Femoral Neck Fractures in patients Over 50 (Fix or Replace)

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Disclosures

• Synthes
  • consultant
• Imagen
  • consultant, stock
• Orthodevelopment
  • consultant, IP

***All figures in the talk belong to David Wellman, MD unless otherwise indicated***
A quick case to begin:

• 56 year old healthy surgeon
  • Struck by car while cycling
    • Fix or Replace?
    • Approaches planned?
    • Fixation Method?
Objectives

• Scope of the problem
• Relevant Anatomy
• Indications part 1
  • Elderly “Nondisplaced Fractures”
• Indications part 2
  • Elderly “Displaced Fractures”
• Indications part 3
  • The gray zone between youth and “elderly”
• Fixation Constructs
• Outcomes
Scope of the Problem

• Femoral Neck Fractures per Year
  • 1.66 million 1990 up to 6.26 million by 2050

• Mortality Risk
  • 14-58% within 1 year of injury

Source: Bzovsky S. Factors Associated With Mortality After Surgical Management of Femoral Neck Fractures. J Orthop Trauma Volume 34, Number 11 Supplement, November 2020
Factors Associated With Mortality After Surgical Management of Femoral Neck Fractures

Sofia Bzovsky, MSc, a Marianne Comeau-Gauthier, MD, MSc, a Emil H. Schemitsch, MD, FRCSC, b Marc Swiontkowski, MD, c Diane Heels-Ansdell, MSc, d Frede Frihagen, MD, PhD, e Mohit Bhandari, MD, PhD, FRCSC, a,d and Sheila Sprague, PhD a,d on behalf of the FAITH and HEALTH Investigators

• Older age
• Low BMI
• High ASA score
• Use of ambulatory aid
• Kidney disease

• Source: Bzovsky S. Factors Associated With Mortality After Surgical Management of Femoral Neck Fractures. J Orthop Trauma. Volume 34, Number 11 Supplement, November 2020
On the issue of timing

• Timing appears to matter

• Delay for Anticoagulants?
  • Antiplatelets: not associated with increased risk

  • Warfarin: INR above 1.5 (up to 3) appear to have similar bleeding complication to INR < 1.5


Relevant Anatomy

Relevant Anatomy

• Intraosseous
• Foveolar
• Retinacular
  • MFCA – 82% head, 67% neck
  • LFCA – 48% of the anterioinferior neck

Anatomy of the MFCA

- Transverse
- Ascending
- Deep

Indications Part 1 – Nondisplaced Fractures

• Garden 1

• Garden 2
Classic teaching...

• 3 partially threaded cannulated screws

• Immediate weight bearing
A case...

• 80 year old ambulatory female, uses a cane for long distance ambulation
  • Mild dementia
  • No other significant medical history
CT Ordered to evaluate displacement at the calcar and posterior roll-off of the head.
Note the Differences in these Similar Constructs:

1) Thread length - yellow arrow
2) Cranial placement of screws - red arrow
3) Washer use - blue arrow
Nondisplaced fracture hot topics:

• Failure Potential:
  • 1) Collapse in the plane of the screws with excessive SHORTENING
  • 2) Cutout with NONUNION
Garden 1 and 2 Femoral Neck Fractures Collapse More Than Expected After Closed Reduction and Percutaneous Pinning

Patrick K. Cronin, MD,* David M. Freccero, MD,* Michael S. Kain, MD,*
Andrew J. Marcantonio, DO, MBA,† Daniel S. Horwitz, MD,† and Paul Tornetta III, MD*
Nondisplaced fracture hot topic: Posterior roll off

• Sources:
Is posterior roll off an issue?

- Apex anterior angulation through the neck

- (Little) Controversy
  - Palm: >20 degrees associated with reoperation
  - FAITH: >20 associated with conversion to arthroplasty
  - Lapidus: no association

- Sources:
FAITH Trial key findings – Things that Matter

• Displacement
• Female Sex
• BMI
• Fixation with a Sliding Hip Screw
  • smokers, base of neck fx, displaced fx
• 3 screw construct choices
  • Inverted triangle optimal

FAITH Trial – Things that do not seem to matter

• Screw Cohort
  • Long vs Short Threads
    • Long threads may be protective
  • Washers
    • Złowodzki’s evidence differs
• Screw Diameter
• Parallel vs Not Parallel

• Sliding Hip Screw Cohort
  • Screw Position (tip apex distance)
  • Number of holes in sideplate
  • Supplemental screws

Nondisplaced fracture hot topics:

• Optimum Construct?
What have we learned?

