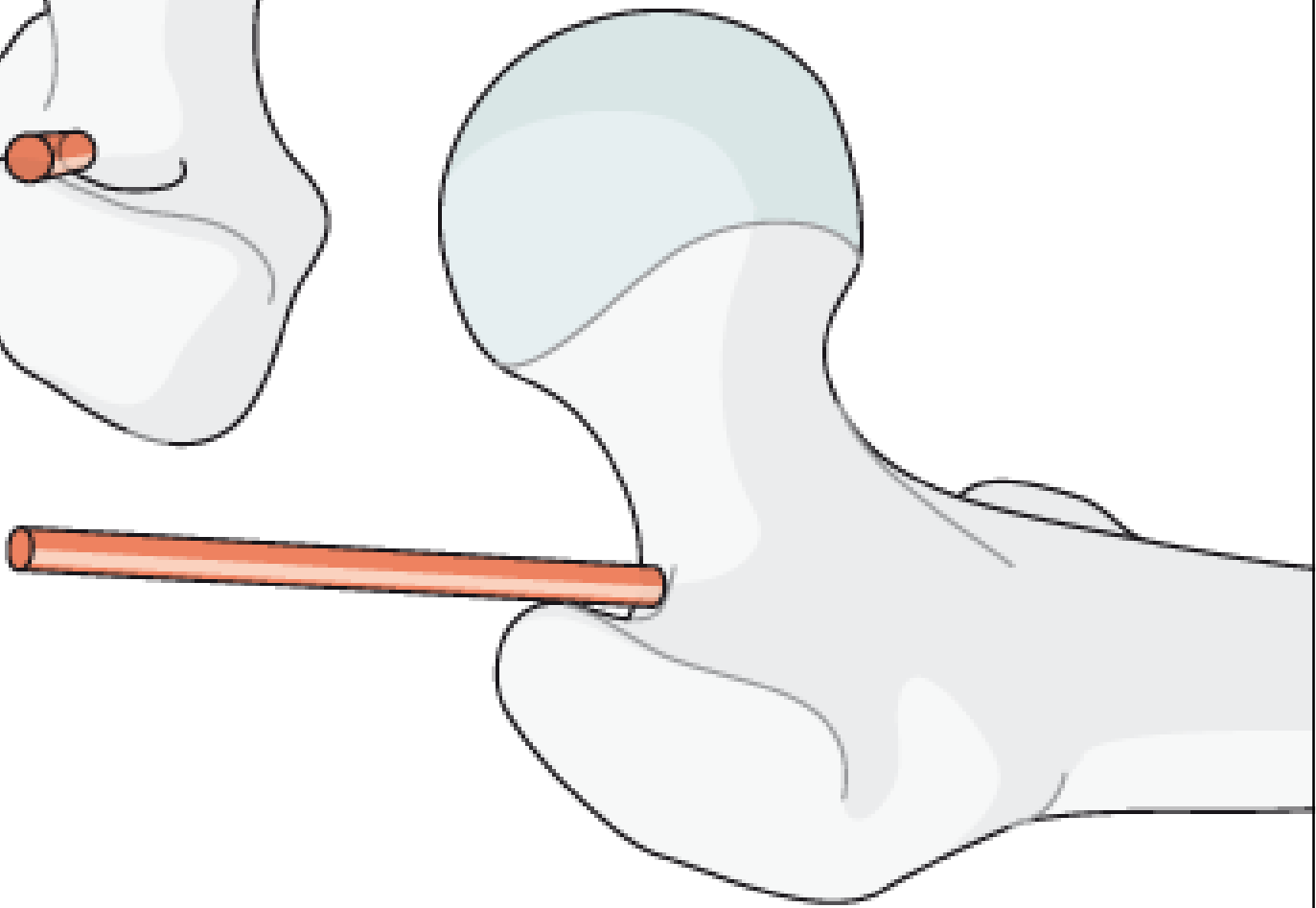
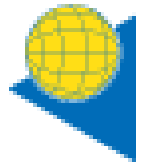
Osteology

