FEMORAL NECK FRACTURES: ORIF OR ARTHROPLASTY?

GEORGE HAIDUKIEWYCH, MD
ORLANDO, FLORIDA

DISCLOSURE

- ROYALTIES DEPUY, BIOMET
- CONSULTING DEPUY, SYNTHESES, BIOMET, RESPONSIVE ORTHOPEDICS
- STOCK OWNERSHIP ORTHOPEDIATRICS

FNFX ORIF OR ARTHROPLASTY?

- NUMBERS INCREASING
- LIFE CHANGING INJURIES
- CONTROVERSIAL
- COST TO SOCIETY
FEMORAL NECK FRACTURES

- OUTCOME RELATED TO:
  - FRACTURE DISPLACEMENT
  - AGE
  - QUALITY OF REDUCTION
  - FRACTURE PATTERN
  - ?? TIMING

FNFX ORIF OR ARTHROPLASTY?

- NON-DISPLACED FRACTURES ARE TREATED THE SAME REGARDLESS OF PATIENT AGE
  - ORIF
  - SCREWS

FNFX ORIF OR ARTHROPLASTY?

- CAREFUL ATTENTION TO SCREW PLACEMENT IS IMPORTANT
  - PERIPHERAL CALCUT SUPPORT ABOVE LESSER TROCHANTER
FNFX ORIF OR ARTHROPLASTY?

- DISPLACED FRACTURES REMAIN CONTROVERSIAL
- PHYSIOLOGIC AGE
- COGNITION??
- STATUS OF THE HIP JOINT
- MEDICAL PROBLEMS

CALLAGHAN ET AL JBJSr 2012

IN GENERAL, UNDER AGE 60, I PREFER ORIF

THE BEST FEMORAL HEAD IS YOUR OWN

ANATOMIC REDUCTION IS VERY IMPORTANT

FNFX ORIF OR ARTHROPLASTY?

FNFX ORIF OR ARTHROPLASTY?

ORIF YOUNG FEMORAL NECKS

- URGENT TREATMENT
- TRY CLOSED REDUCTION, IF NOT PERFECT, OPEN IT
- FIX BASED ON FRACTURE VERTICALITY
ORIF YOUNG FEMORAL NECKS

- URGENT
- ANATOMIC
- SHEAR ANGLE
- CAPSULOTOMY

- 85% WILL KEEP THEIR HIPS 10 YEARS, EVEN THOUGH ABOUT 25% WILL GET AVN

HAIDUKIEWICZ ET AL JBJS Am 2004
DISPLACED FEMORAL NECK FRACTURES IN THE ELDERLY

FEMORAL NECK FRACTURE Prosthetic Replacement
- Unipolar?
- Bipolar?
- THA?
- Cement?
- Press fit?

DISPLACED FNFX IN THE ELDERLY
- THE FAILURE RATE OF ORIF IN THIS SETTING REMAINS AT ABOUT 40%.
- UNCHANGED FOR THE LAST SEVENTY YEARS.

FEMORAL NECK FX FAILURES

- CEMENTED HEMIARTHROPLASTY FOR DISPLACED FRACTURES IN OLDER PATIENTS HAS 10 YEAR SURVIVORSHIP FREE OF REVISION OF 94%

Haidukewych et al CORR 2002
FEMORAL NECK FX FAILURES

- OLDER PATIENT– RIGHT OPERATION??
- ORIF DISPLACED FEMORAL NECK FX
- REOPERATION RATES CONSISTENTLY AT AROUND 40% OVER THE LAST SEVEN DECADES

Bhandari et al JBJS 2004

FEMORAL NECK FX FAILURES

- SUMMARY:
- THE REOPERATION RATE FOR ORIF OF DISPLACED FEMORAL NECK FRACTURES IN ELDERLY PATIENTS IS

10 TIMES HIGHER !!!
- THAN FOR ARTHROPLASTY
DISPLACED FNFX ELDERLY

- Arthroplasty offers
- Lower reoperation rate
- Better function
- Lower cost
- Same mortality
- Same medical risk

BIPOLAR vs. UNIPOLAR

- No difference at mid term follow up
- Bipolar with longer F-U
- Acetabular erosion
- Poly wear
- Cost

Bipolar 10 Year Survivorship 94%
WHAT ABOUT THA??

