Traumaplasty Debates: Hip Fixation as Primary Option!

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I (and/or my co-authors) have something to disclose.

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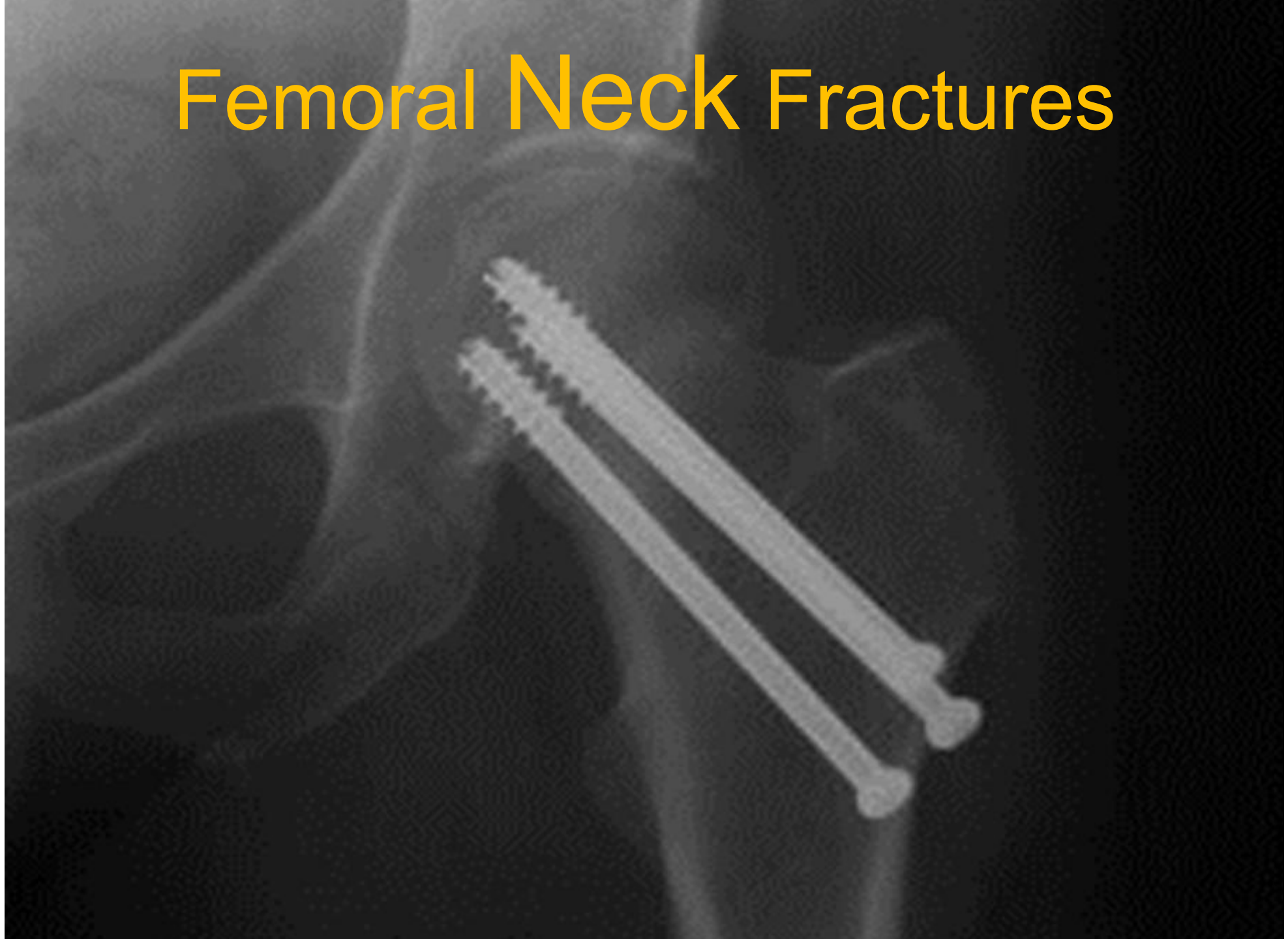
Femoral Neck Fractures



Key Questions

- Is there a difference between IF and arthroplasty
- What is the best IF method?
- What is the best Arthroplasty method?
- Are there exceptions?