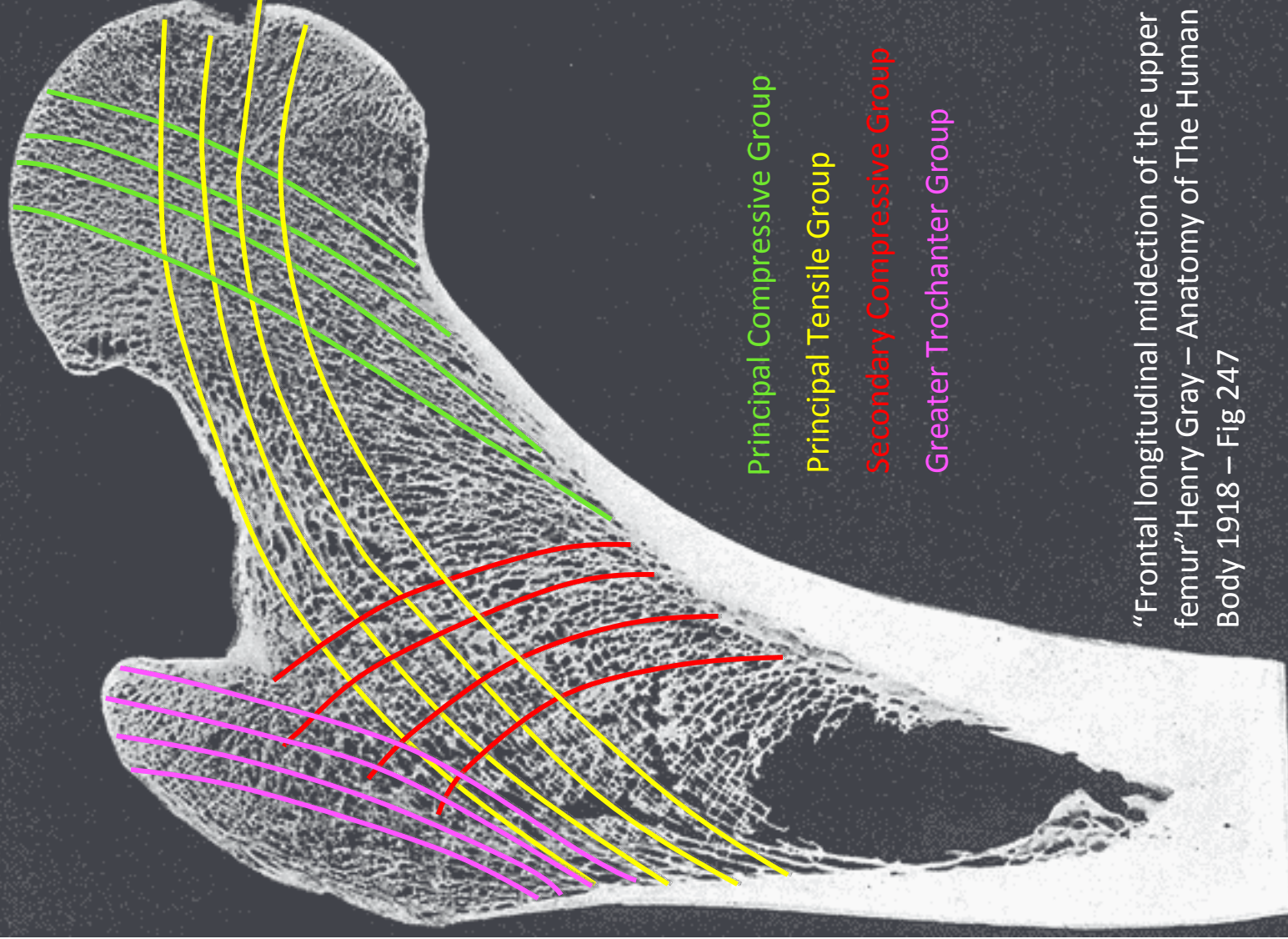


Anterior



- Base of Neck
- Piriformis Fossa
- Trochanteric Fossa
- Posterior edge of Greater Trochanter