- HOT TOPIC
- BETTER FUNCTION THAN BIPOLAR
- NO INCREASE IN COMPLICATIONS OR MORTALITY
- DISLOCATION IS AN ISSUE (OLD LITERATURE?)

DATA THA BETTER:

- KEATING ET AL JBJS 2006
- BLOMFELDT ET AL JBJSBr 2007
- SKODENBURG ET AL JBJS Br 2011
- HEDBECK ET AL JBJSBr 2011
- GJERTSEN ET AL ACTA ORTHOP 2007
- HEETVELD ET AL JOT 2009

ORIF vs arthroplasty for displaced femoral neck fractures

- ORIF - reduced operative time, operative blood loss, need for transfusion, and risk of deep wound infection
- Arthroplasty - lower revision rate
- No differences found in hospital LOS, mortality, residual pain, or regaining mobility

Cochrane review 2002
**ORIF vs Hemi vs THR**

- **RCT 278 patients ≥ 65 years old**
- **SHS vs uncemented AM vs cemented semiconstrained THR**
- One year mortality similar for 3 groups
- Revision rate: ORIF 33%, hemi 13%, THR 4%
- Dislocation rate: hemi 11% and THR 12.5%
- THR had least pain and best mobility in short and long term f/u
- Hemiarthroplasty had worst functional results
  
  *Skinner et al, Injury 1989*

**ORIF vs Hemi vs THR**

- **RCT 290 patients > 65 years old**
- **SHS vs uncemented AM vs cemented THR**
- Mortality rate similar for 3 groups
- Revision rate: ORIF 33%, hemi 24%, THR 6.8%
- Dislocation rate: hemi 13% and THR 20%
- Harris hip scores: ORIF 62, hemi 55, THR 80
- THR had least pain and best mobility in short and long term f/u

  *Ravikumar and Marsh, Injury 2000*

**ORIF vs Bipolar vs THR**

- Prospective randomized multicenter
- Displaced FN fx, pts > 60 years
- 298 pts- ORIF (118); cemented bipolar (111); cemented THR (69)
- ORIF fixation failure (AVN,NU) - 37%
- ORIF – 8x more likely to require revision surgery than bipolar and 5x than THR
- Functional outcome highest for THR

  *Keating et al, JBJS 2006*
Current consensus THR

- Bigger procedure, peri-op complications
- Improved function
  - Over all hemiarthroplasties
    - Baker, JBJS(A) '06
    - Gebhard, Amstutz, ClinOrthop '92
  - Even after successful ORIF
    - Tidermark, Törnkvist, JBJS(B) '03
- Excellent survivorship: 94% at 10 yrs
  - Lee, Berry JBJS(A) '98
- Cost effective
  - Iorio, Healy, Clin Orthop '01

Cost effectiveness* at 2 years

- Repair (Screws) $24,600
- Bipolar $22,000
- Unipolar $21,600
- Cemented THR $20,700

*Hospital + rehab + (revision surgery probability x cost)

Iorio, Healy, Clin Orthop '01

Internal Fixation Compared with Arthroplasty for Displaced Fractures of the Femoral Neck: A Meta-Analysis

- 140 studies examined (14 randomized trials)
- After ORIF
  - 9.7% AVN 20% AVN
  - 18.5% nonunion 30% Nonunion
- Reoperation
  - 10-48% after ORIF 20-36%
  - 0-24% after hemiarthroplasty
- Death w/in 1 year
  - 20% after ORIF 30%
  - 23% after arthroplasty

Intracapsular Hip Fractures: Results of Management Adopting a Treatment Protocol

- 166 patients
- Managed by “physiologic score” to choose between ORIF and arthroplasty in displaced fracture, elderly age group (65-85 yrs).

