

Should We Be Cementing More Hips in the USA in 2022?

Chancellor F. Gray
Associate Professor & Physician Director of Quality
Department of Orthopaedic Surgery

UF | College of Medicine
Department of Orthopaedic Surgery
and Sports Medicine
UNIVERSITY of FLORIDA

Disclosures

- AAOs Board or Committee Member
- Consultant for Smith&Nephew
- Consultant and Royalties Adler Orthopaedics
- No financial disclosures relevant to this talk

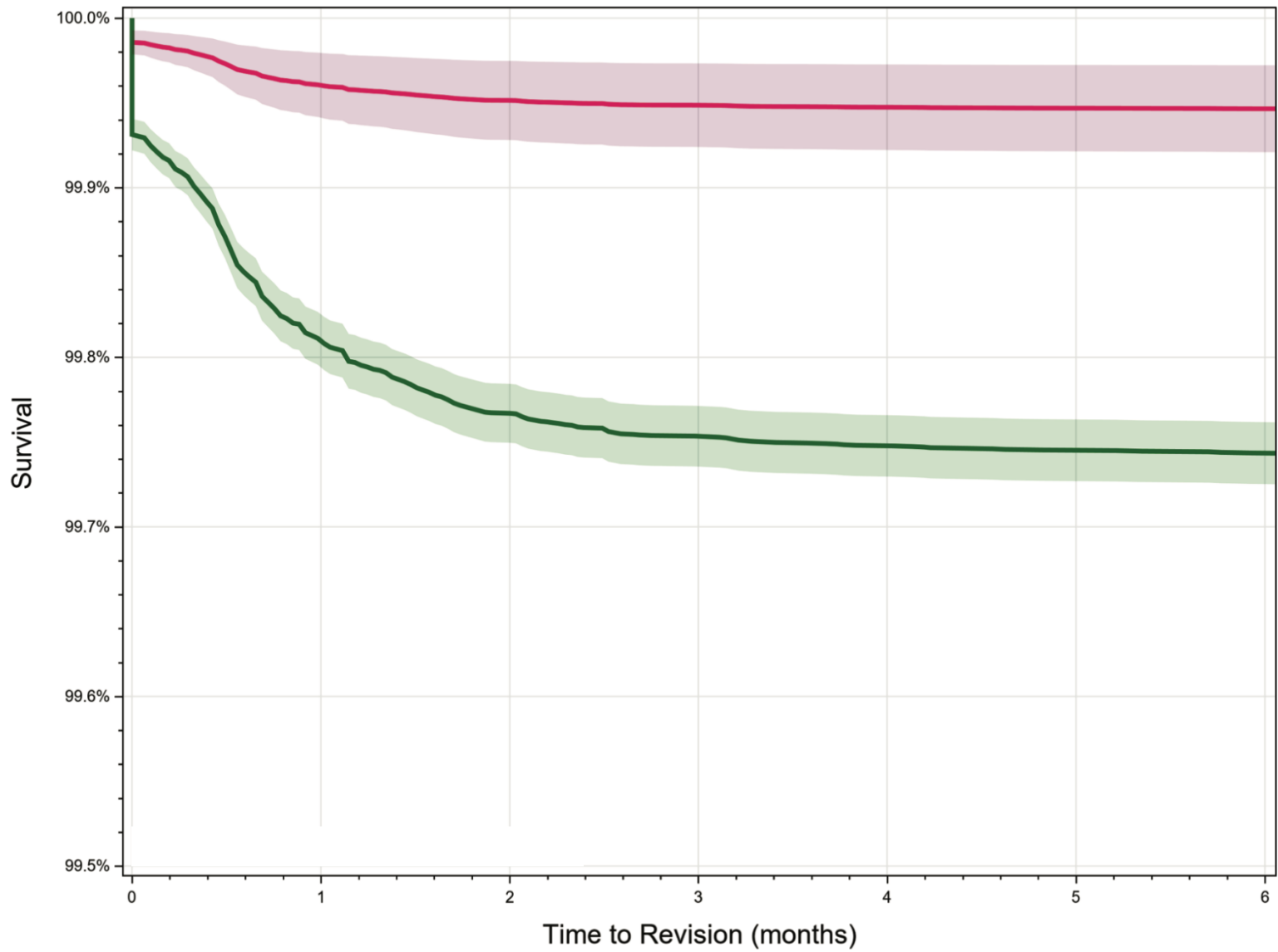
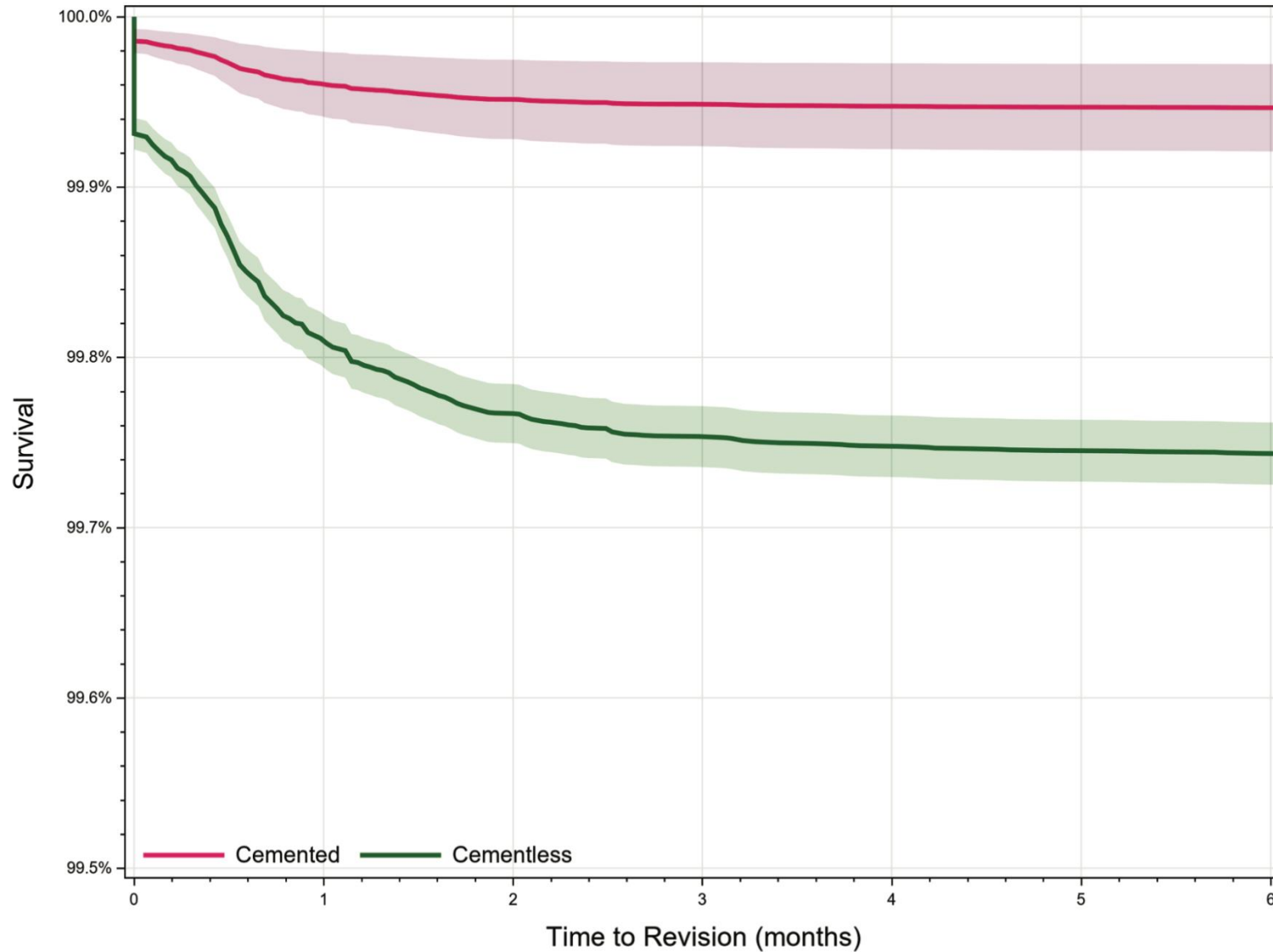