Principal Compressive Group

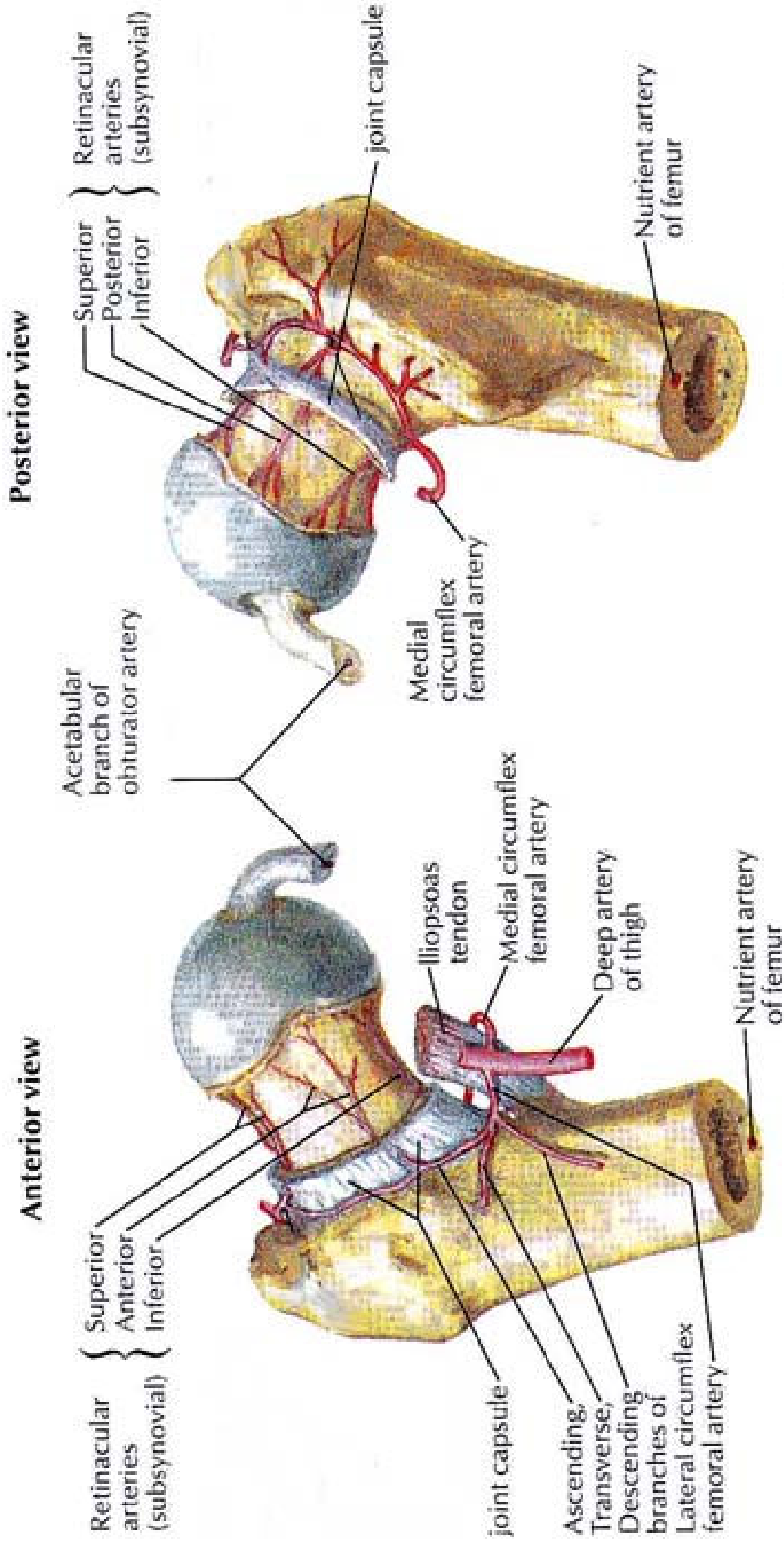
Principal Tensile Group

Secondary Compressive Group

Greater Trochanter Group

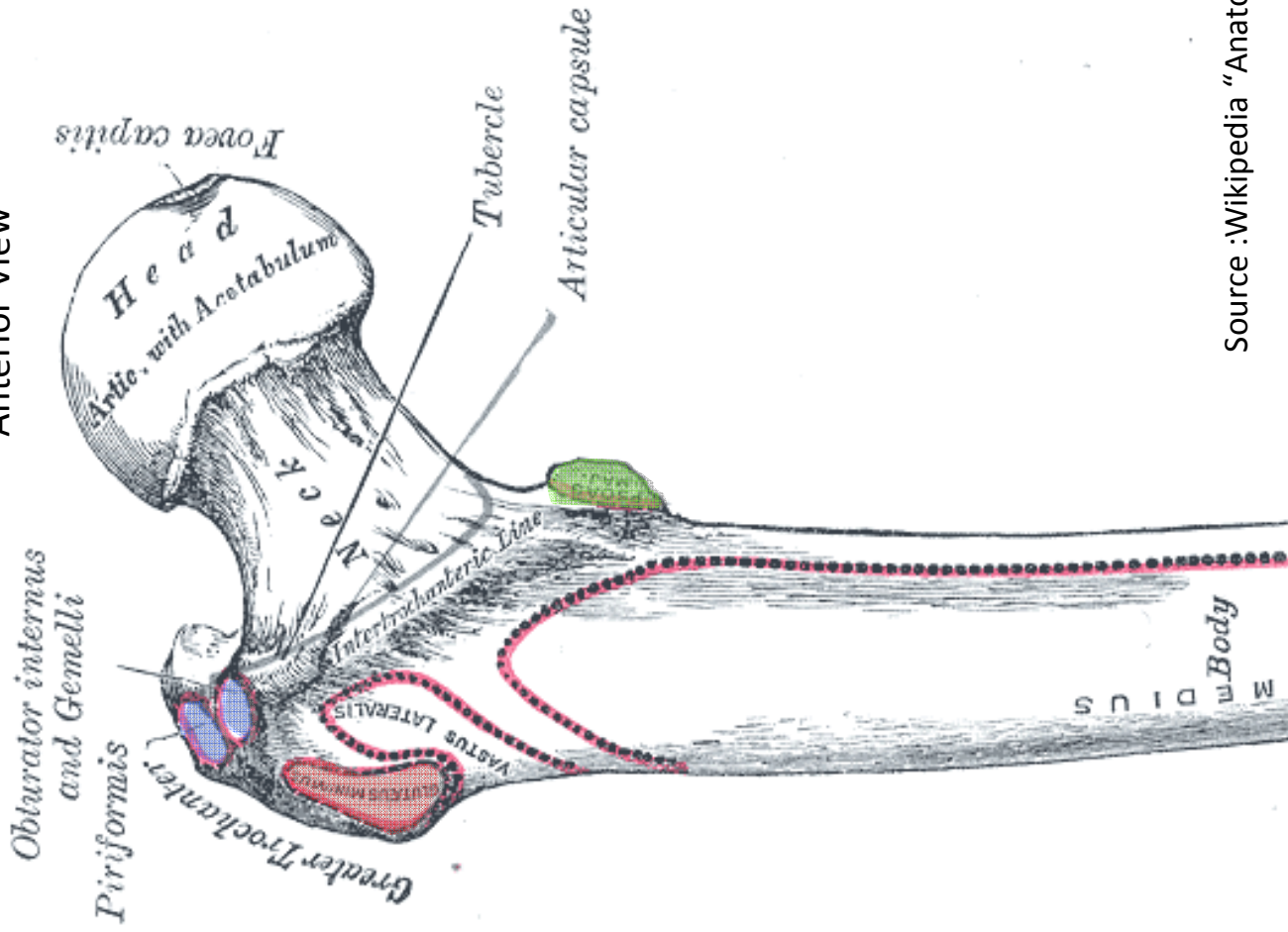
“Frontal longitudinal midsection of the upper femur” Henry Gray – Anatomy of The Human Body 1918 – Fig 247

