18th ANNUAL INTERNATIONAL SAN FRANCISCO
Orthopaedic Trauma Course

Femoral Neck Fractures. Hemi-, Bipolar, or Total Hip Arthroplasty?

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Disclosure Information
Andrew H. Schmidt, M.D.

Disclosure of Financial Relationships

Royalties: Thieme, Inc (textbook)

Consultant: Abbott Labs (spouse)

Stock: Conventus Orthopaedics; Epien; PreferUS Healthcare, Epix Orthopaedics, ActivOrtho, Enova Illumination

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Conflicts of Commitment/ Effort

Editorial Board: OTA International; J Orthopaedic Trauma

Chair, Dept. of Orthopaedic Surgery: Hennepin Healthcare

Committees: Chair, AAOS Council on Education

Disclosure of Off-Label and/or investigative Uses

I will not discuss off label use and/or investigational use in my presentation.

Prosthetic Options

Modular Unipolar Hemiarthroplasty
Bipolar Hemiarthroplasty

Total Hip Arthroplasty

Questions

- When is THA appropriate?
- If doing a hemi – uni or bipolar?

- For either – how to fix the stem?

- What other technique-related choices matter?

Total Hip Replacement

- First case series reported in 1980's
- Now many randomized clinical trials showing superior outcome, longevity

Management of Hip Fractures by Total Hip Arthroplasty

- 112 patients @ Mayo Clinic 1970-1978
- 3 categories of patients:
  - Advanced medical illnesses, cancer, or neuromuscular conditions
  - Pre-existing hip arthrosis
  - High activity level

Sim FH, Stauffer RN. Clin Orthop 1980;152:191

2024

- We *know* that total hip replacement *is* the optimum arthroplasty for some patients with displaced femoral neck fractures.

2024

- We *know* that total hip replacement *is* the optimum arthroplasty for some patients with displaced femoral neck fractures.

- Which ones?

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

Early (1 year) results

- Mortality equal in all 3 groups
- ORIF
  - 25% converted to THA
  - 12% complaining of pain
- Hemiarthroplasty
  - 27% reported pain
- THA
  - No patient had pain

Skinner et al. Injury 20: 291-3, 1989.

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

Displaced intracapsular hip fractures in fit, older people: a randomised comparison of reduction and fixation, bipolar hemiarthroplasty and total hip arthroplasty

JF Keating, A Grant, M Masson, NW Scott and JF Forbes

Health Technology Assessment 2005; Vol. 9: No. 41 October 2005

Health Technology Assessment
NHS R&D HTA Programme

- Multi-center study 11 Scottish hospitals
- 298 patients > 60 with displaced FNF
- Outcomes:
  - Mortality
  - Reoperation / Complications
  - Functional measures (HRQ, EQ-5D)
  - Economic

Keating et al, Health Tech Assess 9(41), Oct 2005

- 207 randomized among all choices; 91 among just ORIF vs HA.
- No differences in clinical outcomes.
- 2 yr reoperation 39% ORIF, 5% HA, 9% THA
- Functional scores favored arthroplasty at all time periods.
- Patient-reported outcomes best for THA.
- Economic analysis of total costs related to the hip (acute + follow-up) showed THA resulted in savings of £ 3,000 / pt vs HA

Keating et al, Health Tech Assess 9(41), Oct 2005

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The American Academy of Orthopaedic Surgeons Evidence-Based Guideline on

Management of Hip Fractures in the Elderly

HEMI VERSUS TOTAL HIP ARTHROPLASTY

Moderate evidence supports a benefit to total hip arthroplasty in properly selected patients with unstable (displaced) femoral neck fractures.