20 years ago

JBJS Paper

A Meta-Analysis that Sparked FAITH and HEALTH

Internal Fixation Compared with Arthroplasty for Displaced Fractures of the Femoral Neck

A Meta-Analysis

By Mohit Bhandari, MD, MSc, P.J. Devereaux, MD, Marc F. Swiontkowski, MD, Paul Tornetta III, MD, William Obremskey, MD, MPH, Kenneth J. Koval, MD, Sean Nork, MD, Sheila Sprague, BSc, Emil H. Schemitsch, MD, and Gordon H. Guyatt, MD, MSc

Investigation performed at McMaster University, Hamilton, Ontario, Canada

Background: The optimal choice for the stabilization of displaced femoral neck fractures remains controversial, with alternatives including arthroplasty and internal fixation. Our objective was to determine the effect of arthroplasty (hemiarthroplasty, bipolar arthroplasty, and total hip arthroplasty), compared with that of internal fixation, on rates of mortality, revision, pain, function, operating time, and wound infection in patients with a displaced femoral neck fracture.

Methods: We searched computerized databases for randomized clinical trials published between 1969 and 2002, and we identified additional studies through hand searches of major orthopaedic journals, bibliographies of major orthopaedic textbooks, and personal files. Of 140 citations initially identified, fourteen met all eligibility criteria. Three investigators independently graded study quality and abstracted relevant data, including information on revision and mortality rates.

Results: Nine trials, which included a total of 1162 patients, provided detailed information on mortality rates over the first four postoperative months, which ranged from 0% to 20%. We found a trend toward an increase in the relative risk of death in the first four months after arthroplasty compared with the risk in the first four months after internal fixation (relative risk, 1.27). At one year, the relative risk of death was 1.04. The risk of death after arthroplasty appeared to be higher than that after fixation with a compression screw and side-plate but not higher than that after internal fixation with use of screws only (relative risk = 1.75 and 0.86, respectively; $p < 0.05$). Fourteen trials that included a total of 1901 patients provided data on revision surgery. The relative risk of revision surgery after arthroplasty compared with the risk after internal fixation was 0.23 ($p = 0.0003$). Pain relief and the attainment of overall good function were similar in patients treated with arthroplasty and those treated with internal fixation (relative risk, 1.12 for pain relief and 0.99 for function). Infection rates ranged from 0% to 18%, and arthroplasty significantly increased the risk of infection (relative risk, 1.81; $p = 0.009$). In addition, patients who underwent arthroplasty had greater blood loss and longer operative times than those who were treated with internal fixation.

Conclusions: In comparison with internal fixation, arthroplasty for the treatment of a displaced femoral neck fracture significantly reduces the risk of revision surgery, at the cost of greater infection rates, blood loss, and operative time and possibly an increase in early mortality rates. Only larger trials will resolve the critical question of the impact on early mortality.

Level of Evidence: Therapeutic study, Level I-2 (systematic review of Level-I randomized controlled trials [studies were homogeneous]). See Instructions to Authors for a complete description of levels of evidence.

More than 220,000 fractures of the hip occur each year in North America, leading to an annual nine-billion-dollar cost to the health care system[1]. The optimal surgical treatment of displaced femoral neck fractures remains controversial[2,3]. Alternatives include prosthetic replacement (arthroplasty) and internal fixation. Arthroplasty options include hemiarthroplasty, bipolar arthroplasty, and total hip arthroplasty. Proponents of prosthetic replacement argue that replacement of the femoral head eliminates the necessity for revision surgery due to avascular necrosis and nonunion, both of which are serious problems following internal fixation[3]. Surgeons who

A commentary is available with the electronic versions of this article, on our web site (www.jbjs.org) and on our quarterly CD-ROM (call our subscription department, at 781-449-9780, to order the CD-ROM).

