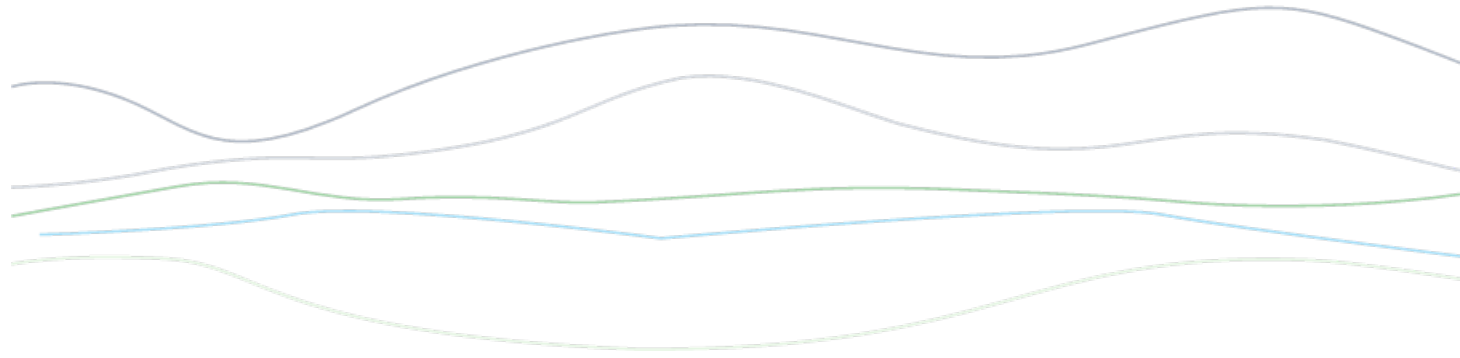




Cemented stems in osteoporotic patients undergoing elective THA

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Disclosure

- Editorial Board, Journal of Arthroplasty

Osteoporosis

Significant public health problem with an expected increase in prevalence in the coming decades

Adami Ther Adv Musculoskelet Dis. 2022

Osteoporosis and THA

- **16% to 26%** of candidates for elective THA may present with Osteoporosis
Xiao, Arch Osteoporos. 2022
- Higher risk of both **surgical and medical complications** after THA Daher, Hip Pelvis. 2024
- **higher readmission rates** and can **compromise functional outcomes**
Emara, J Arthroplasty. 2025.
- **Medically treated osteoporosis** is associated with a **2.8x greater risk** of PFF (compared to non-osteoporotic patients) Lindberg-Larsen Acta Orthop. 2017

Patients with Osteoporosis Are at Higher Risk for Periprosthetic Femoral Fractures and Aseptic Loosening Following Total Hip Arthroplasty

90d*, 1y and 2y*

Layson, Orthop Clin North Am 2024

Cemented stems vs Cementless stems

Overall PPF risk : Classical knowledge

- Cemented stems have significant lower risk of PPF compared to cementless fixation
- Cementless: Early post op
- Cemented: Late post op

Thien, JBJS 2014

Is the risk of femoral failure in osteoporotic patients influenced by the type of fixation in the current era in the US?

Kuyl, JOA 2024

- 8,431 osteoporotic patients included (PearlDiver)
- Primary THA from 2015 to 2022.
- 2,564 patients (13.9%) cemented femoral stem fixation
- 15,867 (86.1%) cementless femoral stem fixation.

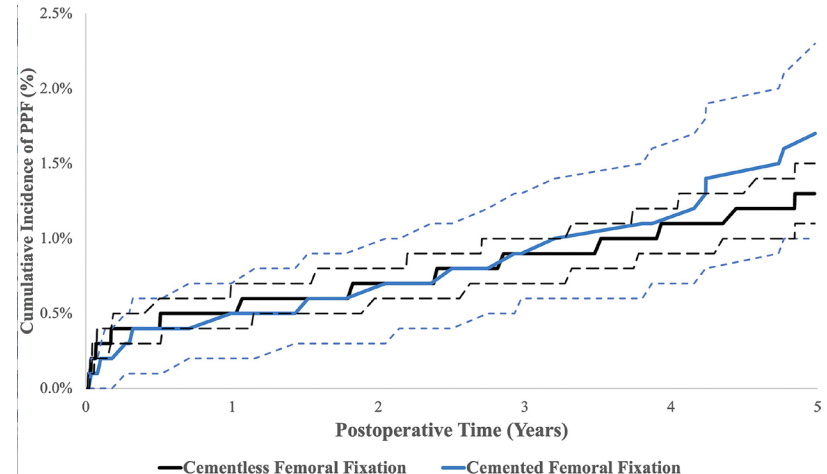
Aseptic loosening more prevalent in cemented stems

No difference in PPF or all aseptic revisions

Table 2. Cumulative Incidence Rate and Cox Proportional Hazard Analysis of 5-Y Periprosthetic Fracture, Mechanical Loosening, and Aseptic Revision for Total Hip Arthroplasty With Cemented Versus Cementless Femoral Fixation.

