Femoral neck fractures

Borrowed heavily from OTA core curriculum
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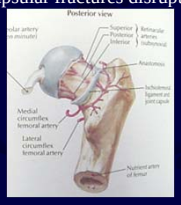
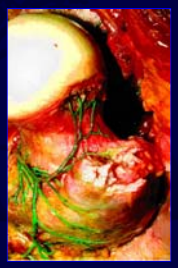
Epidemiology

- 250,000 Hip fractures annually
  - Expected to double by 2050
  - 50% are femoral neck fractures
- Two different injuries
  - Elderly: fragility fractures increase 2x with each decade over 50
  - Young: high energy trauma

Blood supply

- Lateral epiphysel artery
  - terminal branch MFC artery
  - predominant blood supply to weight bearing dome of head
- Intracapsular fractures disrupt this



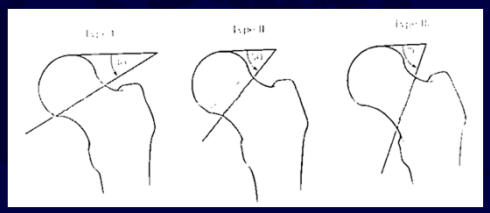


Garden Classification (1961)

I Valgus impacted or incomplete
II Complete Non-displaced
III Complete Partial displacement
IV Complete Full displacement

Pauwels Classification (1953)

Increased risk of Nonunion with increasing angle
- Angle describes vertical shear vector



Treatment

- Options
  - Non-operative
    - Appropriate for some patients
  - Operative
    - Fixation (perc v closed reduction v open reduction)
    - Hemiarthroplasty
    - Total hip replacement

Non-displaced fractures

- Percutaneous pinning
  - Union rate >95
  - Minimal complications
    - AVN < 8%
    - Infection < 5%
  - Quick, minimally invasive
    - less blood loss
  - Early mobilization
    - Weight bearing as tolerated

Displaced fractures

ORIF versus replacement

Most important considerations are life expectancy and activity level

Young adults

- Perfect reduction and internal fixation
- Urgent surgery to perfuse head

Approach for open reduction

Smith-Peterson

- Anterior approach
- Best for transcervical and subcapital fractures
- Fixation is performed through a second approach

Approach for open reduction

Watson-Jones

- Anteriolateral exposure
- Best for basalar neck and IT patterns
- Allows placement of implant through same incision

What reduction is acceptable?

- Ideal reduction is Anatomic
  - Acceptable: $\leq 15^{o}$ valgus $\leq 10^{o}$ AP angulation
    - NO varus

Patient Categories of Femoral Neck Fractures

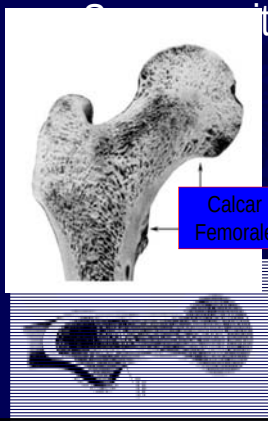
Young Patients

Old Patients

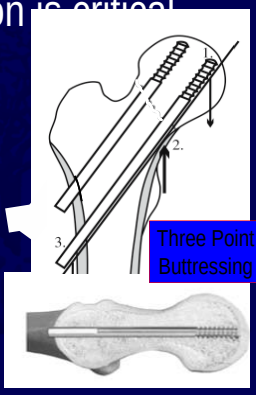
Good bone quality allows stable internal fixation

Poor bone quality threatens internal fixation

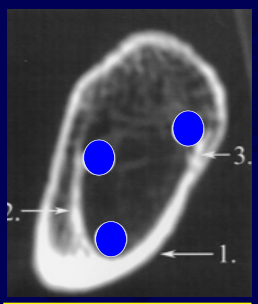
tion is critical



Calcar Femorale



Three Point Buttressing



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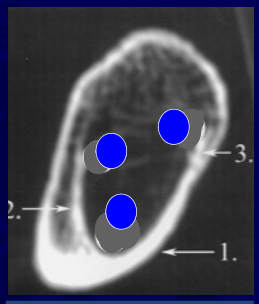

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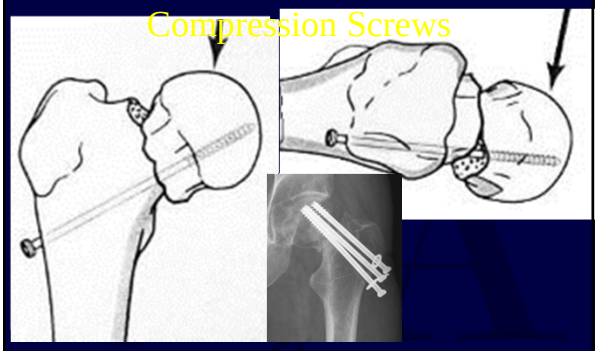
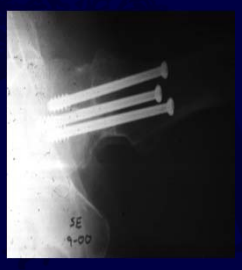
Compression Screws



Failure: Head displaces inferiorly and posteriorly until the screw contacts a cortex

ORIF: most important variable is quality of reduction



Sliding hip screw fixation

- Compression Hip Screws
  - Sacrifices larger amount of bone
  - Biomechanically superior in cadavers
  - Anti-rotation screw needed
- No clinical advantage over parallel screws
  - * May have role in high energy/ vertical shear fractures

Sedentary elderly

- Hemiarthroplasty is the procedure of choice

Unipolar vs. bipolar


- Bipolar theoretical advantages
  - Lower dislocation rate
  - Less acetabular wear/ protrusio
  - Less pain

Cochrane collaboration 2010

- No advantage of bipolar HA over unipolar HA

Cemented versus uncemented

- ? 1% sudden death
- less pain
- better function

Displaced FNF-Cochrane 2002

ORIF
- Shorter operation
- Less blood loss
- Fewer transfusions
- Fewer deep infections

Hemiarthroplasty
- Lower revision rate

No differences found in hospital LOS, mortality, residual pain, or regaining mobility

Re-evaluation for role of THR in treatment of femoral neck fractures in the active elderly

ORIF vs Bipolar vs THR

ORIF

- 37% failure (AVN, NU)
- 8X revision rate compared to Bipolar
- 5X revision compared to THA

Bipolar/THA

Functional outcome best for THA

Prospective randomized multicenter
Displaced FNF, pts > 60 years
298 pts- ORIF (118); cemented bipolar (111); cemented THR (69)
Keating et al, JBJS 2006

Treatment for displaced Femoral neck fractures

- Young: ORIF
- Oldest old: Hemiarthroplasty
- Middle range: Dependent on patient
  - HA for displaced femoral neck fractures in sedentary
  - THR for active individuals and those with DJD
  - ORIF for active elderly with understanding that there is a high risk for revision surgery

Thank you