Figure 2.28 Percent Survival for Revision due to Periprosthetic Fracture for Elective Primary Total Hip Arthroplasty ≥ 65 Years of Age Adjusted for Age and Gender, 2012-2020

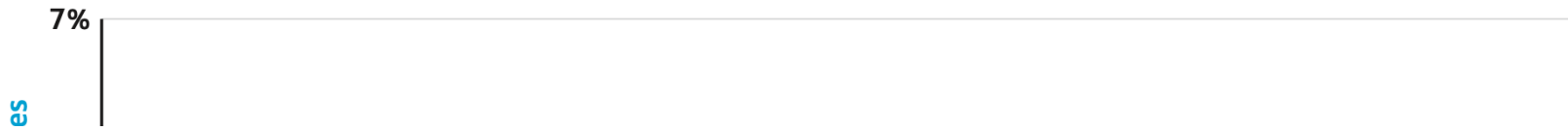


What Are the Current Usage Patterns?

- National Joint Registry (Britain): 32.3% across all age groups
- Australian/ New Zealand NJRR: ~30%
- Swedish Register: 58%

*all 2021 data

Figure 2.25 Cemented Femoral Stem Fixation in Elective Primary Total Hip Arthroplasty Procedures, 2012-2020
(N=597,511)



INSIGHTS

The trend towards increasing use of cement for femoral component fixation in primary elective THA continues to increase and has doubled since 2013.