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- Higher re-operation rates and treatment failure in the internal fixation cohort
- More infections, more blood loss, longer OR time with arthroplasty

FAITH Trial: Large RCT of Femoral Neck Fractures

Sliding Hip Screws
Multiple Cancellous Screws

Primary Endpoint (All patients)

Hip re-operation within 24 months:

Sliding hip screw group:
107 of 542 patients (19.7%)

Cancellous screws group:
117 of 537 patients (21.8%)

HR 0.83, 95% CI: 0.63-1.09; p=0.18
No difference

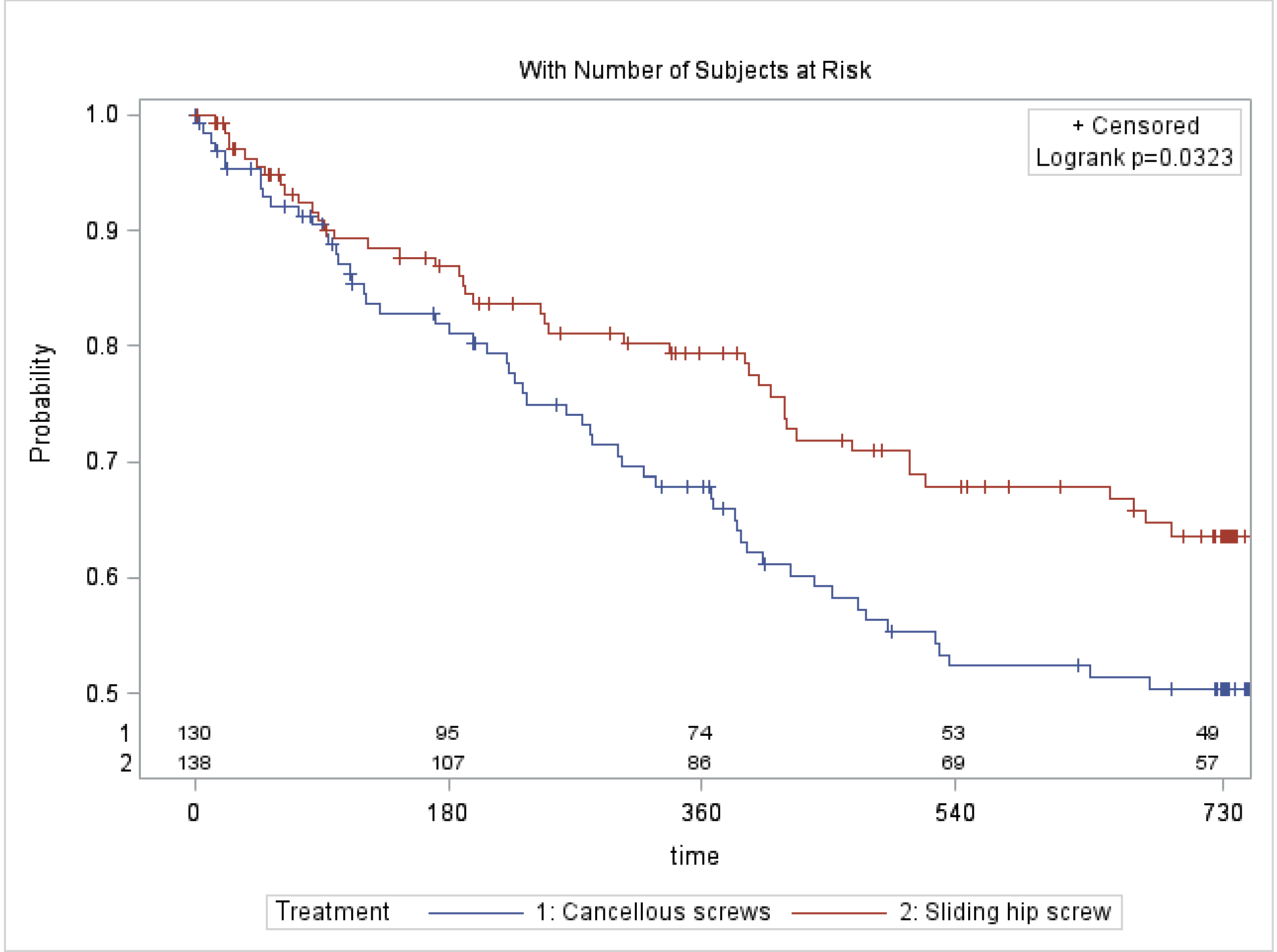
Subgroup Analysis

Sliding hip screws significantly reduced re-operations among

- Displaced (43% risk reduction, p=0.04)
- Basicervical (76% risk reduction, p=0.04)
- Smokers (61% risk reduction, p=0.02)

