# Femoral Neck Fractures- Gold standards and breaking news



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### **Learning outcomes**







### **Learning Outcomes**

Epidemiology Preoperative planning Reduction techniques Methods of fixation Complications





## Elderly w femoral neck fracture (≥ 65 yrs)



Displaced  $\longrightarrow$  arthroplasty Non displaced  $\longrightarrow$  osteosynthesis

**Biomfeldt R et al.** Comparison of internal fixation with total hip replacement for displaced femoral neck fractures. Randomized, controlled trial performed at four years. J Bone Joint Surg Am 2005; 87:

Rogmark C et al. A prospective randomised trial of internal fixation versus arthroplasty for

displaced fractures of the neck of the femur. Functional outcome for 450 patients at two years. J Bone Joint Surg Br 2002; 84: 183-188

Tidermark J et al. Internal fixation compared with total hip replacement

for displaced femoral neck fractures in the elderly. A randomised, controlled trial. J Bone Joint Surg Br 2003; 85:380-3885

Chammout GK et al. Total hip replacement versus open reduction and internal fixation of displaced femoral neck fractures: a randomized long-term follow-up study. J Bone Joint Surg Am 2012; 94: 1921-1928

### Femoral neck fracture – unusual fx in young



## Swedish Fracture registry 2011-01-01 – 2016-12-31





Antal observationer: 2763

### What is young?



### Woman, 52 yrs, heavy drinking problem+ smoker



THA cost effective in healthy >54, mild comorbidity >47, multiple comorbidities >44

Swart E, JBJS 2017





## **Femoral Neck Fractures in young adults**

Uncommon, 3-10% of all femoral neck fx

Often result of high energy trauma

Often present with other polytraumatic injuries



High incidence of osteonecrosis (12-86%) and non union (10-30%)



### Classification





Traction view



### Femoral neck fractures in young - is it a Problem?

Slobogean GP et al.: Complications following young femoral neck fractures Injury, 2015

Meta analysis of 1558 fractures, 41 studies

14,3% Osteonecrosis9.3 % nonunion7.1% malunion9.7% implant failure5.1% infection

## 18% reoperation





### What is the problem?

Osteonecrosis Non-Union



Chronic pain Gait problem Osteoarthritis





## What is the problem? Shortening, varus

- > 5 mm; Altered biomechanics
  - Change in moment arm for the Abductor muscles



search







The effect of shortening and varus collapse of the femoral neck on function after fixation of intracapsular fracture of the hip

A MULTI-CENTRE COHORT STUDY

M. Zlowodzki, O. Brink, J. Switzer, S. Wingerter, J. Woodall, B. A. Petrisor, P. J. Kregor, D. R. Bruinsma, M. Bhandari DOI: 10.1302/0301-630X-98811.30593 Published 31 October 2008.



### **Different treatment goals**

Treatment goal: Pain free, functional hip

- Union
- Biomechanics
- **Priority in younger:** Preserved anatomy /biomechanics and full function
- **Priority in elderly:** Mobilise as soon as possible and an "acceptable" function



### Controversies

## **1- Timing**



## Timing

Current practice has no firm evidence

Displaced fractures – EMERGENCY - op as soon as possible, even night time, if surgical A-team available

Non displaced or minimally displaced fractures -- URGENT - op. soon, OK to wait until next morning

Fewer AVN if op. emergently ( $\leq 12$  hrs)



No Difference

Karaeminogullari O et al 2004 Haidukewych GJ et al 2004

Swiontkowski M et al 1984 Kuner EH et al 1995 Jain R et al 2002

Quality of reduction and quality of bone has a more pronounced effect on healing than surgical timing (Song KS, JBJS br 2010)

## **Preoperative planning**

Analyse fracture Pauwel classification, Comminution Anatomical reduction goal -Be prepared for open reduction Preop imaging:

AP, LAT, Pelvic AP, CT

General Anaesthesia with complete muscle relaxation

Fracture table w traction, w/o traction, radiolucent flat top w leg draped free Supine or lateral



## **CT for displaced high energy fx**





### **Controversies**

### **2- Reduction**





## **Reduction is KEY in reducing failure**



### Reduction

# Closed reduction **carefully** in GA with muscle relaxation

## Open reduction if failed closed (Watson-Jones anterolateral or Smith-Pedersen/Heuter approach/)

### Suboptimal reduction = high risk of ON/non-union

Weinrobe M et al 1998 Upadhyay A et al 2004 Parker MJ. 2000

### Good reduction+stable fixation reduce relative risk of complications by a factor of 13

Chua D. et al.: Predictors of early failure of fixation in the treatment of displaced subcapital hip fractures JOT 1998;12:230-234



### **Closed reduction** Leadbetter 1939, Flynn 1974

- No hasty and "aggressive" movements!
  - Avoid excessive traction!

Start with :

- from flexed hip, subtle abduction, internal rotation and careful traction.
  - Anatomical reduction (Garden index)



### **Open reduction**

#### Watson-Jones anterolateral Medius (nerve and artery)!



#### Smith-Petersen, Hueter (1882) anterior





### Controversies 3- Choice of construct



### **Biomechanical properties**

### **Multiple screws**

Garden I-II: compared to SHS no difference
Parallell screws better

Bonnaire FA, Weber AT. Injury 2002; 33 Suppl 3: C24-C32

- 3 vs 4 screws: No benefit of 4

Yang JJ, Lin LC, Chao KH, Chuang SY, Wu CC, Yeh TT, Lian YT. J Bone Joint Surg Am 2013; 95: 61-69

- Inverted triangle configuration



#### Surgical treatment

### **B1** subcapital

B1.1 valgus impaction (Garden I) B1.2 minimal valgus impaction (Garden I/II) B1.3 non displaced (Garden II)

### Do not reduce, in situ fixation w parallel screws





LIH®

Surgical treatment



#### 37 yrs male, downhill bicycle, 3 mo postop



Multple screws 7,3mm cannulated screws



### Surgical treatment

### **B3 Subcapital, displaced**

CRIF or ORIF Screws or SHS (acc to Pauwels classification)



## Take home messages

Femoral neck fracture in younger patients:

- Emergency/urgency
- Anatomical reduction
  - Non forgiving
- Fracture pattern dictates implant

-Complications difficult to treat

- Shortening, varus, non union, osteonecrosis



# Breaking news

When you do not know what you are doing, or if you do not know if what you are doing is the right thing or not,

You can always introduce a new implant



### Screws + medial buttress



Mir H, Collinge C. Application of a medial buttress plate may prevent many treatment failures seen after fixation of vertical femoral neck fractures in young adults. *Med Hypotheses*. 2015; 84 (5):429–433



### New implants

### Targon FN; Braun Melsungen AG, Melsungen

Angular stable, controlled collapse



Non displaced. 112 pts: 3 (2.7%) non-union/redisloc. 5 (4.5%) AVN 5 (4.5%) konvertering till THA 6 (5.4%) extraction.

Displaced 208 pts 32 (15.4%) non-union/redisloc 23 (11.1%) AVN 43 (20.7%) konv to THA 7 (3.3%) extraction

Parker M et al.: Internal fixation of intracapsular fractures of the hip using a dynamic locking plate: two-year follow-up of 320 patients. *Bone Joint J*. 2013; 95-B:1402–1405

### **Dynaloc/Pinloc**