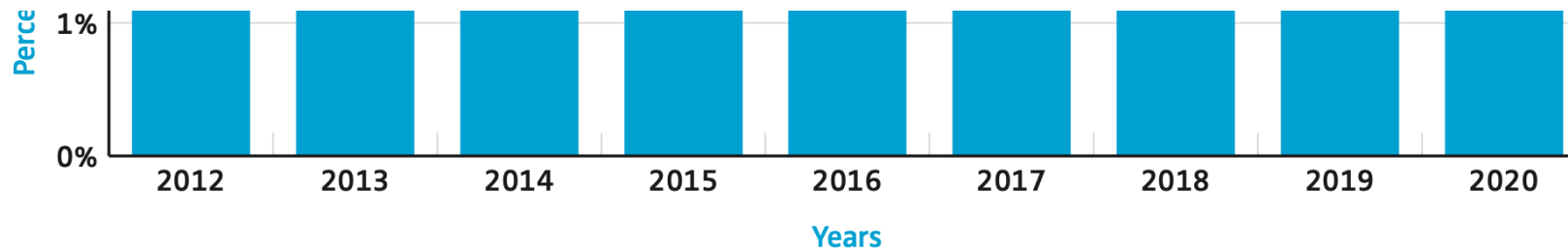
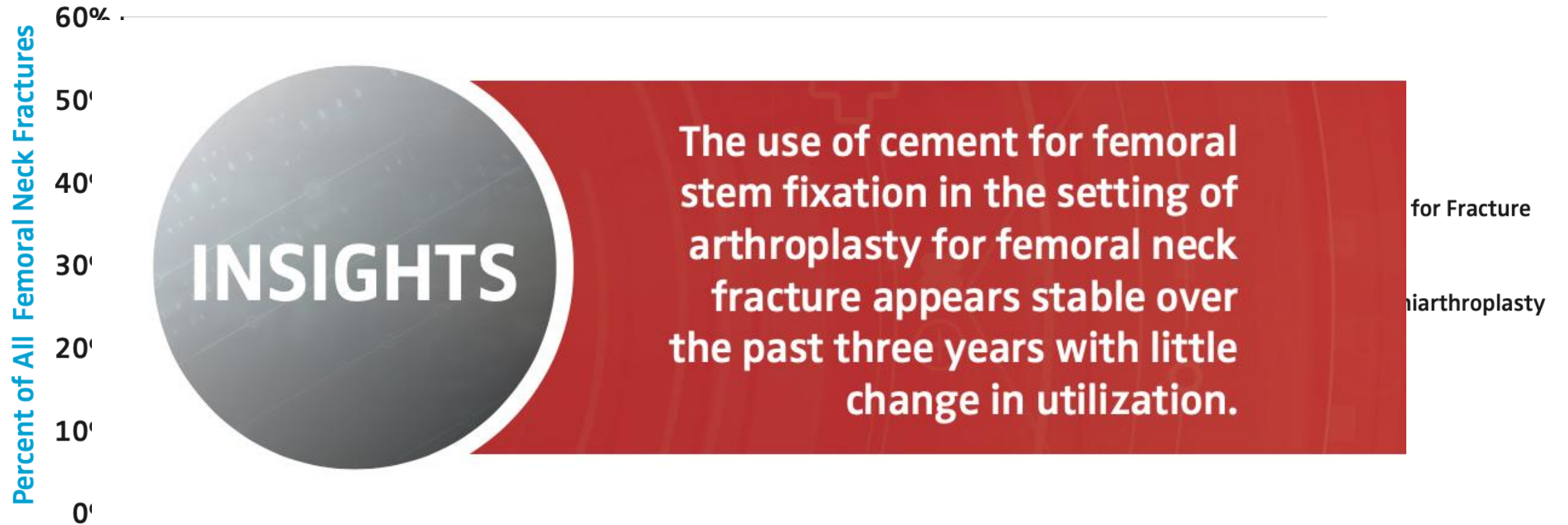


Figure 2.6 Cemented Fixation for Femoral Stems in Total Hip Arthroplasty and Hemiarthroplasty for Femoral Neck Fracture, 2012-2020 (N=32,356)



So...Why Aren't We Cementing More Hips in the US?

1. Performance
2. Bone Cement Implantation Syndrome