Strength of Recommendation: Moderate ★★★☆


Check for updates

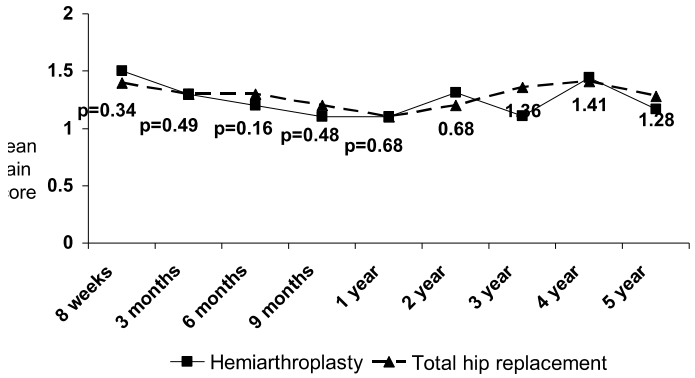
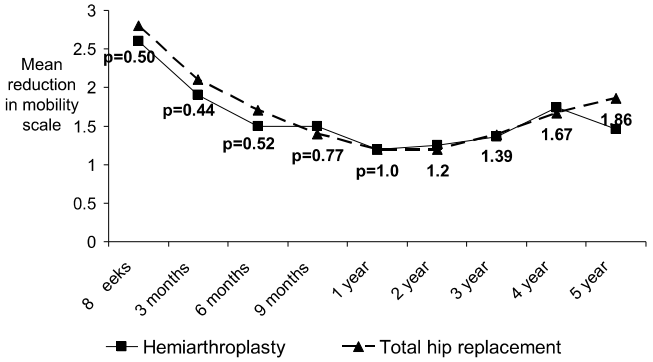


Fig. 2. Mean pain scores.



dency scale.

It Still Isn’t Perfectly Clear…

ORIGINAL ARTICLE

Total Hip Arthroplasty for Acute Femoral Neck Fractures: Who Should Perform the Operation—Adult Reconstructive or Trauma Surgeons?

John C. Thomas, MD and George J. Haidukewych, MD

- 149 THAs for displaced FNF
- Implant survival, 90-day complications & readmissions, 1-year complications.

- Major surgical complication rate (defined as dislocation, deep infection, loosening, fracture) was significantly higher for T surgeons (20%) than for AR surgeons (7%) ($P = 0.021$).
- AR surgeons had significantly less radiographic component mal-positioning 12% versus 3% ($P = 0.024$).
- Mortality and readmission rates were similar between the 2 cohorts at all time points.
- Implant survivorship was significantly higher at 1 year for AR surgeons ($P = 0.05$).

Who Did the Arthroplasty? Hip Fracture Surgery Reoperation Rates are Not Affected by Type of Training—An Analysis of the HEALTH Database

Ryan D. DeAngelis, MD,[a] Gregory T. Minutillo, MD, MPH,[a] Matthew K. Stein, MD,[a] Emil H. Schemitsch, MD, FRCSC,[b] Sofia Bzovsky, MSc,[c] Sheila Sprague, PhD,[c,d] Mohit Bhandari, MD, PhD, FRCSC,[c,d] Derek J. Donegan, MD, MBA,[a] and Samir Mehta, MD[a] on behalf of the HEALTH Investigators

- 1441 patients enrolled in RCT of HA vs THA
- Surgeon's training assessed retrospectively
- Outcomes compared.
  - 1° : unplanned secondary procedure at 24 months
  - 2° : death, serious adverse events, PJI, dislocation, discharge disposition, and use of ambulatory devices postoperatively.

TABLE 3. Association Between Fellowship Training and HEALTH Outcomes in THA Patients

Outcome	HR (95% CI)	*P*
Unplanned secondary procedure		Overall: 0.29
Trauma vs. arthroplasty	1.44 (0.63–3.28)	
Other vs. arthroplasty	0.84 (0.24–2.92)	
Unknown vs. arthroplasty	1.81 (0.86–3.80)	
None vs. arthroplasty	1.38 (0.66–2.89)	
Dislocation		Overall: 0.98
Trauma vs. arthroplasty	1.10 (0.40–3.06)	
Other vs. arthroplasty	0.75 (0.16–3.45)	
Unknown vs. arthroplasty	1.25 (0.49–3.22)	
None vs. arthroplasty	0.95 (0.37–2.44)	
Death		Overall: 0.81
Trauma vs. arthroplasty	1.06 (0.59–1.90)	
Other vs. arthroplasty	0.59 (0.23–1.49)	
Unknown vs. arthroplasty	0.86 (0.48–1.55)	
None vs. arthroplasty	1.01 (0.61–1.69)	
Serious adverse event		Overall: 0.52
Trauma vs. arthroplasty	1.08 (0.76–1.54)	
Other vs. arthroplasty	0.95 (0.59–1.52)	
Unknown vs. arthroplasty	1.17 (0.85–1.63)	
None vs. arthroplasty	1.08 (0.79–1.46)	
Prosthetic joint infection		Overall: **0.04**
Trauma vs. arthroplasty	3.94 (0.92–16.81)	0.06
Other vs. arthroplasty	4.54 (0.91–22.64)	0.06
Unknown vs. arthroplasty	4.00 (0.98–16.33)	0.053
None vs. arthroplasty	4.49 (1.20–16.81)	**0.03**