No suggestion of other subgroup effects

FAITH
Fixation Using Alternative Implants for the Treatment of Hip Fractures


With Number of Subjects at Risk
+ Censored
Logrank p=0.0323
Probability
1.0
0.9
0.8
0.7
0.6
0.5
1 130 95 74 53 49
2 138 107 86 69 57
0
180
360
540
730
time
Treatment
1: Cancellous screws
2: Sliding hip screw

Hip Fracture Evaluation with ALternatives of Total Hip Arthroplasty Versus Hemi-Arthroplasty (H.E.A.L.T.H)

HEALTH Investigators

NEJM 2019

Primary Endpoint

Secondary hip procedures within 24 months:

THA group:
57 of 718 patients (7.9%)

HA group:
60 of 723 patients (8.3%)

HR 0.95, 95% CI: 0.64-1.40; p=0.79

No difference

Functional Outcomes and Quality of Life

Patients in the THA group had superior function as measured by the WOMAC but differences were below MCID: 9 points

Endpoint, n (%)	Total N=1,441	Mean Difference at 24 Months (99% CI)
WOMAC Total	943 (65.4)	-6.37 (-9.18, -3.56)
WOMAC Pain	990 (68.7)	-0.93 (-1.42, -0.44)
WOMAC Stiffness	987 (68.5)	-0.44 (-0.65, -0.23)
WOMAC Function	947 (65.7)	-4.97 (-7.11, -2.83)
EQ-5D Utility	1,141 (79.2)	0.04 (-0.03, 0.11)
EQ-5D VAS	1,111 (77.1)	0.72 (-2.02, 3.46)
SF-12 PCS	1,006 (69.8)	1.41 (-0.33, 3.14)
SF-12 MCS	1,006 (69.8)	1.34 (-0.38, 3.05)
Endpoint, n (%)	**Total N=1,441**	**Odds Ratio (99% CI)**
TUG	1,268 (88.0)	0.72 (0.38, 1.36)

The problem

- No pivotal trial comparing internal fixation and arthroplasty

The Problem with IF…

- **High revision rates**
  - 30-40% displaced, 20% undisplaced
- **Femoral neck shortening**
  - 30% shortening rates
  - Affects patient function negatively (SF-36)
- **High rate of technical errors**

So why not arthroplasty?

Traditional thinking:

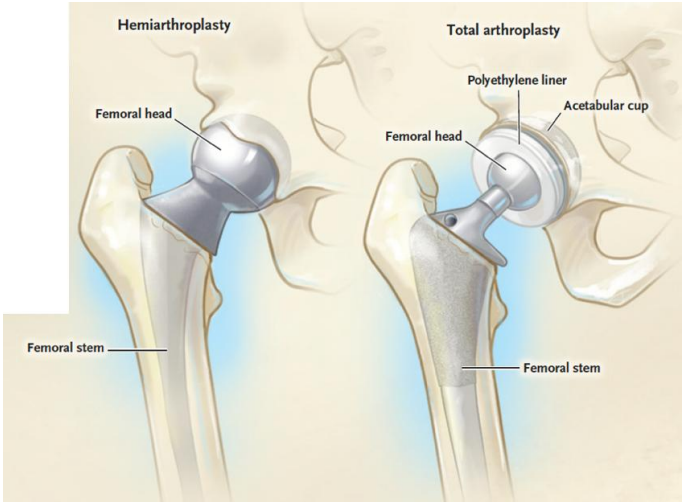
- Not usually necessary with undisplaced fractures
- Arthroplasty in young patients problematic
    - Dislocation
    - Loosening
    - Infection
    - Revision
- Difficulty defining “young”

Internal Fixation

- **So limit this to….**
  - Young patients
  - Undisplaced fractures
  - Sick patients not able to tolerate arthroplasty

Rationale to do a trial

- Revision to arthroplasty is a common reoperation after internal fixation has failed
- Preliminary data suggest that arthroplasty for minimally displaced FNFs may lead to better patient outcomes:
  - Lower risk of death
  - Fewer re-operations
  - Improved ambulation