3. Cost?
4. Speed/ Efficiency
5. Familiarity

Performance

Figure 2.26 Cumulative Percent Revision for Femoral Stem Fixation for Elective Primary Total Hip Arthroplasty Males ≥ 65 Years of Age with Primary Osteoarthritis Age Adjusted, 2012-2020

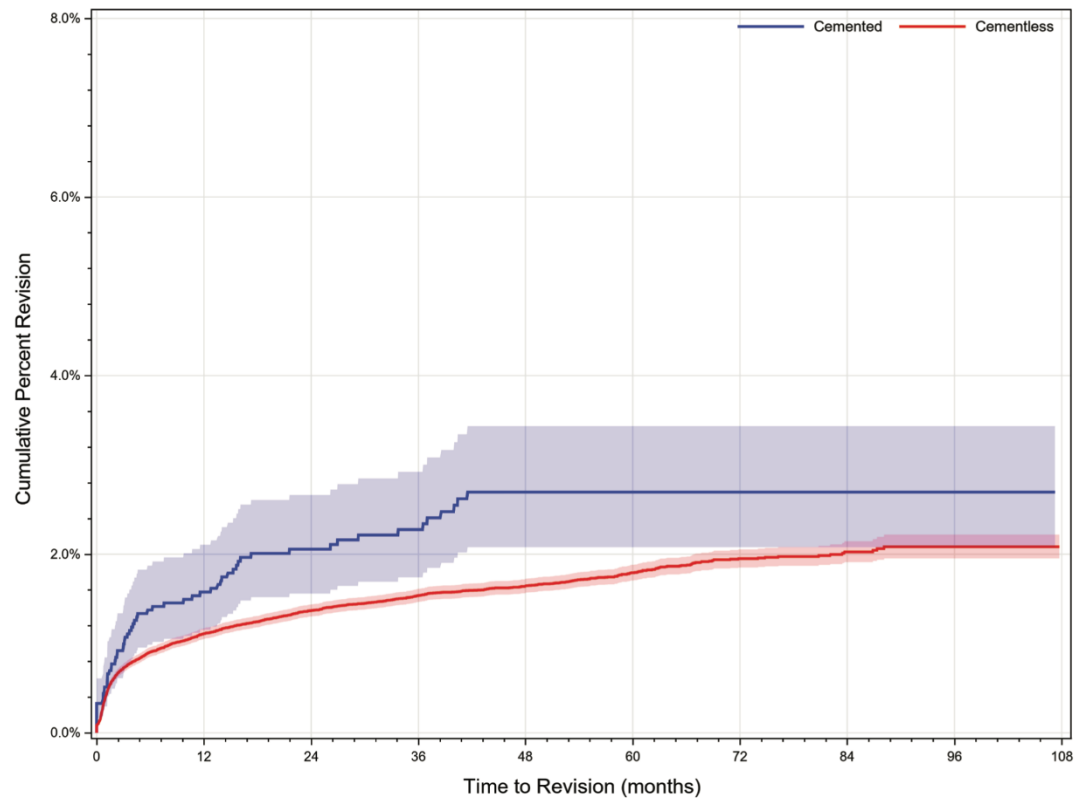
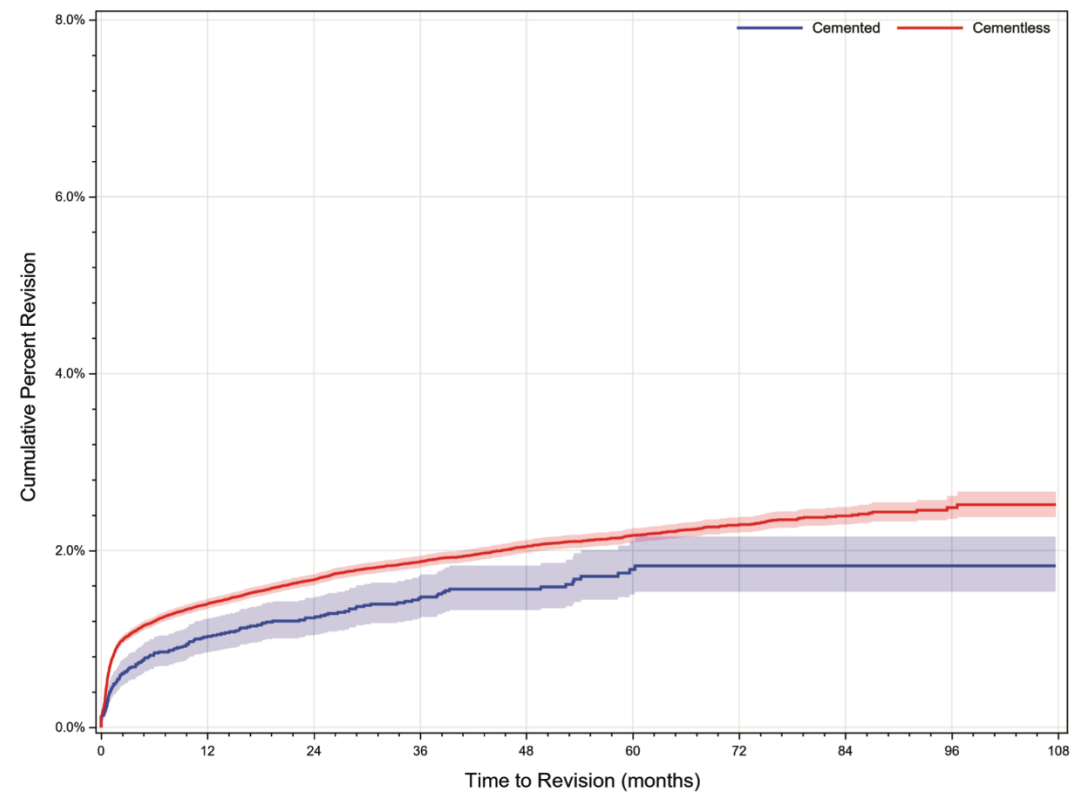


