Geriatric Femoral Neck Fractures
ORIF vs. Hemi vs. THA

Jonathan Eastman, MD
Department of Orthopaedic Surgery
University of California, Davis
Disclosures

- I have no conflicts of interest
Overview

- Epidemiology
- Classification
- Role for ORIF
- Role for Arthroplasty
- Surgical Approaches
Introduction

• Currently 352,000 hip fractures per year in the United States

• This number is expected to increase to 650,000 annually by 2050

• Over 8 million per year worldwide by 2020

Introduction

• The cost of hip fracture averages $26,912 per patient

• This is nearly $10 billion per year currently

• Expected to cost $18 billion by 2025

Overview

- Epidemiology
- **Classification**
- Role for ORIF
- Role for Arthroplasty
- Surgical Approaches
Garden Classification

I: Valgus impacted or incomplete

II: Complete fracture Non-displaced
Garden Classification

III: Complete fracture
    Partial displacement

IV: Complete fracture
    Full displacement
Overview

• Epidemiology
• Classification
• **Role for ORIF**
• Role for Arthroplasty
• Surgical Approaches
What About Garden I/II?

ORIF  Arthroplasty
Internal Fixation Indicated

- All patients who can tolerate surgery
- $\geq 94\%$ union rate
- 4% AVN
- Can WBAT
- No prolonged recumbency
- Decreased mortality
- Difference with degree of impaction?

Conn CORR 2004
Hansen Acta Orthop Scand 1994
Song JOT 2013
Internal Fixation Not Indicated

- Surgery for high risk patients?
- Nonambulatory with minimal discomfort?
- Increased nonunion: 14 - 60%
- 90% mortality
  - PNA
  - DVT/PE
  - Decubitus ulcer
  - UTI

Zuckerman AAOS 2008
Parker JBJS Br 1992
Internal Fixation

- Indicated for majority of elderly Garden I/II

Haidukeywch JBJS Br 2012
Rodriguez CORR 2002
What About Garden III/IV?
What About Garden III/IV?

ORIF

Arthroplasty
Internal Fixation

- Who and how?
Spectrum of Elderly

- Physiological **NOT** chronological age!

Wide Range
Reduction Matters

• Avoid varus and apex anterior angulation

Lindquist JOT 1995
Schemitsch J Trauma 2010
Lian JBJS 2013
Internal Fixation

• Screw location matters!

89% Union Rate
100% Failure Rate

Lindquist JOT 1995
Schemitsch J Trauma 2010
Lian JBJS 2013
Internal Fixation vs. Arthroplasty

Fixation Failure Rate:
• Up to 43% with internal fixation

Reoperation Rate:
• 35% Internal Fixation
• 9% Arthroplasty

Complications for Conversion Arthroplasty:
• Superficial infection: 2x increased
• Deep infection: 4x increased
• Early dislocation: 2.3x increased

Cost:
• Arthroplasty: $4300 – $5300 less per patient

Keating JOT 2009
Bhandari JBJS 2003
McKinley JBJS 2002
Summary Role of ORIF

Cautiously consider operative fixation:

- In patient ≈60 years of age
- Physiologically and cognitively young
- Permissive bone quality
- Fracture pattern amenable to fixation
- No prior hip pathology

Arthroplasty recommended:

- Lower revision rates
- Increased complication in salvage vs. primary
- Decreased cost
- Improved function
Overview

- Epidemiology
- Classification
- Role for ORIF
- **Role for Arthroplasty**
- Surgical Approaches
What About Garden III/IV?

ORIF

Arthroplasty
What About Garden III/IV?
What About Garden III/IV?