	OR (95% CI)	*P*
Discharged to facility postoperatively		Overall: 0.26
Trauma vs. Arthroplasty	1.25 (0.76–2.06)	
Other vs. Arthroplasty	0.92 (0.50–1.69)	
Unknown vs. Arthroplasty	0.99 (0.62–1.57)	
None vs. Arthroplasty	1.43 (0.93–2.22)	
Use of ambulatory devices postoperatively		Overall: 0.13
Trauma vs. Arthroplasty	1.90 (0.01–20.09)	
Other vs. Arthroplasty	2.10 (0.03–19.87)	
Unknown vs. Arthroplasty	1.87 (0.05–18.91)	
None vs. Arthroplasty	1.89 (0.07–19.54)	

Other, fellowship not in trauma or arthroplasty; Unknown, unknown fellowship status; None, no fellowship training.

CI - confidence interval, HR - hazard ratio, OR - odds ratio

Significance = $p < 0.05$

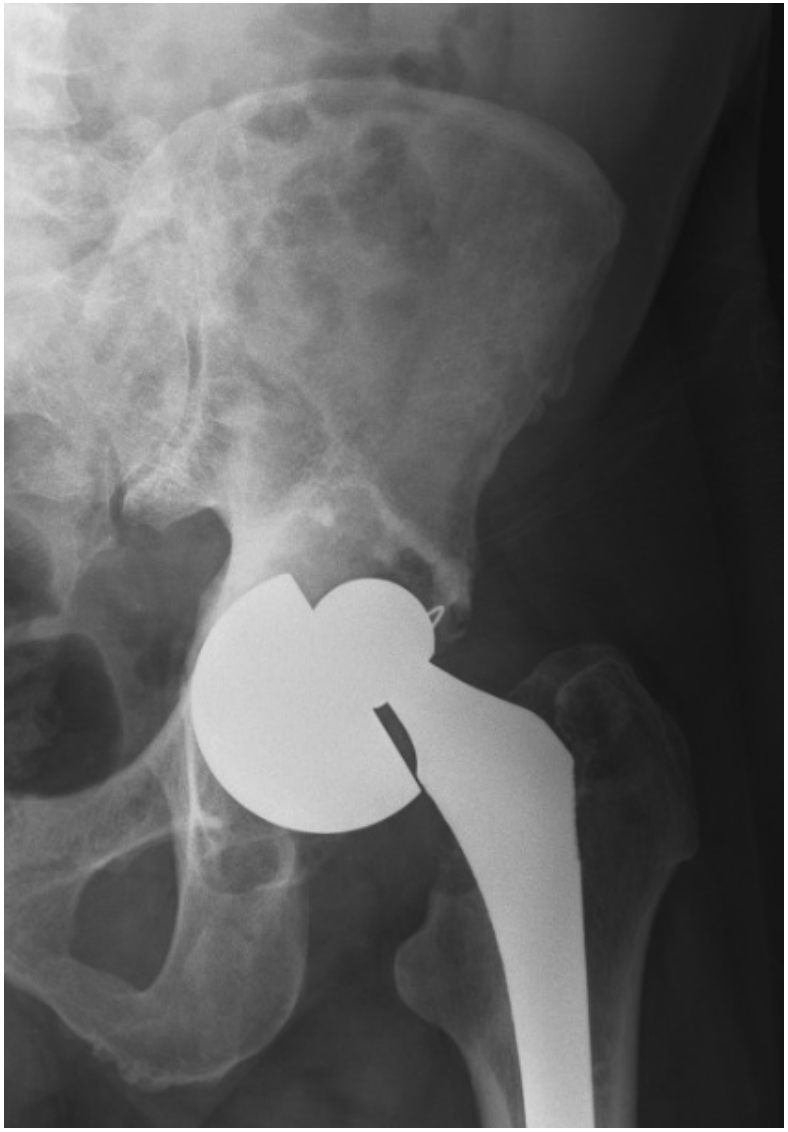
Hemiarthroplasty

Bipolar

- Rationale:
  - Motion at inner bearing protects acetabulum.
  - Revisable to THA