Figure 2.27 Cumulative Percent Revision for Femoral Stem Fixation for Elective Primary Total Hip Arthroplasty Females ≥ 65 Years of Age with Primary Osteoarthritis Age Adjusted, 2012-2020



Performance

 Bone & Joint
Open

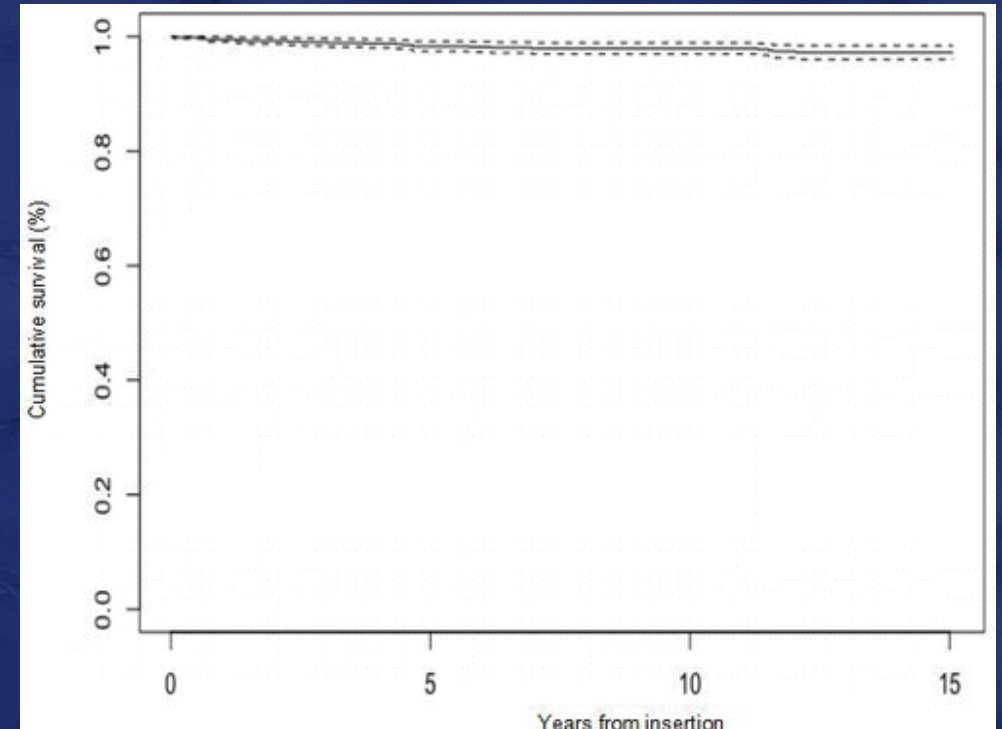
HOME ABOUT ▾ SUBMIT JOURNALS ▾ ORTHOSEARCH PUBLISHER HOME

Bone & Joint Open, Vol. 1, No. 12 | Arthroplasty  Open Access | 

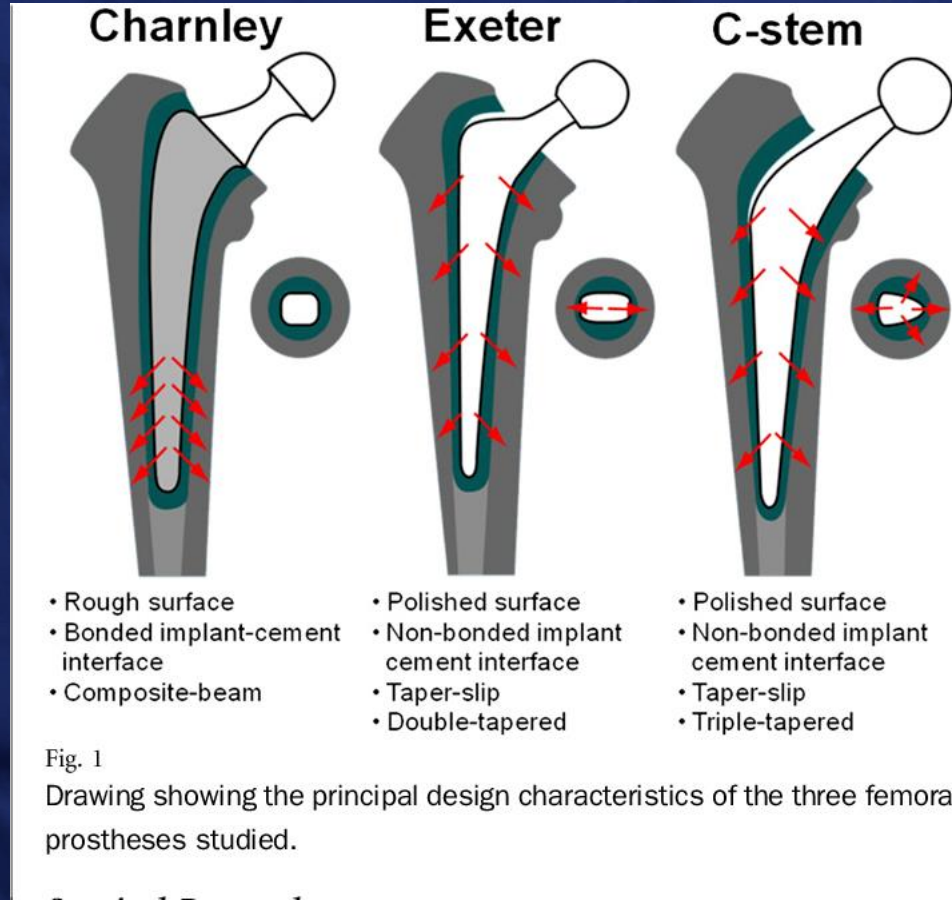
Outcomes of the Exeter V40 cemented femoral stem at a minimum of ten years in a non-designer centre

John Mahon , Cathal Jack McCarthy, Gerard A. Sheridan, James P. Cashman, John M. O'Byrne,  Check for updates
Paddy Kenny

- Single center (non-designer) series
- Exeter V40 only- “taper slip” design
- 829 stems in 745 patients
- 97.6% survivorship at minimum 10 years