Vascularity

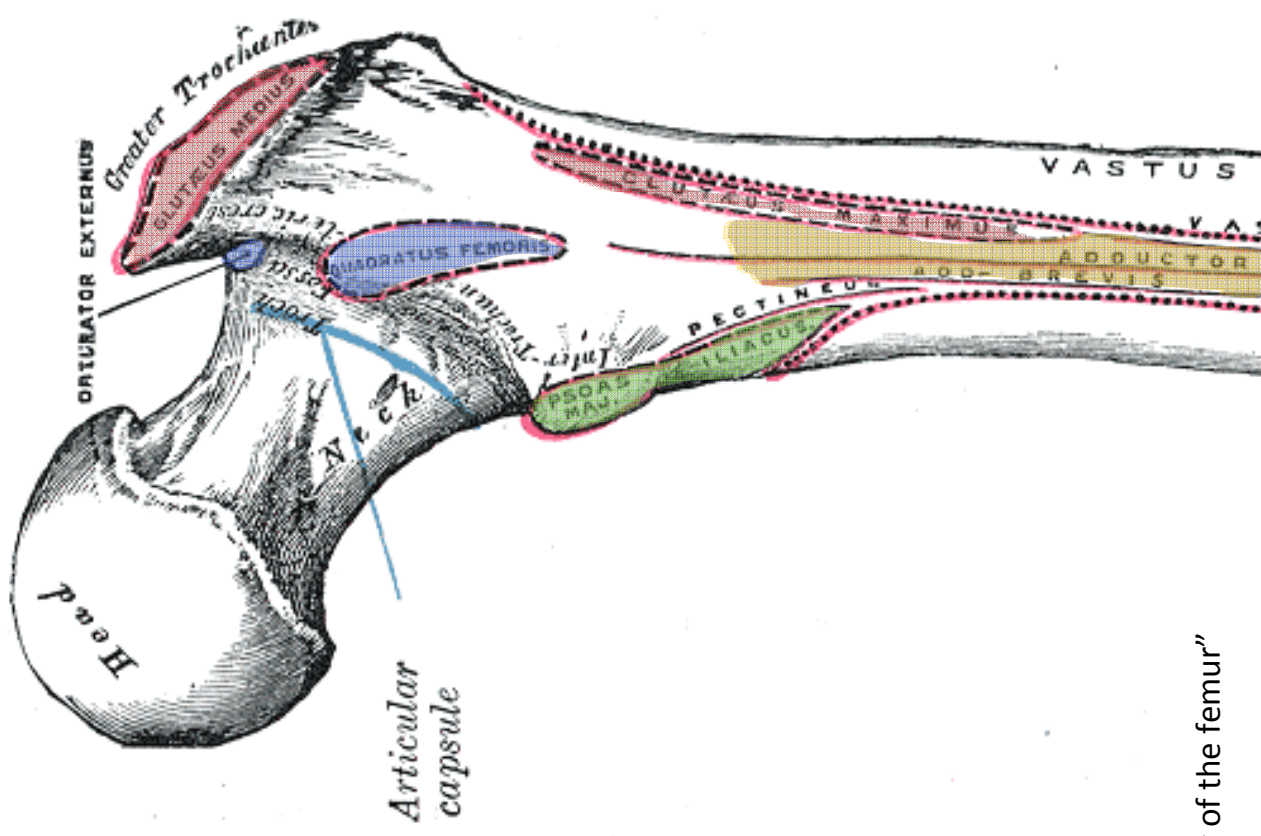


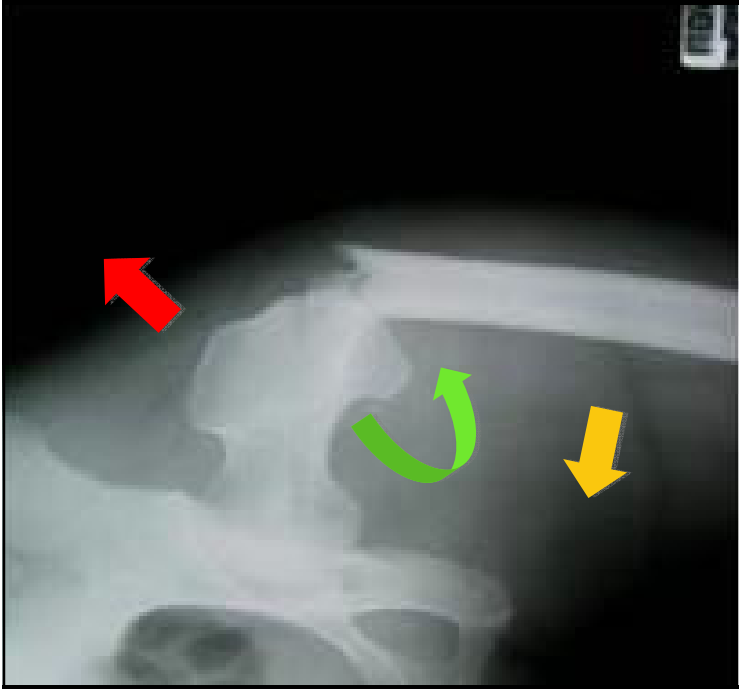
Muscle Attachments

Anterior View

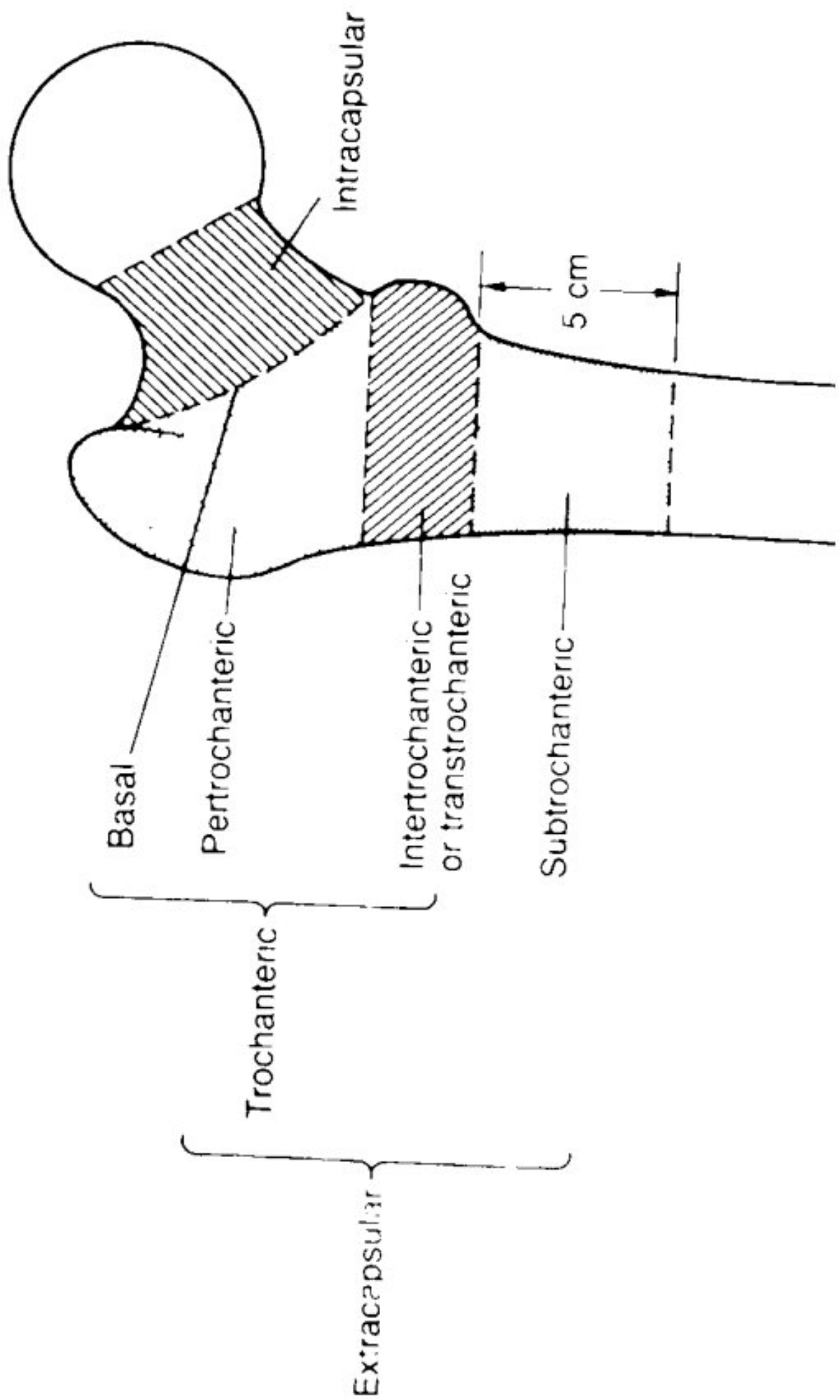


Posterior View



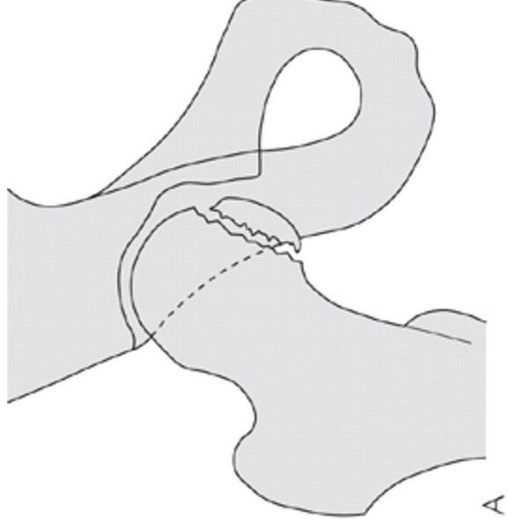


Fracture Classification

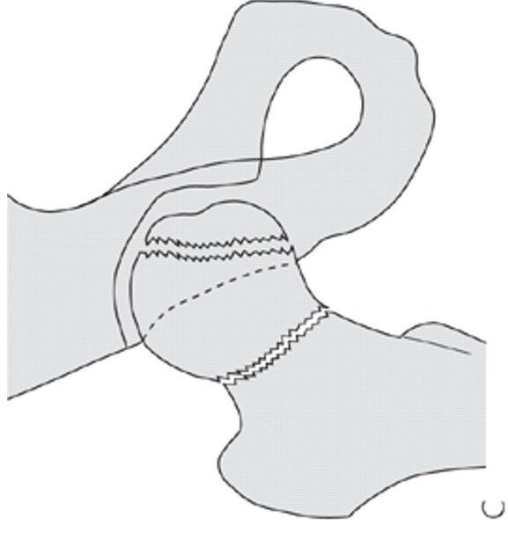


Fractures of the Femoral Head – “Pipkin Classification”

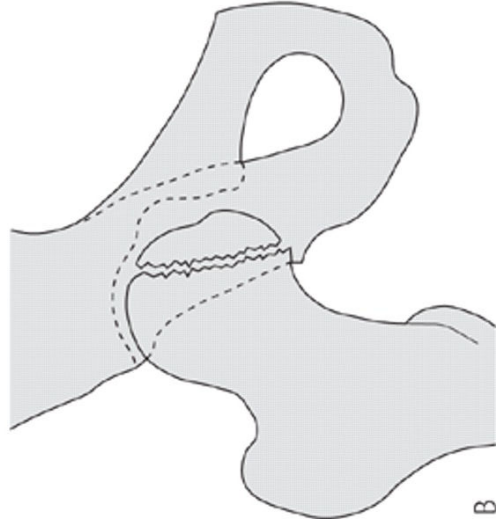