"Physiologic Score"

- Mobility (5 points)
- Accommodation (5 pts)
- Osteoporosis (Singh Index, 6 points)
- Cognition (10 questions, 5 points)
- Medical (5 points)

Management Protocol

<65 or non-displaced → ORIF

65-85
Physiologic Score > 20
< 20

> 85 → Prosthesis
Results

- ORIF done in 42% of patients aged 65-85.
- 2-yr mortality 14%
- AVN 5%
- Nonunion 2%
- Dislocation 3%
- Reoperation 5%

CM Robinson et al., CORR 302, 1994

Internal fixation versus hemiarthroplasty versus total hip arthroplasty for displaced subcapital fractures of the femur – 13 year results of a prospective randomized study

- 271 elderly patients randomized into 3 groups:
  - Internal fixation
  - Hemiarthroplasty
  - Cemented total hip arthroplasty

Ravikumar and Marsh, Injury 31: 793, 2000

Long-term (13 year) Results

- ORIF
  - 33% revised (25% in 1st year)
- Hemiarthroplasty
  - 25% revised
  - Dislocation rate 13%
- THA
  - Overall survival 93%
  - Dislocation rate 20%, only 6% recurrent

Ravikumar and Marsh, Injury 31: 793, 2000
Long-term (13 year) Results

- ORIF and hemiarthroplasty patients deteriorated over time.
- Mortality remained equal over time.
- THA group: least pain and best function.

Ravikumar and Marsh, Injury 31: 793, 2000

Changing trends in the RX of FN fxs: a review of the ABOS database

- 19,541 FN fxs Rx'd by 4450 ABOS candidates, 1999-2011
- Use of THA increased (0.7% in 1999, 7.7% in 2011, p < 0.001)
- Proportion of pts < age 65 managed with THA increased from 1.4% to 13.1% (p < 0.001)
- Candidates with subspecialty of "adult recon" had increasing use of THA (4.3% from 1999 to 2002, 21.1% from 2009 to 2011, p < 0.001) while "trauma" subspecialty candidates had decreasing use of ORIF (40.9% from 1999 to 2002, 32.9% from 2009 to 2011, p = 0.012)

Miller et al JBJS 2014

CEMENTED OR UNCEMENTED?

- GOOD RESULTS WITH BOTH TECHNIQUES, SLIGHT TREND FAVORING CEMENTED STEMS

- DEANGELIS ET AL JOT 2012
- JAMESON ET AL JBJSbr 2012
- STAFFORD ET AL ANN R COLL SURG 2012
- TAYLOR ET AL JBJS Am 2012
DISLOCATION THA FOR FNFX

- WHY?
- NOT STIFF
- GET MOTION EARLY
- FALLS
- COMPLIANCE
- DEMENTIA?

ROLE OF DUAL MOBILITY?

- REASONABLE CHOICE TO MINIMIZE RISK OF DISLOCATION
- ADAM ET AL ORTHOP TRAUM SURG 2012
- TARASEVICIUS ET AL BMC 2010
THA FOR FNFX
66 FEMALE

WHAT ABOUT THA??

STEM FIXATION STRATEGY ON BONE QUALITY

BIGGEST HEAD YOU CAN.... ROLE OF DUAL MOBILITY?

CONSIDER SURGICAL APPROACHES THAT MINIMIZE DISLOCATION RISK

PATIENT EDUCATION
SUMMARY

- THE GOAL IS TO PROVIDE GOOD FUNCTION
- WHILE MINIMIZING COMPLICATIONS AND REOPERATIONS
- A SIMPLE ALGORITHM CAN BE HELPFUL

MY ALGORITHM

- NON-DISPLACED FRACTURES, ANY AGE
  - ORIF WITH THREE SCREWS
  - SPREAD OUT, CALCAR SUPPORT
  - START ABOVE LESSER TROCHANTER

MY ALGORITHM

- DISPLACED FRACTURES UNDER AGE 60
  - URGENT ORIF
  - FIXATION DEVICE BASED ON VERTICALITY (BEWARE HIGH SHEAR ANGLES!)
  - ANATOMIC REDUCTION
  - CAPSULOTOMY?
**MY ALGORITHM**

- **DISPLACED FRACTURES AGE 60-80**
  - TOTAL HIP ARTHROPLASTY
  - ANTEROLATERAL APPROACH
  - MODULAR CUP WITH SCREWS
  - BIGGEST HEAD POSSIBLE—DUAL MOBILITY?
  - STEM FIXATION BASED ON BONE QUALITY

**MY ALGORITHM**

- **DISPLACED FRACTURE OVER AGE 80**
  - CEMENTED HEMIARTHROPLASTY
  - ANTEROLATERAL APPROACH
  - CLEAN AND DRY CANAL WELL
  - ANTIBIOTICS IN CEMENT?

**THANK YOU**