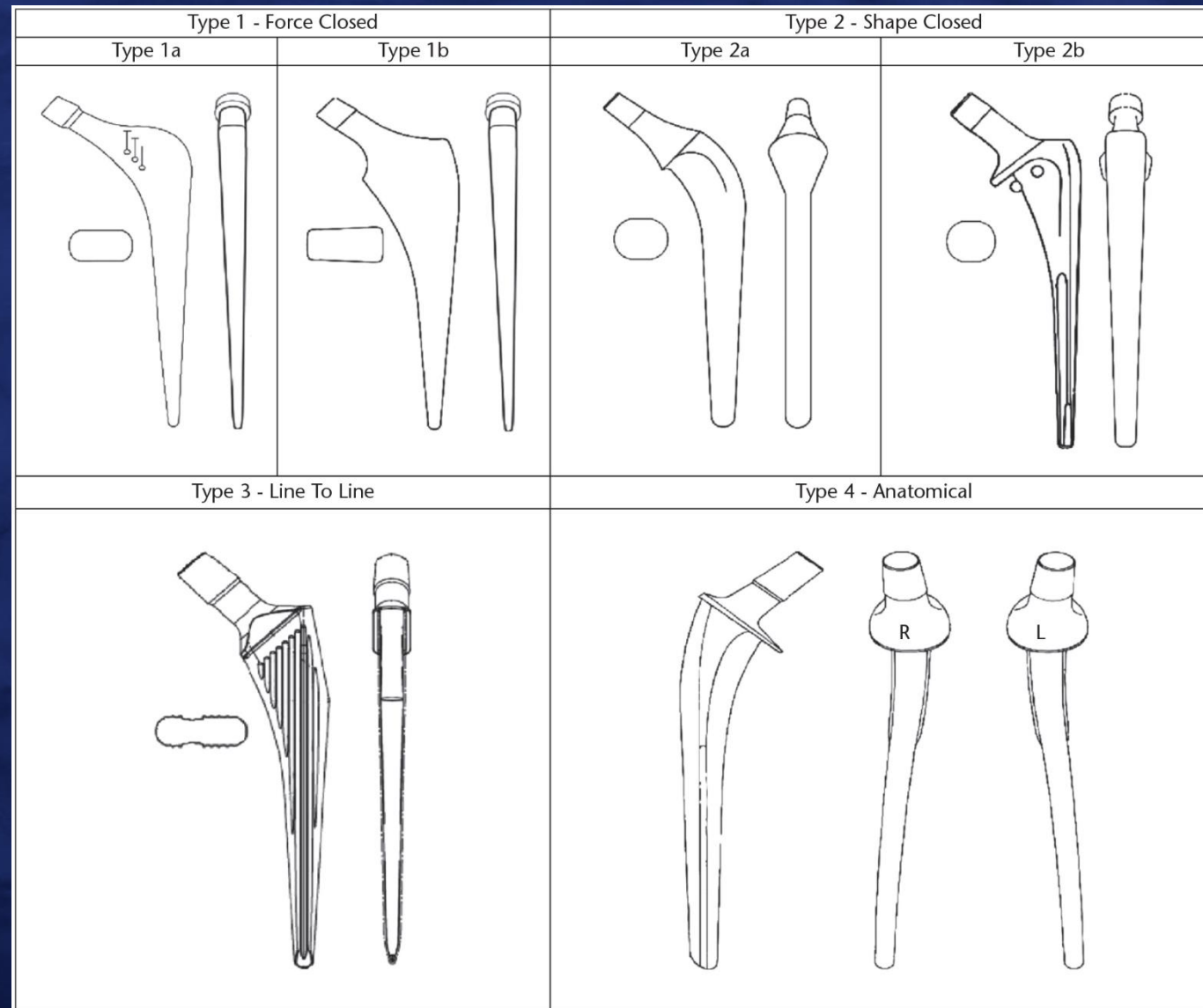


Composite Beam vs Taper Slip



- Differing design philosophies
- Composite Beam stems:
 - Charnley, Spectron, Synergy cemented and Summit cemented
 - Also called “shape-closed”
- Taper Slip stems:
 - Exeter, C-stem
 - “Force-closed”

Fig. 1



Schematic diagram demonstrating the classification system of cemented femoral stem design. Revision stem for each type can be subclassified into the short or long version, Rs and Rl respectively (e.g. Type 1Rs).

EFORT Open Reviews 5,
4; [10.1302/2058-5241.5.190034](https://doi.org/10.1302/2058-5241.5.190034)

The So-Called “French Paradox”

- “Excellent long-term outcomes [in several French cemented stems] despite the presence of a radiographically thin cement mantle, though thin mantles have been shown to be prone to failure...”

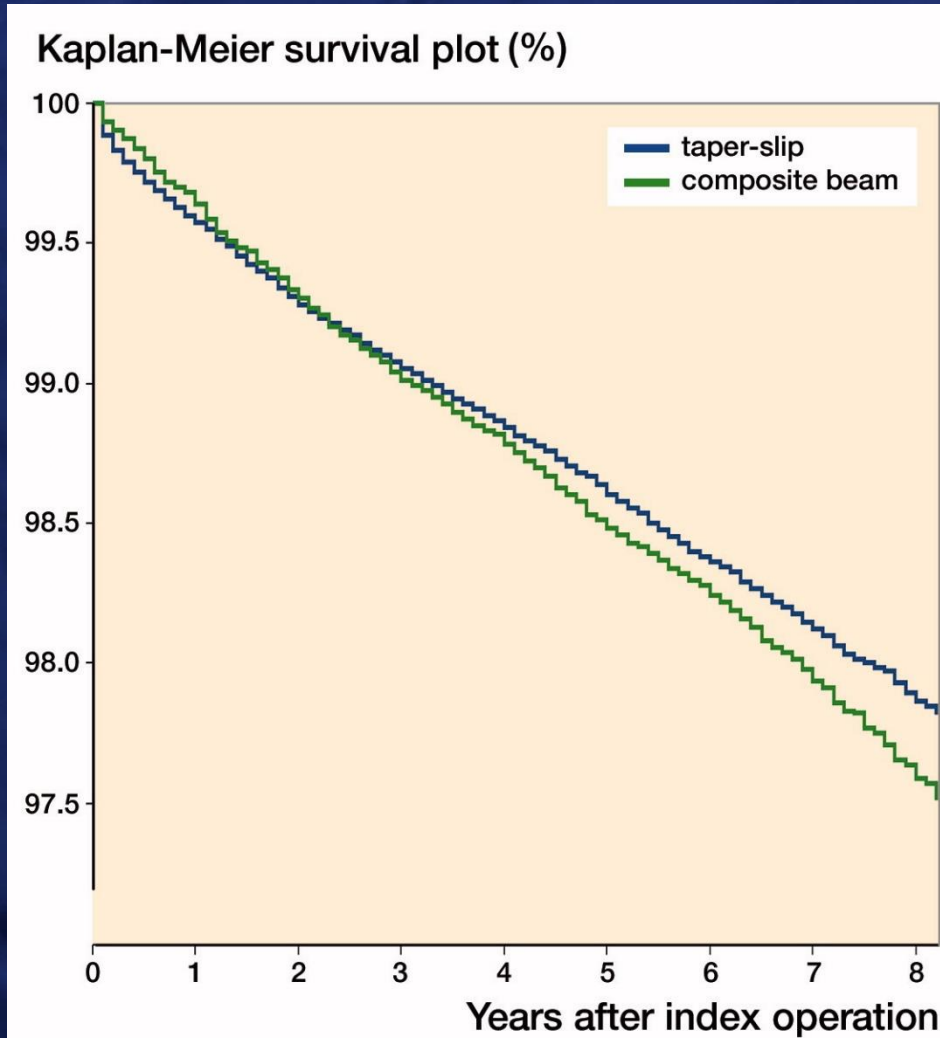
Clauss M, “The ‘French paradox’ may not be a paradox after all—but for what reason?”, *Bone and Joint Research* 2019

How Do Cemented Stems Fail?

