

# Femoral neck fractures

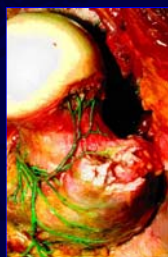
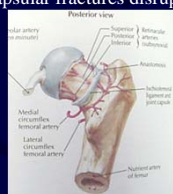
Borrowed heavily from OTA core curriculum  
 Authors: Steven A. Olson, MD and Brian Boyer, MD  
 Kenneth J Koval, MD

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



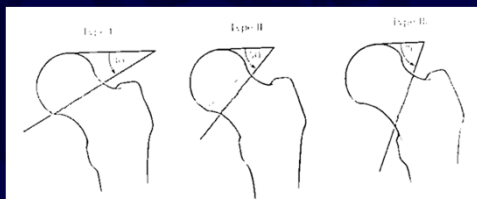
## Garden Classification (1961)

- 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 basilar neck and IT patterns
- Allows placement of implant through same incision

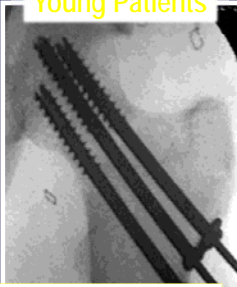


## What reduction is acceptable?

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


### Patient Categories of Femoral Neck Fractures

**Young Patients**



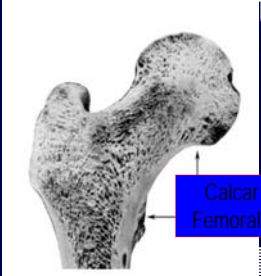
Good bone quality allows stable internal fixation

**Old Patients**

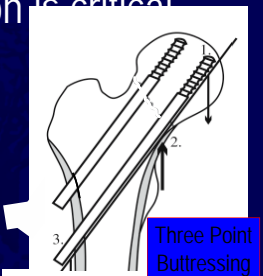


Poor bone quality threatens internal fixation

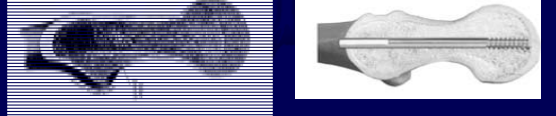
### Position is critical

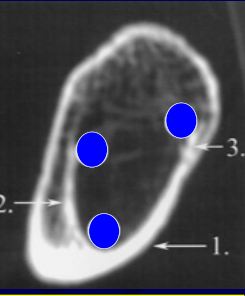


Calcar Femorale

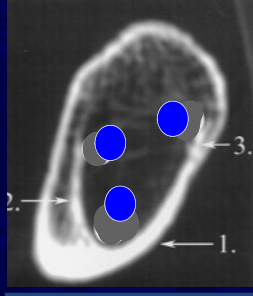


Three Point Buttressing



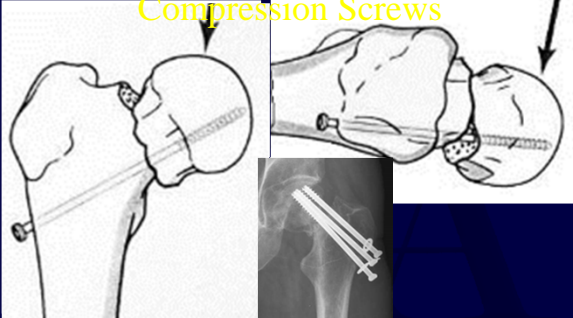


**Calcar contact**




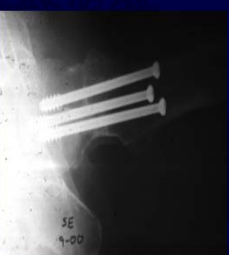
**No Calcar contact**

### 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/ protrusion
  - 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