Fractures of the Proximal Femur

Anatomy and Classification

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Contents

• 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

Posterior Aspect

Anterior Aspect

Head
Fovea
Trochanteric Fossa
Neck
Vascular Foramen
Lesser Trochanter
Pectineal Line
Quadrate Tubercle
Spiral Line
Greater Trochanter
Gluteal Tuberosity
Nutrient Foramen
“Frontal longitudinal midection of the upper femur” Henry Gray – Anatomy of The Human Body 1918 – Fig 247
Muscle Attachments

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

Source: Oxford Textbook of Trauma and Orthopaedics
Intracapsular Fracture of the Femoral Neck – “Garden Classification”

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

Source: Orthoteers
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

Source: BiomedSearch.com
Extra-capsular, Trochanteric Fracture Neck of Femur – Evans/Jensen Classification

• Jensen’s modification (1978) of Evans’ classification (1949)
• Based of stability (i.e. ability to achieve medial cortical apposition).
• Types I and II are considered stable.
• Types III – V are comminuted or unstable.
Extra-capsular Trochanteric Fracture Neck of Femur – AO / OTA Classification
Technical Note – Tip Apex Distance (TAD)

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

Source: Orthopaedic Knowledge Update Trauma 2, AAOS, 2000 p127.
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