Rationale and Background

The need for a trial

- Despite the literature, the surgical treatment of minimally displaced FNFs has remained largely unchanged over the last 30 years

- Preliminary data in support of arthroplasty is promising, but a definitive trial is needed to determine if arthroplasty is superior to internal fixation in the management of minimally displaced FNFs

MAPT MUSCULOSKELETAL ADAPTIVE PLATFORM TRIAL

USC University of Southern California

McMaster University

UCI

FASTER HIP

Fixation Versus Arthroplasty Surgical Treatments for Early Recovery after HIP fracture

Fixation versus Arthroplasty Surgical Treatments for Early Recovery after HIP fracture

SCIENTIFIC ARTICLES

Not All Garden-I and II Femoral Neck Fractures in the Elderly Should Be Fixed

Effect of Posterior Tilt on Rates of Subsequent Arthroplasty

The Journal of Bone and Joint Surgery: October 16, 2019 - Volume 101 - Issue 20 - p 1852-1859

- Posterior tilt ≥20° at higher risk of arthroplasty vs <20° (22.4% vs 11.9%)

Total Hip Arthroplasty Leads to Better Results After Low-Energy Displaced Femoral Neck Fracture in Patients Aged 55 to 70 Years

A Randomized Controlled Multicenter Trial Comparing Internal Fixation and Total Hip Arthroplasty

Stefan Bartels, MD, Torbjørn B. Kristensen, MD, PhD, Jan-Erik Gjertsen, MD, PhD, Frede Frihagen, MD, PhD, Cecilia Rogmark, MD, PhD, Filip C. Dolatowski, MD, PhD, Wender Figved, MD, PhD, Jūratė Šaltytė Benth, PhD, and Stein Erik Utvåg, MD, PhD

Investigation performed at Akershus University Hospital, Lørenskog, and Haukeland University Hospital, Bergen, Norway

- THA patients reported better health-related quality of life
- 51% of the IF group vs 4% in the THA group underwent a major reoperation
- **Is 55 the upper limit for internal fixation in displaced fractures?**