Bipolar

- Active patients may have pain.
- Cartilage does not do well articulating with metal.
- Osteolysis may occur due to poly wear at inner bearing.
- Dislocation rate appreciable
- Clinical results deteriorate with time, no different than unipolar.



Unipolar vs. Bipolar

- **Cochrane Database Systematic reviews – 2022 update: 13 studies, 1499 participants**
- Low-certainty evidence of little or no difference between bipolar and unipolar HAs in early mortality (RR 0.94, 95% CI 0.54 to 1.64; 4 studies, 573 participants) and 12-month mortality (RR 1.17, 95% CI 0.89 to 1.53; 8 studies, 839 participants).
- The overall risk of adverse events was similar. The absolute risk of dislocation was low (approximately 1.6%) and there was no evidence of any difference between treatments.

Lewis SR, Macey R, Parker MJ, Cook JA, Griffin XL. Cochrane Database Syst 2022, Issue 2. Art. No.: CD013410.

Lind et al. BMC Musculoskeletal Disorders (2023) 24:911
https://doi.org/10.1186/s12891-023-07035-z

BMC Musculoskeletal Disorders

RESEARCH Open Access

Long-term risk of reoperation after modular hemiarthroplasty

Any differences between uni- or bipolar design?

Dennis Lind[1*], Jonatan Nåtman[2], Maziar Mohaddes[2,3] and Cecilia Rogmark[1,2]

- 57800 patients from Swedish Arthoplasty Register
- Propensity scoring for Tx with BHA.
- 16,216 patients treated with bipolar HA matched to 12,280 patients who had unipolar HA.
  - < 10% difference in all baseline co-variates

- 92% patients in both groups free from reoperation at 13 years
- BHA was associated with more reoperations until 3 years.
  - Reoperation due to infection was most common after BHA, n = 212 (1.7%) compared to n =141 (1.1%) after UHA.
  - Dislocation led to reoperation in 192 of the BHA cases (1.6%) and in 157 of the UHA cases (1.3%).
  - Acetabular erosion/pain occurred in 0.1% and 0.4%.

- Amongst those surviving ≥ 5 years, 93% of the BHA group was free from reoperation (CI 0.92–0.94) at 13 years, 92% after UHA (CI 0.90–0.94).
  - BHA had more reoperations during the 1st year only.
  - The causes for reoperations showed similar rates except for acetabular erosion/pain, which were higher in the UHA group (BHA group had 2 cases (0.1%); the UHA had 39 (1.1%).

To cement or not…

- Increased time.
- May not be needed with modern implants
- Reports of death during cementing.
- Much more difficult revision

HA: Cemented v uncemented

- **17 studies, 3644 participants**
- Moderate-certainty evidence of a benefit with cemented HA consistent with clinically small to large differences in health-related quality of life (HRQoL) and reduction in the risk of mortality at 12 months
- Moderate-certainty evidence of little or no difference in performance of activities of daily living (ADL) and independent mobility.
- For functional status, there was very low-certainty evidence showing no clinically important differences.
- The risks of most adverse events were similar. However, cemented HAs led to less periprosthetic fractures intraoperatively and postoperatively, but had a higher risk of pulmonary embolus.

Lewis SR, Macey R, Parker MJ, Cook JA, Griffin XL. Cochrane Database Syst 2022, Issue 2. Art. No.: CD013410.