- **Type I** – Fracture below fovea
- **Type II** – Fracture above fovea
- **Type III** – I or II plus femoral neck fracture
- **Type IV** – I or II plus acetabular fracture



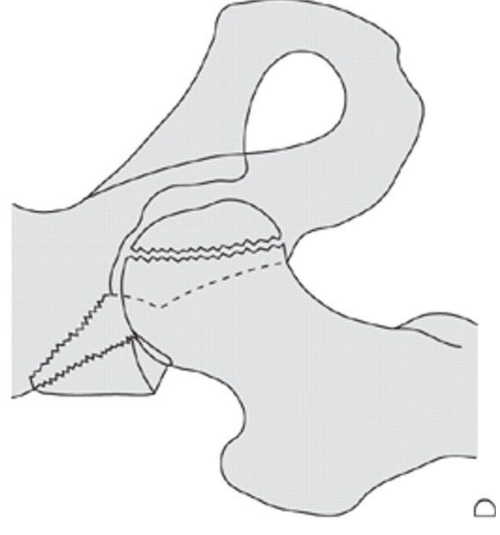
A



C



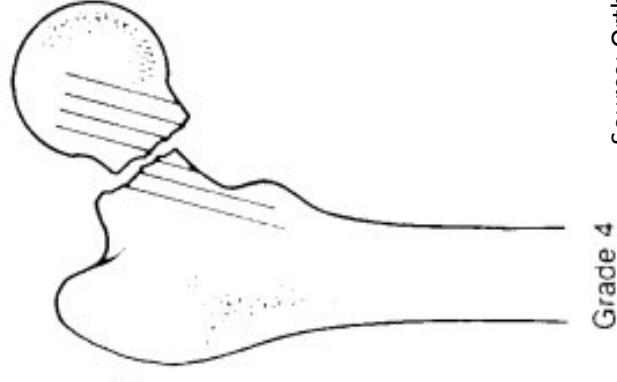
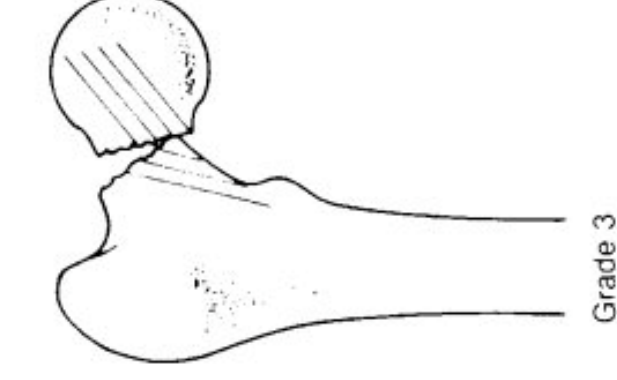
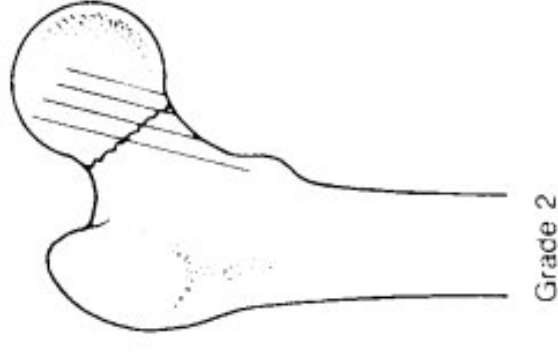
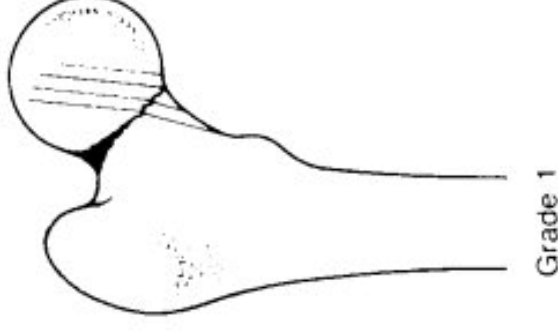
B