OPEN ACCESS

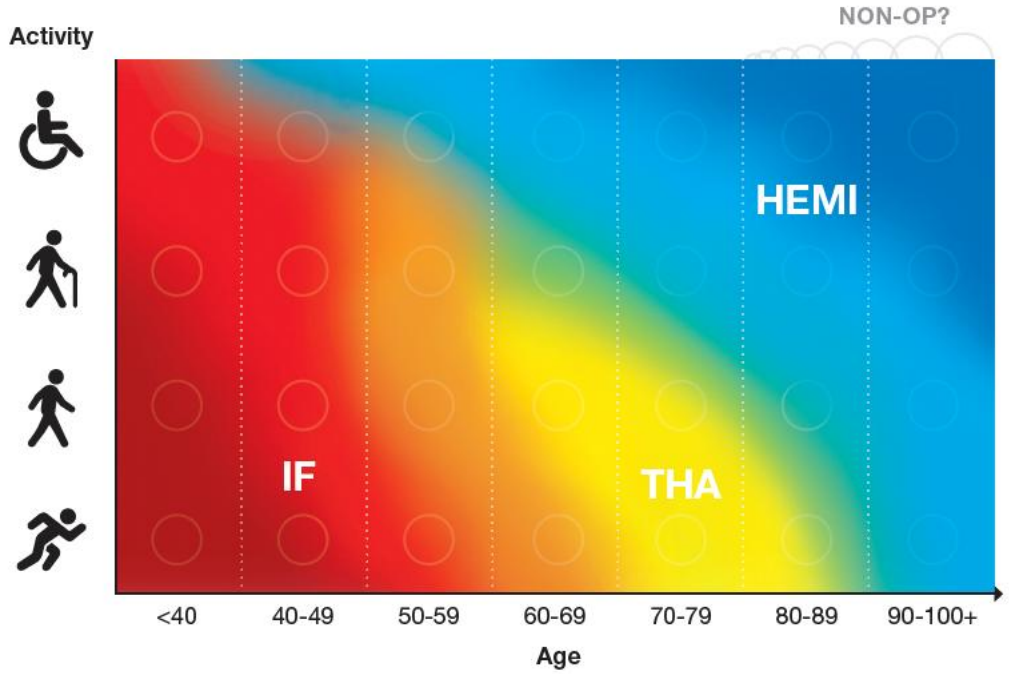
Acta Orthopaedica 2025; 96: 632–639

Educational article

Femoral neck fractures in adults with emphasis on surgical treatment

Cecilia ROGMARK [1], Bjarke VIBERG [2], Olof WOLF [3], Sebastian MUKKA [4], Matthew L COSTA [5], and Jan-Erik GJERTSEN [6,7]

- Working age
- Healthy
- Physically active



ORIGINAL ARTICLE

Cannulated Screws or Hemiarthroplasty for Femoral Neck Fractures: Is There a Mortality Difference?

Austen L. Thompson, MD, PhD, Nicolas P. Kuttner, MD, Marc Greenberg, MD, Krystin A. Hidden, MD, and Brandon J. Yuan, MD

JOT 2024

- HA same lifetime risk of mortality as CS
- HA higher risk of mortality at 1 year
- HA significantly lower lifetime reoperation risk than CS

Acta Orthopaedica 2021; 92 (2): 163–169

Mortality and revision risk after femoral neck fracture: comparison of internal fixation for undisplaced fracture with arthroplasty for displaced fracture: a population-based study from Danish National Registries

Bjarke VIBERG [1,2,4], Trine FRØSLEV [3], Søren OVERGAARD [4,5], Alma Becic PEDERSEN [3]

[1] Department of Orthopaedic Surgery and Traumatology, Lillebaelt Hospital – University Hospital of Southern Denmark, Kolding; [2] Department of Regional Health Research, University of Southern Denmark, Odense; [3] Department of Clinical Epidemiology, Aarhus University Hospital; [4] Orthopaedics Research Unit, Department of Orthopaedic Surgery and Traumatology, Odense University Hospital, Odense; [5] Department of Clinical Research, University of Southern Denmark, Odense, Denmark
Correspondence: bjarke.viberg@rsyd.dk
Submitted 2020-07-03. Accepted 2020-10-27.

- 30-day mortality higher with arthroplasty
- No difference in mortality at 5 years

"Damage Control" Fixation of Displaced Femoral Neck Fractures in High-Risk Elderly Patients: A Feasibility Case Series

Sanjit R. Konda, MD,[a,b] Nicket Dedhia, BA,[a] Samantha Rettig, BS,[a] Roy Davidovitch, MD,[a] Abhishek Ganta, MD,[a,b] and Kenneth A. Egol, MD[a,b]

- In acutely ill patients with DFNFs, "damage control" fixation with CRPP can be safely performed in lieu of HA
- Patients unable to tolerate anesthesia or the sequelae of major surgery
- Less blood loss, OR time
- Helpful with frail, bed-ridden, dementia