Outcome	Cemented Femoral Fixation CIR (%)	Cementless Femoral Fixation CIR (%)	Hazard Ratio	95% CI	P Value
5-Year Surgical Outcomes					
Periprosthetic Fracture	1.7	1.3	0.96	0.64 to 1.44	.858
Mechanical Loosening	1.7	0.8	1.79	1.17 to 2.71	.007
Aseptic Revision	2.3	1.4	1.13	0.79 to 1.62	.500

CIR, cumulative incidence rate.



Cementless in the current US scenario is a great option

Specifically in Osteoporotic patients

- A **literature gap** exists regarding the performance of the **Collared Triple-Taper Stem (CTTS)** in osteoporotic patients.
- Recent registry data comparing **CTTS to cemented stems** in *elderly patients* shows **no difference** in periprosthetic fracture risk **Kelly, JOA 2025**
- **Limitation:** This data uses **age as the sole surrogate** for bone quality

Low Risk of Early Femoral Failure in Osteoporotic THA with Cementless Collared Triple Taper Stems: An Early Clinico-Radiographic Analysis

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INTRODUCTION

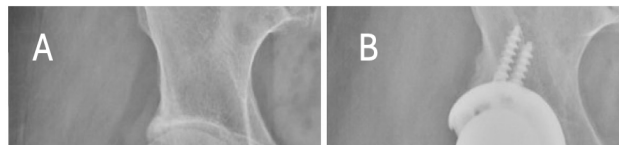
- Osteoporosis is a major risk factor for early femoral failure after elective cementless total hip arthroplasty (THA)
- The performance of cementless collared triple taper stems (CTTS) in patients with confirmed osteoporosis remains unknown
- Our study aimed to **evaluate early clinico-radiographic outcomes of cementless CTTS in osteoporotic patients undergoing elective THA**

METHODS

- **Design:** Retrospective study at a single academic institution (2018 – 2025)

Characteristic	Mean ± SD	Characteristic	%N
DEXA < -2.5	89%	Treatment	81%
T-score	-3.1 ± 0.6	Pre-op	26%
T-score range	-5.7 – -2.5	Peri-op	47%
Time from surgery (months)	6.2 ± 3.3	Post-op	8%
Fragility Fracture	35%	Bisphosphonates PO	52%
Hip, n	11	Bisphosphonates IV	11%
Pelvis, n	2	RANKLi	10%
Spine, n	9	PTH Analog	5%
Wrist, n	4	PTHrP	3%