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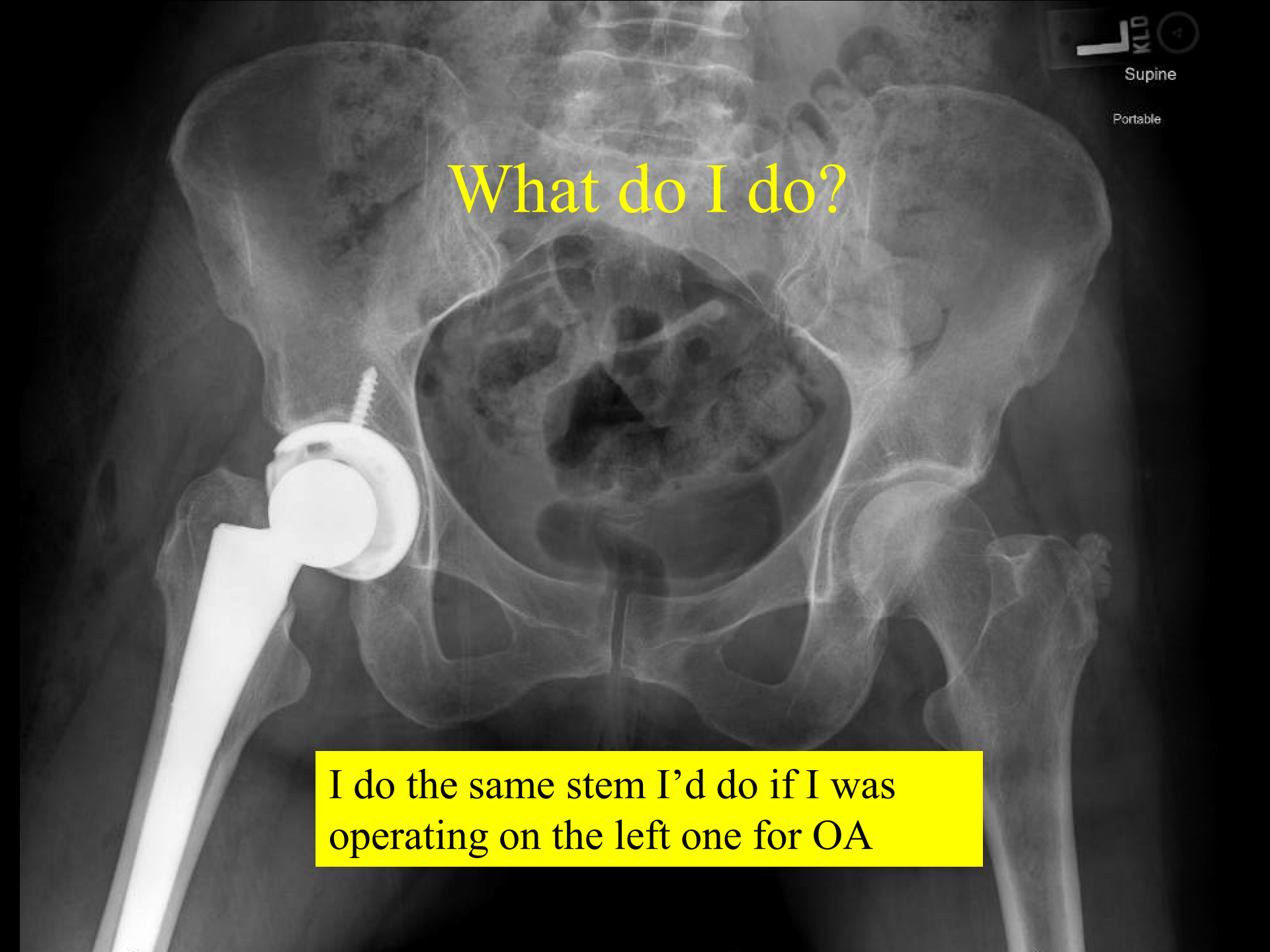
Management of Hip Fractures in the Elderly

CEMENTED FEMORAL STEMS

Moderate evidence supports the preferential use of cemented femoral stems in patients undergoing arthroplasty for femoral neck fractures.

Strength of Recommendation: Moderate ★★★☆

What do I do for stem fixation?



What do I do?

I do the same stem I'd do if I was operating on the left one for OA

My Conclusions…

- Consider a conventional total hip with capsular repair and a *slightly* larger head in active "elderly" patients with a displaced FNF.
- Have dual mobility components available.
- Modular unipolar hemiarthroplasty appropriate for those with less functional demands and short life expectancy.
- Use the implants and approaches that you are familiar with.
- Don't forget VTE prophylaxis, blood loss management, nutritional support, …

Thank You