Femoral neck: Bottom Line

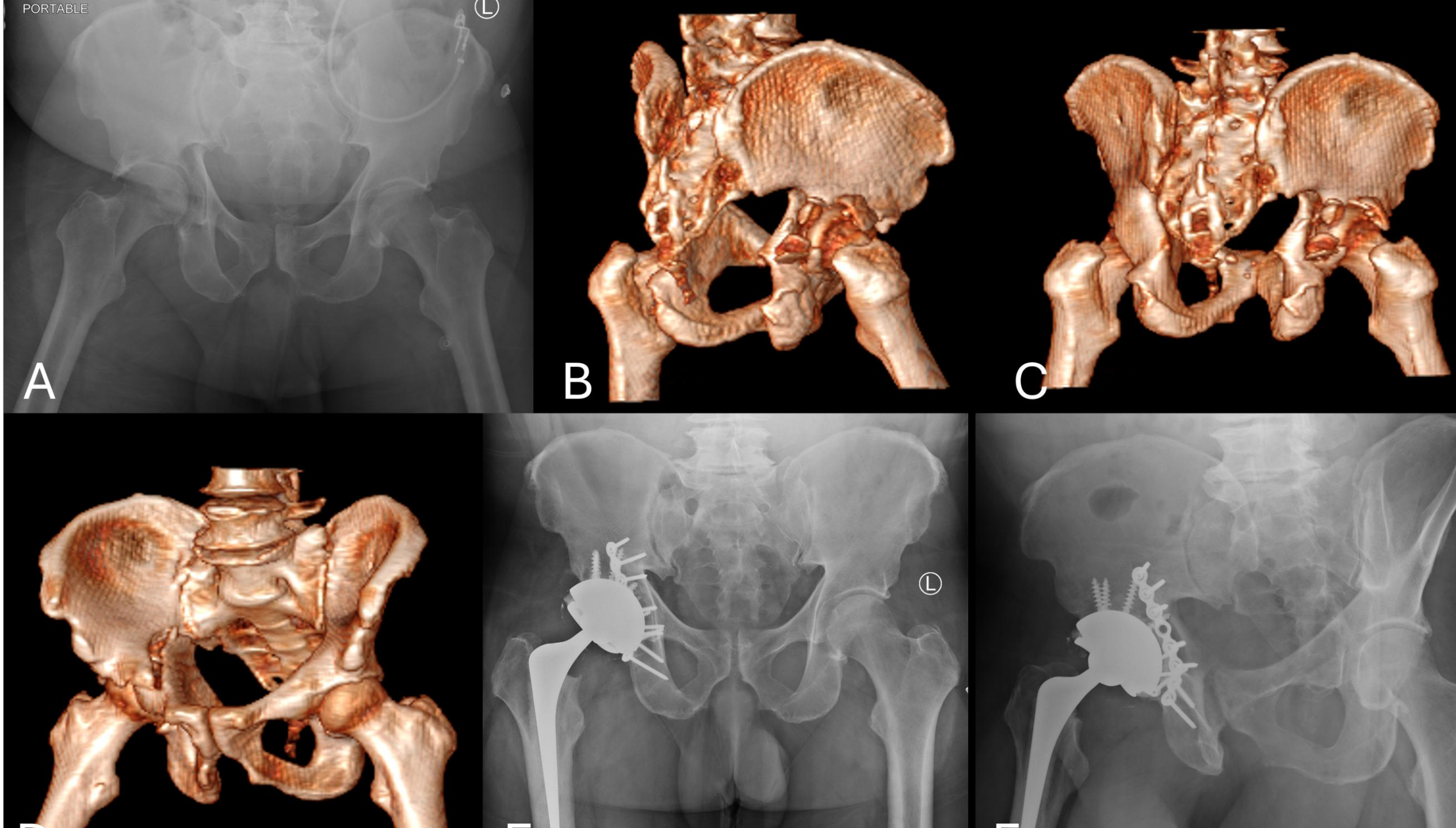
- Internal fixation
  - Still a role in undisplaced fractures
  - Avoid with significant anterior and posterior tilt
  - Difficult to define age threshold in younger patients with displaced fractures
  - May play a significant role in patients who are medically unwell and are unable to tolerate HA

Acetabulum fractures

- Evidence comparing ORIF to acute arthroplasty +/- ORIF in the treatment of acetabulum fractures is limited
- Recommend treating younger active patients with ORIF to attempt joint salvage in the vast majority of cases.
- Need an RCT