Table 1. Patient Osteoporosis Characterization

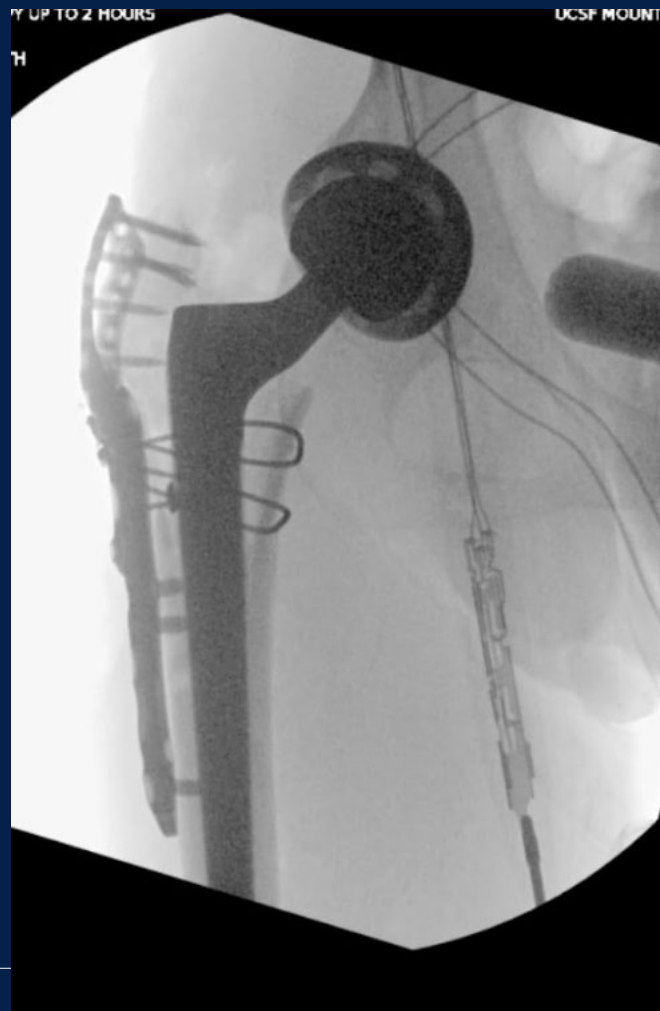


RESULTS

- The morphologic characterization of the included osteoporotic proximal femurs is shown in table 2
- Postoperative CFRs were **high (Zone 1: 0.66; Zone 2: 0.79; Zone 3: 0.76; Zone 4: 0.74)** indicating a satisfactory fit of the CTTS in osteoporotic proximal femur
- **No measurable** stem subsidence (>3 mm) was observed, even in the cases with a proud collar (number?)
- **During the first 90 days, there were no femoral failures**
- With a mean follow-up of **18.5 months**, there was no femoral failures

PPF after a fall. No previous diagnosis of osteoporosis





Femoral neck fractures

The definition of Osteoporotic patient

Revision Risk

- 30-day revision risk due to PFF with CS is ten times lower (0.07%) compared to uncemented stems (0.74%)
- No revisions for CS were reported at 90 and 180 days in a 4,427 THA cohort
- More pronounced effect on FNF favoring cemented

Heckmann, JOA 2021



HIP

FULL ACCESS

2021 John Charnley Award: A protocol-based strategy when using hemiarthroplasty or total hip arthroplasty for femoral neck fractures decreases mortality, length of stay, and complications

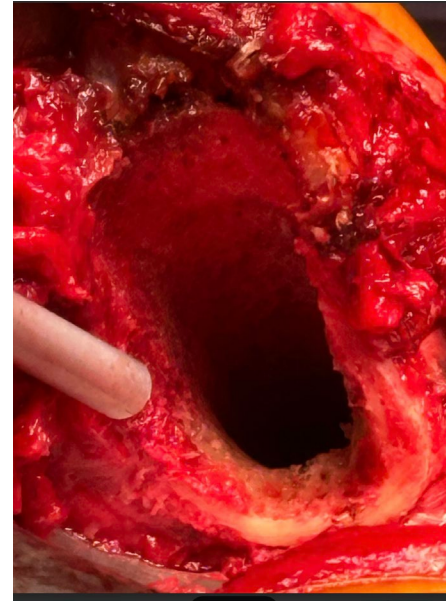
[Heather J. Roberts](#) ▾ [Jeffrey Barry](#) ▾ [Kevin Nguyen](#) ▾ [Thomas Vail](#) ▾

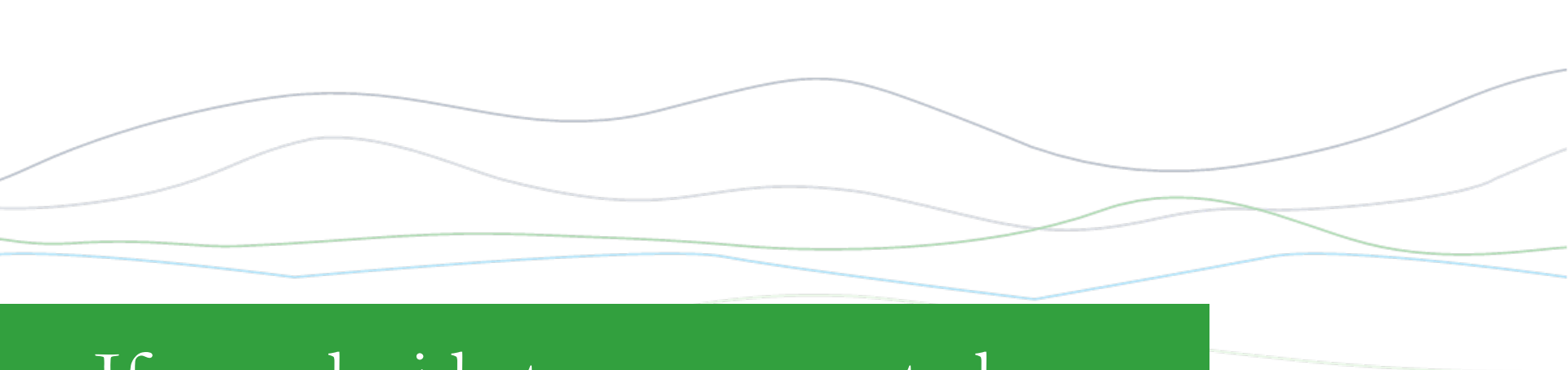
[Utku Kandemir](#) ▾ [Stephanie Rogers](#) ▾ [Derek Ward](#) ▾

Cemented stems are our choice

Line to Line Cementation (French Paradox)