• Garden 1 and 2 based on AP radiographs
  • Scrutinize the calcar
  • Scrutinize the lateral x-ray

Not every “Nondisplaced” Garden 1/2 fracture should be fixed!!!
Nondisplaced fracture hot topics:
• Is Arthroplasty Superior?
• No difference in Mortality

• Outcome scores overall similar

• Internal Fixation: 13% reoperation rate

• Hemiarthroplasty: 5.8% reoperation rate (70% reduction)

Indications Part II - Elderly Displaced Fractures
Indications Part II - Elderly Displaced Fractures

• Another case...
  • 79 year old male
    • Mild dementia
    • COPD, Current Smoker
    • Low energy fall
• Cemented Bipolar Hemi
• Hardinge Approach
• WBAT
• No posterior hip precautions
### Rates of Revision Surgery in Eight Randomized Trials

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The revision rates for hemiarthroplasty and THR in the trial of Rogmark et al. are not included in the table.
Arthroplasty Hot Topics

• Hemi versus Total Hip
• Bipolar versus Monopolar
• Cemented versus Uncemented
• Choice of Approach
HEALTH investigators:
Total Hip versus Hemiarthroplasty

• No significant difference in secondary procedures

• No significant differences in serious adverse events
  • THA dislocated twice as often as hemiarthroplasty

• No clinically significant differences in outcome scores
  • THA trended better (clinically insignificant)

The HEALTH Investigators. Total Hip Arthroplasty or Hemiarthroplasty for Hip Fracture. n engl j med 381;23 nejm.org December 5, 2019.
Journal of Arthroplasty 2019 - Meta-Analysis

• 1364 patients
• THA superior in terms of:
  • Reoperation
  • Harris Hip Score
  • Quality of Life

• Hemiarthroplasty recommended for:
  • Live expectancy of less than 4 years
  • Age > 80

Arthroplasty Hot Topics:
• Cemented vs Uncemented
Cemented = Less complications

• Less fractures and dislocations

• No difference in functional scores or thigh pain

Bone Cement Implantation Syndrome

• Occurs with ANY surgery on breaching the femoral medullary space
  • Exaggerated in frail patients receiving cement

• GRADE 1
  • 20% - saturation falls below 94%, 20% drop in systolic Blood Pressure

• GRADE 2
  • 3% - saturation falls below 88%, 40% drop in systolic BP

• GRADE 3
  • <1% - Resuscitation required

Bipolar vs Unipolar

• Unipolar advantages: Cost

• Bipolar Advantages:
  • hip function
  • range of motion
  • reoperation rate
  • Improved rates of acetabular erosion

Approach Technique

• Direct Lateral
  • Less dislocations
  • More abductor weakness
  • Advantage in movement disorders and severely demented

• Posterolateral
  • Increased risk of posterior dislocation
  • Better QOL scores

Future Directions: Direct Anterior Approach

• Reduction in Dislocation Risk
• Less Damage to Abductors

• Anterior Approach
  • Courtesy: OTA Video Library
Putting it all together – current trends

• When performing hemiarthroplasty:
  • Cemented
  • Bipolar
  • Consider “Alternate Approaches”

• Consider Total Hip for younger/active patients
Indications part 3

• Physiologically young, active patients over 50 with a displaced femoral neck fracture
Back to the first case of the talk...
56 year old healthy surgeon
• Struck by car while cycling
• Fix or Replace?
How to indicate:

1) What are the demand levels of the patient?

2) What is the fracture pattern?
   • Subcapital, transcervical, basicervical
   • Pauwels Angle
   • Comminution and bone quality
Predicting failures

• Neutral up to 15 deg valgus acceptable, 0-15 deg anteversion acceptable

• No varus

• No retroversion

• No inferior offset
Preferable Implants

• Pauwels 3, Basicervical, High degree comminution

  • Sliding hip screw +/- antirotation screw

Outcomes

In the setting of good to excellent reduction
- Osteonecrosis rate 21%
- Nonunion rate 4%
- 10 year rate of survival 85%


Evaluate the Xray and CT scan closely
56 year old male, fall mountain biking
79 year old male, low energy fall
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No Algorithm for the “gray area” patient
What happened to our 56 year old surgeon?
Another case...
61 year old with hyperthyroidism, slip and fall
Quality of Reduction: ORIF when in doubt

- Smith Petersen vs Watson Jones
- Smith Petersen = benefit of exposure of subcapital neck
Summary

• Indications part 1
  • Elderly “Nondisplaced Fractures” – Careful scrutiny of films, fixation when appropriate

• Indications part 2
  • Elderly “Displaced Fractures” – Arthroplasty offers superior outcomes. Be critical of the literature when deciding approach and implant type

• Indications part 3
  • The gray zone between youth and “elderly” – Risk of re-operation must be outweighed by the benefits of avoiding arthroplasty in an active patient
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