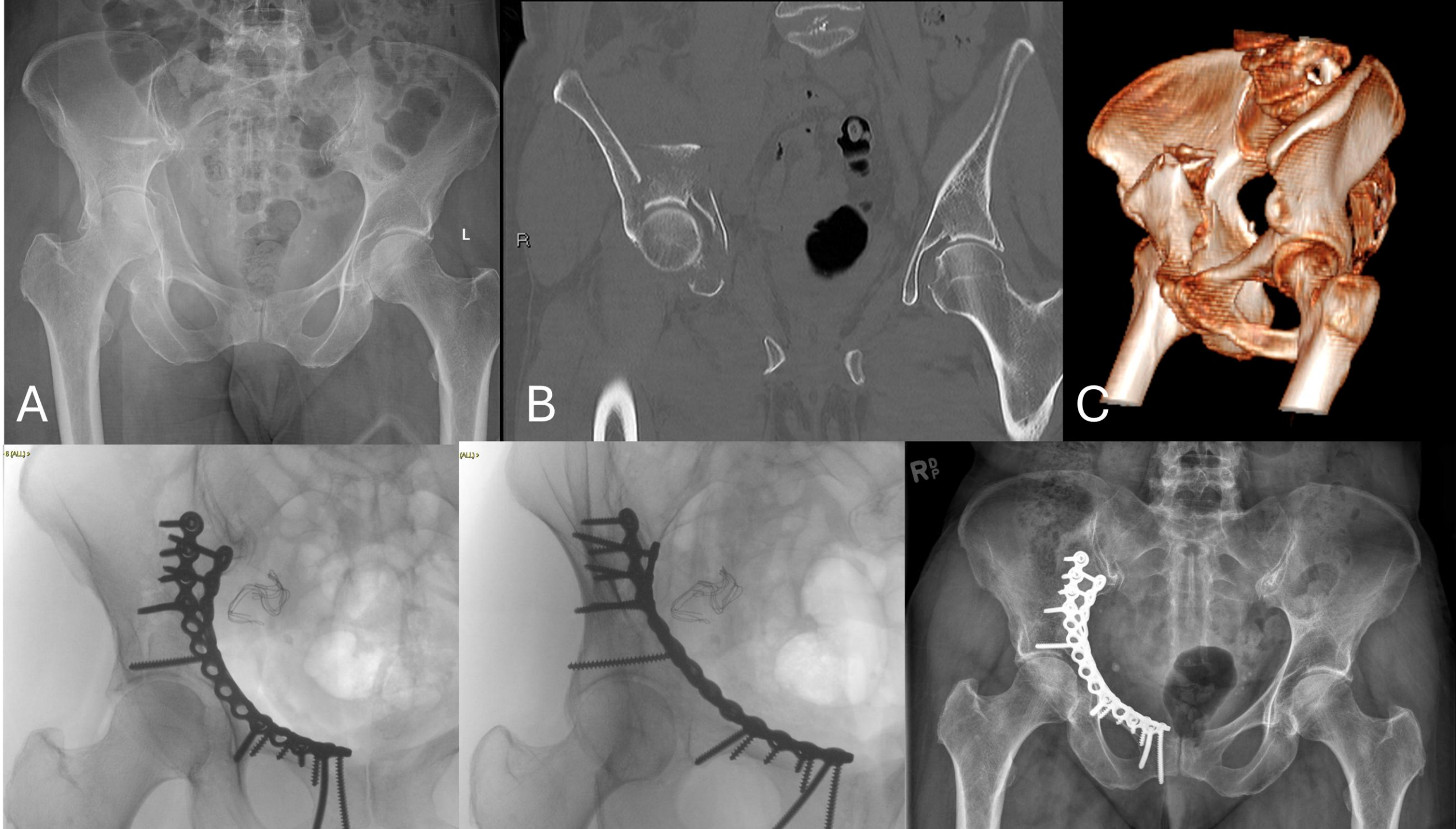
Risk factors for early conversion to THA

- Large areas of acetabular articular surface impaction involving the weight bearing dome
- Femoral head lesions
- Posterior wall comminution
- Poor bone stock


PORTABLE
L
A
B
C
L

Good candidates for surgery

- Young physiologically
- Active
- Relatively large articular fragments
- No substantial articular impaction
- Good bone stock
- No significant femoral head lesions


A
L
B
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C

Comparative literature limited and conflicting

- Manson et al: Fewer reoperations in the acute THA group
- Upfill-Brown et al: No difference in revision free survival between elderly patients treated with either acute THA or ORIF
- Singh et al: Increased odds of return to hospital and reoperation at 90 days postoperative and increased odds of infection at 1-year in patients treated with acute THA

Evidence based conclusions

- IF still has a significant role to play in hip fracture management
- Need to determine role of IF in undisplaced fractures and threshold for fixation in displaced fractures
- IF results in more reoperations and likely worse function than Arthroplasty for femoral neck fractures
- IF may be helpful in medically unwell patients not able to tolerate arthroplasty
- Cannulated screws have a limited role to play
- Unclear role of acute THA for acetabular fractures

Thank you