- Infection (esp short term)
- Aseptic Loosening (esp long term)
 - “Crazing”
 - Result of long-term loads to sub-yield levels
 - PMMA “cold flow”



Performance



- National Joint Register
- ~300,000 cemented THAs
- Compared two design philosophies:
 - Composite Beam
 - Taper Slip
- All greater than 97% at ~ 10 years

ACTA ORTHOPAEDICA
2019, VOL. 90, NO. 3, 214-219
<https://doi.org/10.1080/17453674.2019.1582680>

 Taylor & Francis
Taylor & Francis Group

 Open access

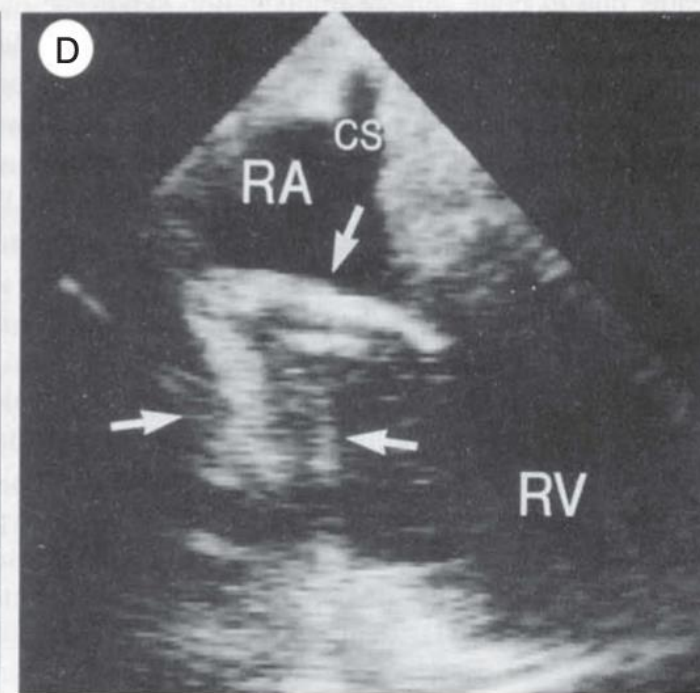
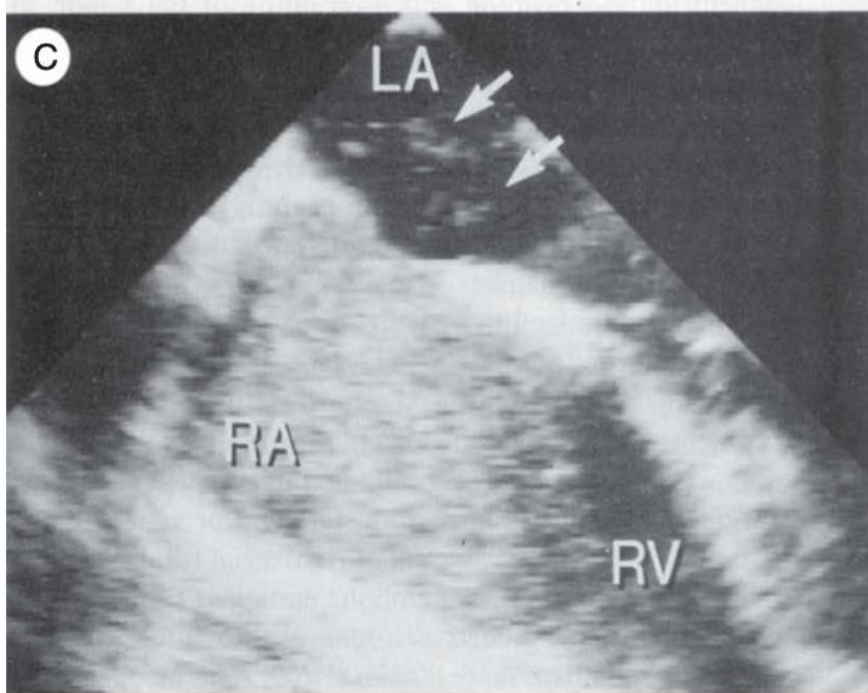
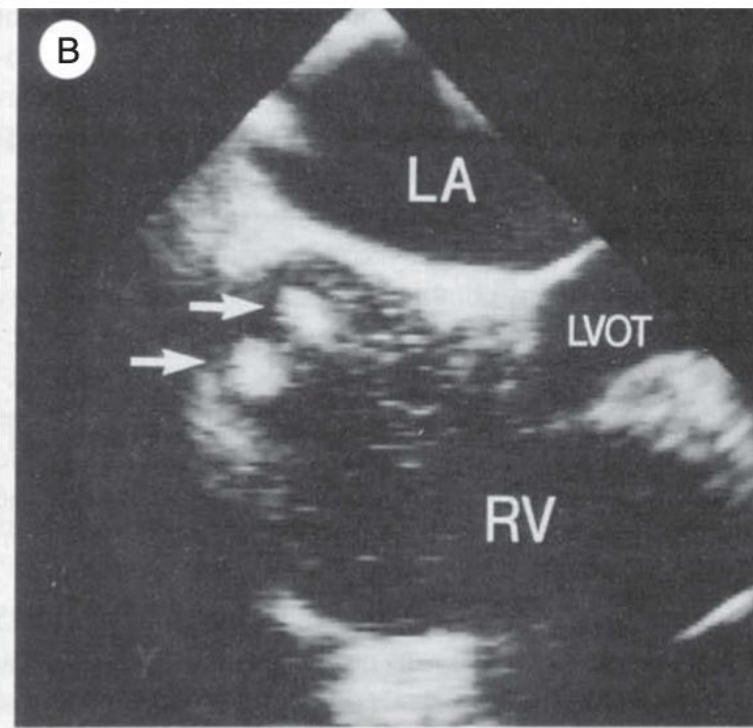
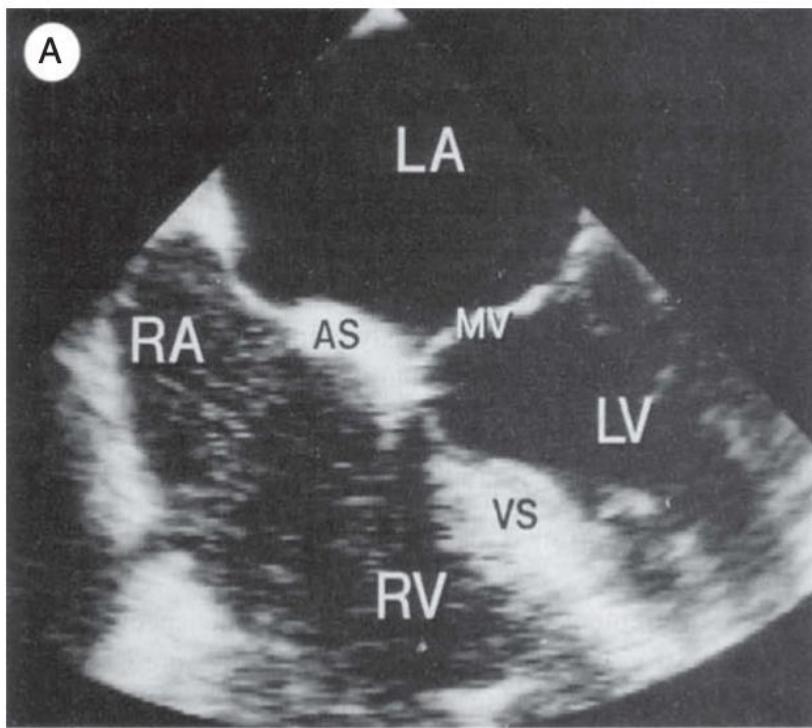
Not all cemented hips are the same: a register-based (NJR) comparison of taper-slip and composite beam femoral stems