ORIF

THA

HA

Bipolar

Unipolar

THA
Role of Hemiarthroplasty

- Long history of successful use
- Commonly used for displaced fractures
  - 61% of all femoral neck fractures in US
- Increased risk of native cartilage erosion
  - < 70 years = 26%
  - > 80 years = 1.5%
- 37% need conversion at 2 years

Hedbeck JOT 2013
Kim J Arthroplasty 2013
Macaulkay JAAOS 2006
Soderqvist JBJS Am 2006
Role of Bipolar Hemiarthroplasty

Potential Benefits:

• Decreased motion at articular surface
• Decreased erosion
• Decreased dislocation

Data shows:

• Still 80% motion at articular surface
• No decreased articular erosion
• No decreased dislocation
• Avg ≈ $500 increased cost

Calder JBJS Br 1996
Raia CORR 2006
Parker Cochrane 2004
Miyamoto JAAOS 2008
Role of Total Hip Arthroplasty

Several PRCT of THA vs HA

• Function:
  - Higher HHS for THA
  - Less pain
  - Higher QOL

• Mortality:
  - 13% vs 15%

• Cost:
  - THA with $927 – $1,373 decrease per patient at 2 years

• Dislocation rate:
  - 9% vs 3%

Chammout JBJS Am 2012
Haidukewych JBJS Br 2012
Burgers Int Orthop 2012
Schmidt JOT 2009
Summary for Role of Arthroplasty

Unipolar Hemiarthroplasty Indicated:
  • Medically infirm
  • Decreased cognitive function
  • Diminished physical activity

Total Hip Arthroplasty Recommended:
  • Age > 65 years
  • Normal cognitive function
  • Independent ambulator
  • Improved functional outcomes
  • No difference in mortality
  • Cost effective
  • Higher dislocation rate

Chammout JBJS Am 2012
Overview

• Epidemiology
• Classification
• Role for ORIF
• Role for Arthroplasty
• Surgical Approaches
Role of Surgical Approach

- Classically posterolateral vs anterolateral
- Multiple factors investigated
  - Infection
  - Operative time
  - Blood loss
  - Functional outcomes
- Dislocation
  - Component Position
Role of Surgical Approach

Keene and Parker, Injury 1993
  • Anterolateral – 1.7%
  • Posterolateral – 4.3%

Varley and Parker, Int Orthop 2004
  • Anterolateral – 2.4%
  • Posterolateral – 5.1%

Sierra RJ et al, CORR 2006
  • No difference in dislocation rate
Role of Surgical Approach

Enocson A et al, Acta Orthopaedica 2008

- Posterolateral – 13%
- Posterolateral with repair – 8.5%
- Anterolateral – 3.0%

Skoldenberg O et al, Acta Orthopaedica 2010

- Switched from posterolateral to anterolateral
- Dislocation decreased from 8% to 2%
Direct Anterior Approach

Pros

• Supine
• Anterior incision
  - Decreased wound complications
• Intermuscular interval
  - All hip musculature attached
• Posterior capsule intact
• No posterior hip precautions
• Intraoperative fluoro
  - Cup position
  - Leg-length & offset

Modified Smith-Petersen/Heuter

Molnar & Routt, JOT 2007
Matta-anterior THA publications
Direct Anterior Approach

**Cons**

- Need for special table
- Steep learning curve
- Complications
  - Greater trochanter fracture
  - Increased in osteoporotic bone
- Prolonged surgery
  - 2 – 3 hour procedure
Direct Anterior Approach

- 56 patients
- All ≥ 65 years
- Displaced femoral neck fractures
- 33 THA, 23 Bipolar HA
- 0 infections
- 0 dislocations
- Average leg-length difference:
  - THA – 1.1 mm
  - HA – 1.4 mm

Kregor et al. OTA 2008
Summary

• Elderly femoral neck fractures common
• Incidence is increasing
• Physiological age is important
• Internal fixation for majority Garden I/II
• Cautious role for ORIF of Garden III/IV
  • Physiologically and cognitively young
  • Fracture pattern amenable to fixation
  • No prior hip pathology
Summary

• Unipolar hemiarthroplasty for cognitively impaired and limited physical demand

• Total hip arthroplasty indicated:
  - Age > 65 years
  - Normal cognitive function
  - Independent ambulator

• Anterolateral approach with decreased dislocation rate compared to posterolateral

• Direct anterior approach shows promise

• More experience and research needed
THANK YOU