D

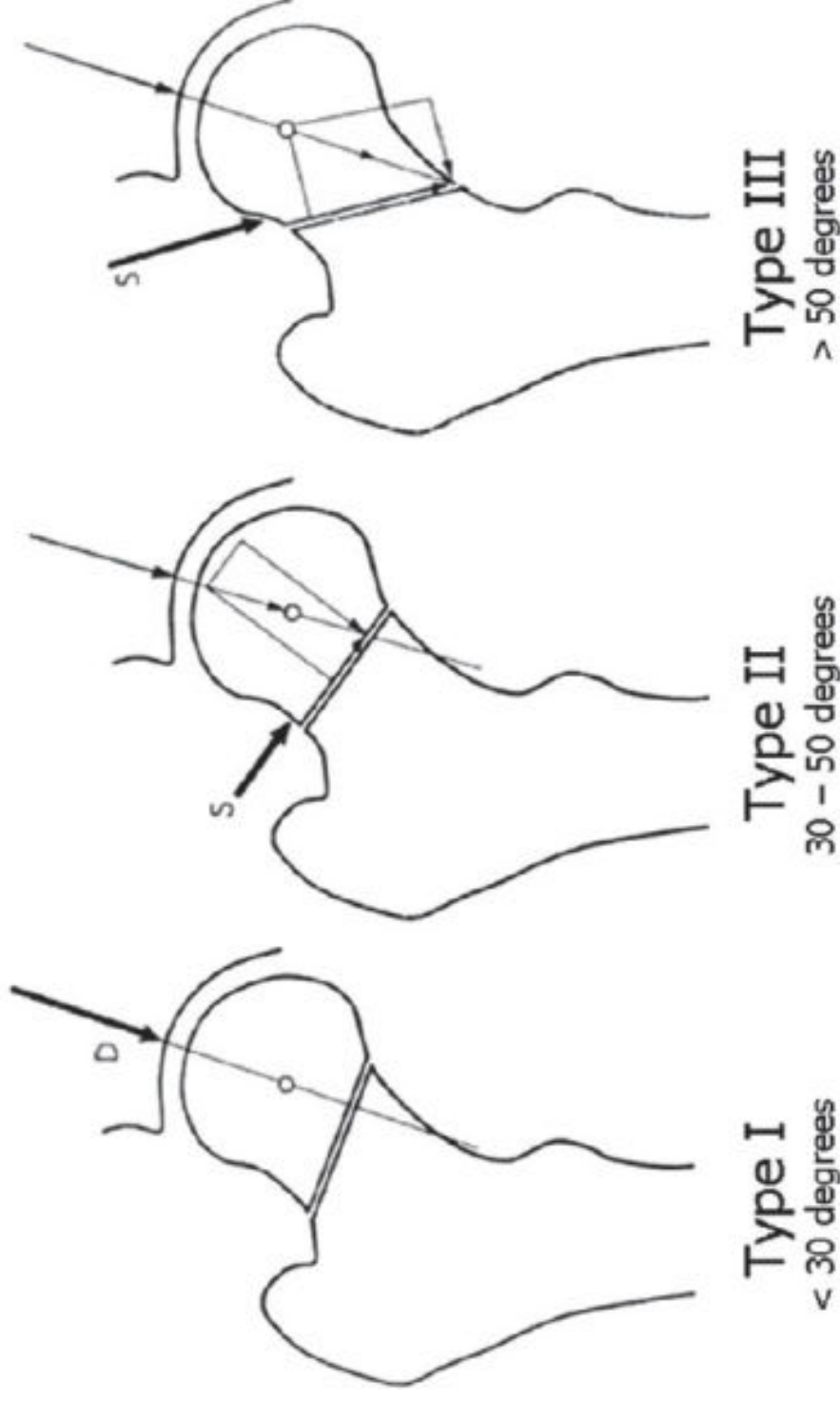
Intracapsular Fracture of the Femoral Neck – “Garden Classification”

- **I**-Undisplaced – Incomplete / valgus impacted fracture
- **II** -Undisplaced – complete fracture.
- **III** - Displaced <50%
- **IV** - Complete displacement.



Intracapsular fracture of the Femoral Neck – “Pauwel Classification”

- Based on orientation of fracture line.
- Increase risk of complications with increased vertical orientation of fracture line.
- Pauwel III – highest incidence of osteonecrosis / non-union

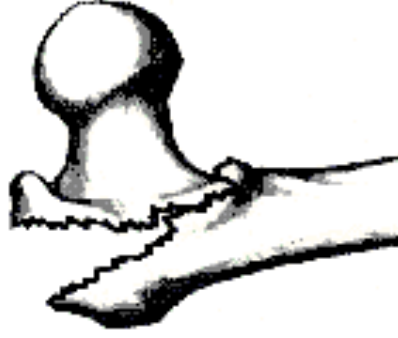


Extra-capsular, Trochanteric Fracture Neck of Femur – Evans/Jensen Classification

- Jensen's modification (1978) of Evans' classification (1949)
- Based of stability (ie. ability to achieve medial cortical apposition).
- Types I and II are considered stable.
- Types III – V are comminuted or unstable.