Hussain A Kazi^a, Sarah L Whitehouse^b, Jonathan R Howell^a, and A John Timperley^{a,c}

^a Princess Elizabeth Orthopaedic Centre, Royal Devon and Exeter NHS Foundation Trust, Exeter, UK; ^b Queensland University of Technology (QUT), Brisbane, Queensland, Australia; ^c University of Exeter, Exeter, UK

Bo

- “Hypoxia occurring during cementation of a tourniquet”



ne

thology
ted THAs
omer

BCIS

Table 4 Significant risk factors for developing BCIS

Pre-existing disease
Pre-existing pulmonary hypertension
Significant cardiac disease
New York Heart Association class 3 or 4
Canadian Heart Association class 3 or 4
Surgical factors
Pathological fracture
Inter-trochanteric fracture
Long-stem arthroplasty

Table 3 Mean and peak intramedullary pressures generated during cementation and prosthesis insertion in vented and unvented femurs

	Finger packing		Cement gun	
	Peak pressure (mean, mm Hg)	Mean pressure (mean, mm Hg)	Peak pressure (mean, mm Hg)	Mean pressure (mean, mm Hg)
Unvented femur				
Cementation ³⁵	608	127	1177	322
Unvented femur (cadaveric studies)				
Cementation ³⁵	881	229	2051	374
Prosthesis insertion ³⁵	4931	3140	5003	3008
Vented femur				
Cementation ⁶⁵	>117			
Prosthesis insertion ⁶⁵	>190			

Donaldson AJ, "Bone Cement Implantation Syndrome,"
Brit J of Anes, 2009

Cost

- ~\$300 cheaper per case in 2009 dollars
- Included cost of cement prep equipment and cement itself

Clin Orthop Relat Res (2009) 467:1546–1551
DOI 10.1007/s11999-008-0485-z

ORIGINAL ARTICLE

Cementless Femoral Prostheses Cost More to Implant than Cemented Femoral Prostheses

Aasis Unnanuntana MD, Apostolos Dimitroulias MD, Michael P. Bolognesi MD, Katherine L. Hwang MS, Stuart B. Goodman MD, PhD, Randall E. Marcus MD

■ HIP

Cost savings of using a cemented total hip replacement

AN ANALYSIS OF THE NATIONAL JOINT REGISTRY DATA

E. J. Griffiths, D. Stevenson, M. J. Porteous



- ~ 200 British Pounds Sterling cheaper per construct
- Cost savings ~ 10 million with additional ~ 5-10 million in revision reduction

So...Why Aren't We Cementing More Hips in the US?

1. Performance
2. Bone Cement Implantation Syndrome
3. Cost?
4. **Speed/ Efficiency**
5. **Familiarity**

Focus on Intra-op Workflow

- Several commercially available systems with no difference in broaching
- Decision can be made throughout case
- Have cement and prep-equipment nearby if any question
- Do regularly with your teams +/- trainees to keep everyone fresh



Simple Workflow

- After neck cut, check bone quality
- Prep and finish acetabulum as normal
- Prep femur as normal but have team open cementation equipment as you start
- Once trialing complete, prep canal and have tech mix cement





ELSEVIER

Contents lists available at ScienceDirect

Arthroplasty Today

journal homepage: <http://www.arthroplastytoday.org/>



Systematic review

Still no single gold standard for using cementless femoral stems routinely in total hip arthroplasty

Joseph T. Moskal, MD^{a,*}, Susan G. Capps, PhD^b, John A. Scanelli, MD^c

“Older patients with cementless fixation increase the risk of revision, there is no clear fixation advantage in mid-aged patients, and younger patients fare better with cementless fixation. Although cementless femoral fixation for THA has evolved to the “new standard,” it has not been proven to be the “gold standard” for all patients”

Should We Be Cementing More Hips in the US? UCSF Arthroplasty for the Modern Surgeon

Chancellor F. Gray



Thank
You