Type 1
Two part
undisplaced



Type 2
Two part
displaced



Type 3
Three part, loss of
posterolateral support

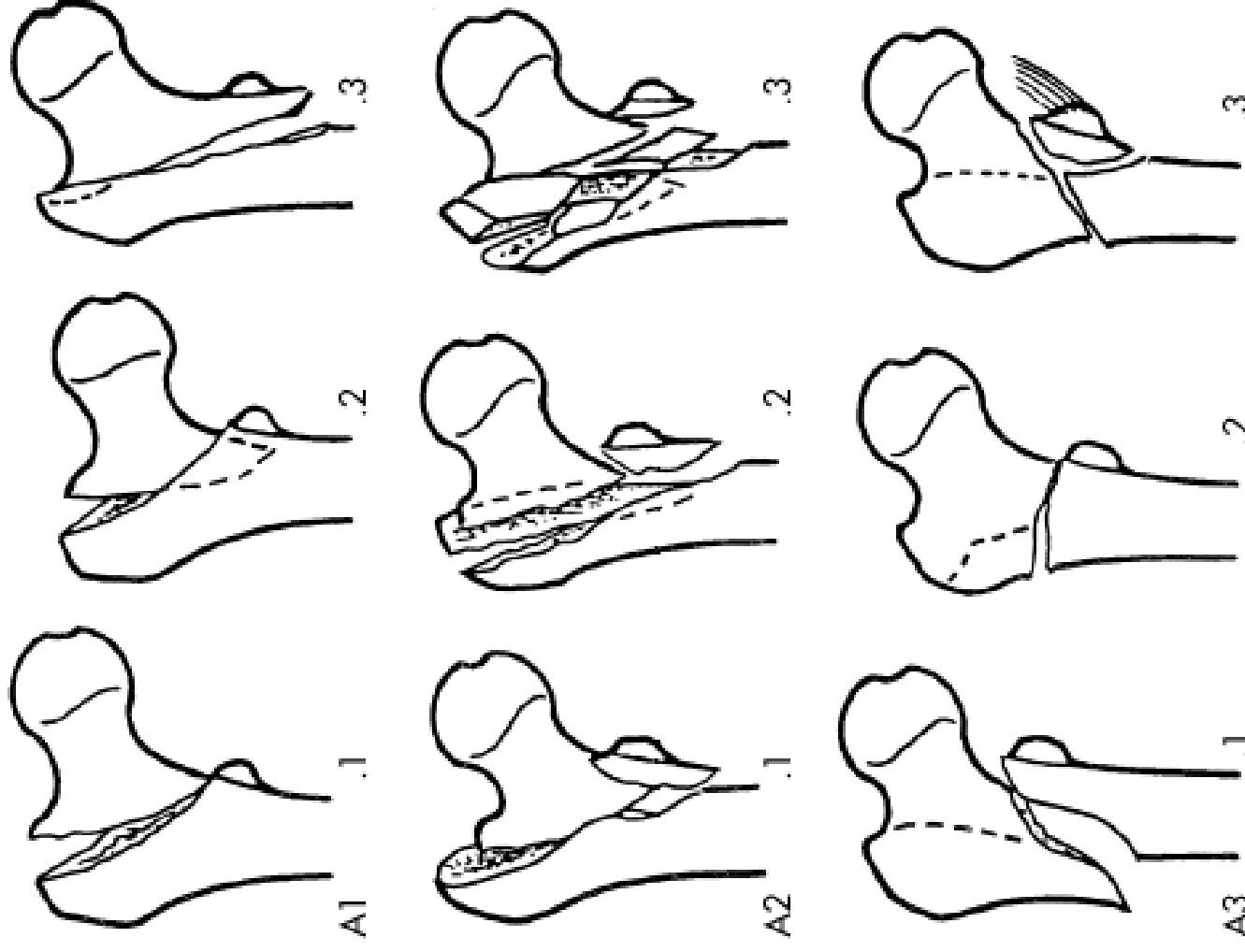


Type 4
Three part, loss of
medial support



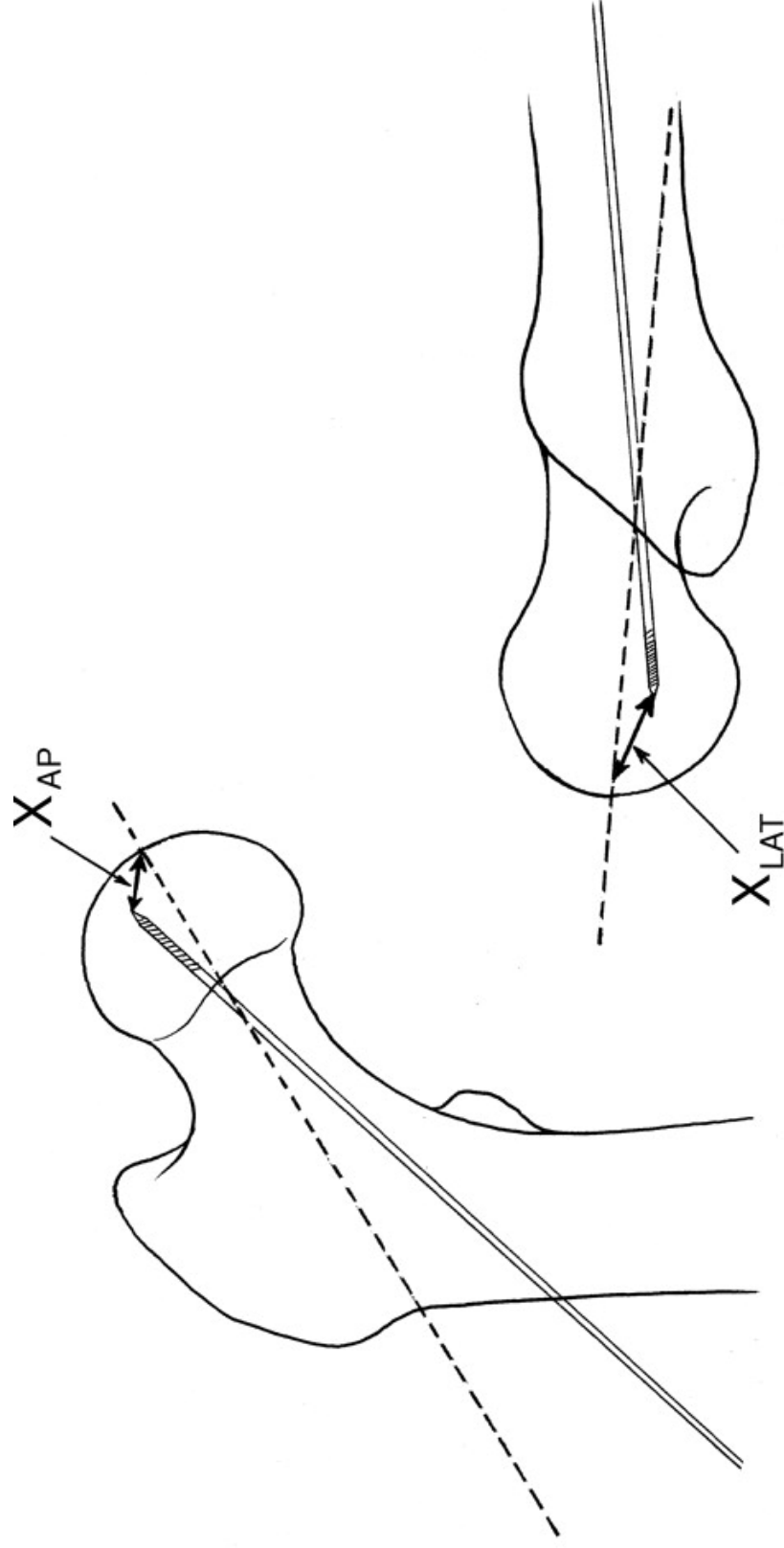
Type 5
Four part

Extra-capsular Trochanteric Fracture Neck of Femur – AO / OTA Classification



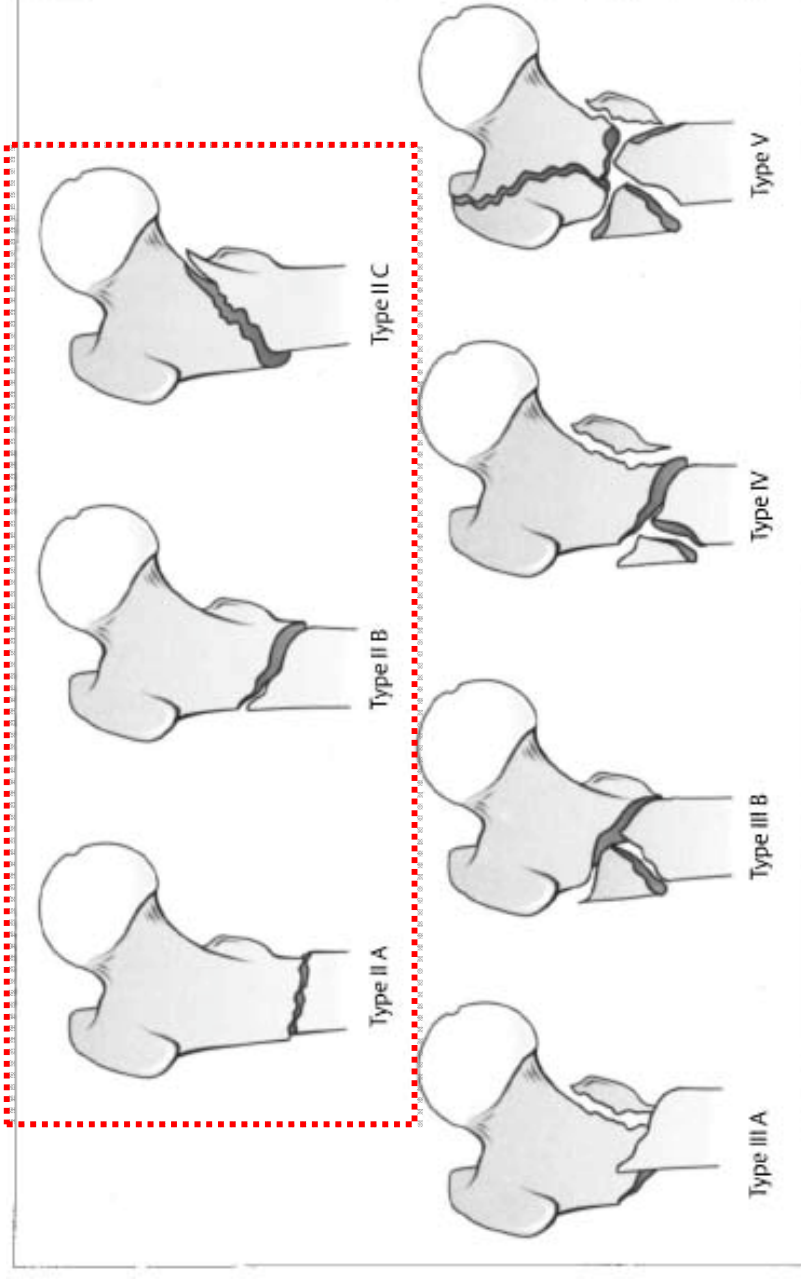
Technical Note – Tip Apex Distance (TAD)

- $TAD = X_{AP} + X_{LAT}$
- $TAD < 25\text{mm}$



Subtrochanteric Fracture Femur – “Seinsheimer classification”

- **Type I:** Nondisplaced frx: < 2 mm of displacement of frx frags
- **Type II:** Two part fractures:
 - **IIA:** Two part transverse femoral fracture
 - **IIB:** Two part spiral frx w/ lesser troch attached to prox frag
 - **IIC:** Two part spiral frx w/ lesser troch attached to distal fragment



- **Type III:** three part fractures:
- **IIIA:** three part spiral fracture in which lesser trochanter is part of 3rd fragment which has an inferior spike of cortex
- **IIIB:** three part spiral fracture of proximal 1/3 of femur, with third part butterfly fragment
- **Type IV:** comminuted fracture with 4 or more fragments implant failures and non-unions are common
- **Type V:** subtrochanteric intertrochanteric fractures - this group includes any subtroch frx w/ extension through greater trochanter