Current personal choice





If you decide to go cemented,
what should you know



Contents lists available at ScienceDirect

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journal homepage: www.arthroplastyjournal.org



2022 AAHKS Symposium

Cemented Femoral Stem Fixation: Back to the Future

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PPF in CS: Low risk, late presentation

- Long-term Risk [Baryeh Arch Orthop Trauma Surg. 2022](#)
- 1.5% PFF risk observed with CS.
- Average time to fracture was 71 months, usually following low-energy falls

Not all cemented stems are equal

⑩ National Joint Registry of England and Wales (2003 a 2013)

⑩ 292.987 CS

⑩ There was a difference in the risk of PPF between the most implanted taper-slip design (0.1%, Exeter V40) and all other taper-slip stems (0.3%), both higher than the composite beam groups (0.05%), which was statistically significant.

Kazi, Acta Orthop 2019

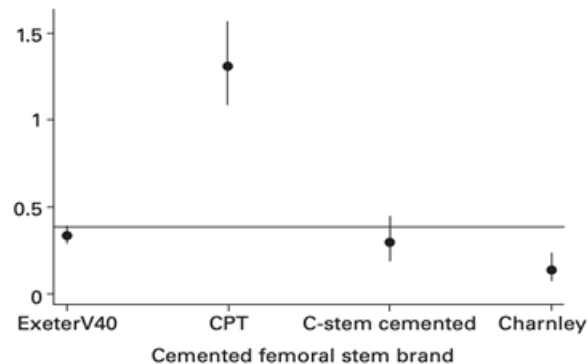


Fig. 2

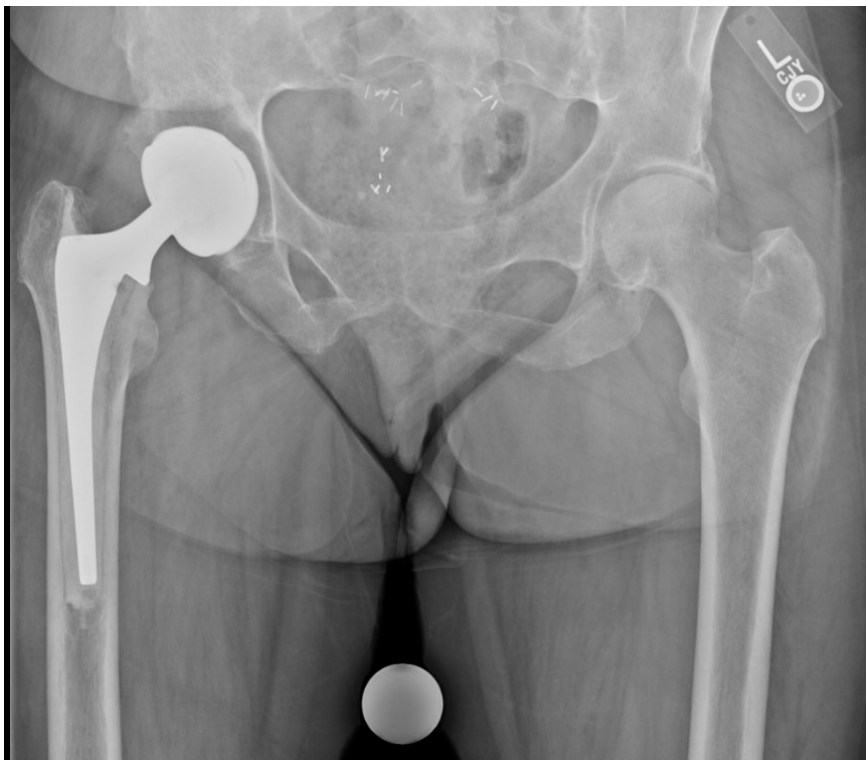
Person-time incidence rates (PTIR) for the four cemented stem brands with the 95% confidence intervals shown. The overall PTIR for all cemented femoral stems is shown as a solid black horizontal line for comparison.

Table III. Univariable and multivariable Poisson regression models of the effect of stem brand and patient factors on revision rate for periprosthetic fracture for cemented femoral brands (based on the cemented sample of brands with $n = 206\,004$)

Brand	Univariable model RR (95 % CI), p-value for model*	Multivariable model 1† RR (95 % CI)	Multivariable model 2 RR (95 % CI)
Exeter V40	1.00	1.00	1.00
C-Stem Cemented	0.88 (0.56 to 1.38)	0.87 (0.55 to 1.37)	0.88 (0.56 to 1.38)
CPT	3.91 (3.09 to 4.95)	3.97 (3.13 to 5.02)	3.93 (3.10 to 4.97)
Charnley	0.41 (0.24 to 0.69), $p < 0.001$	0.41 (0.24 to 0.70)	0.42 (0.25 to 0.70)

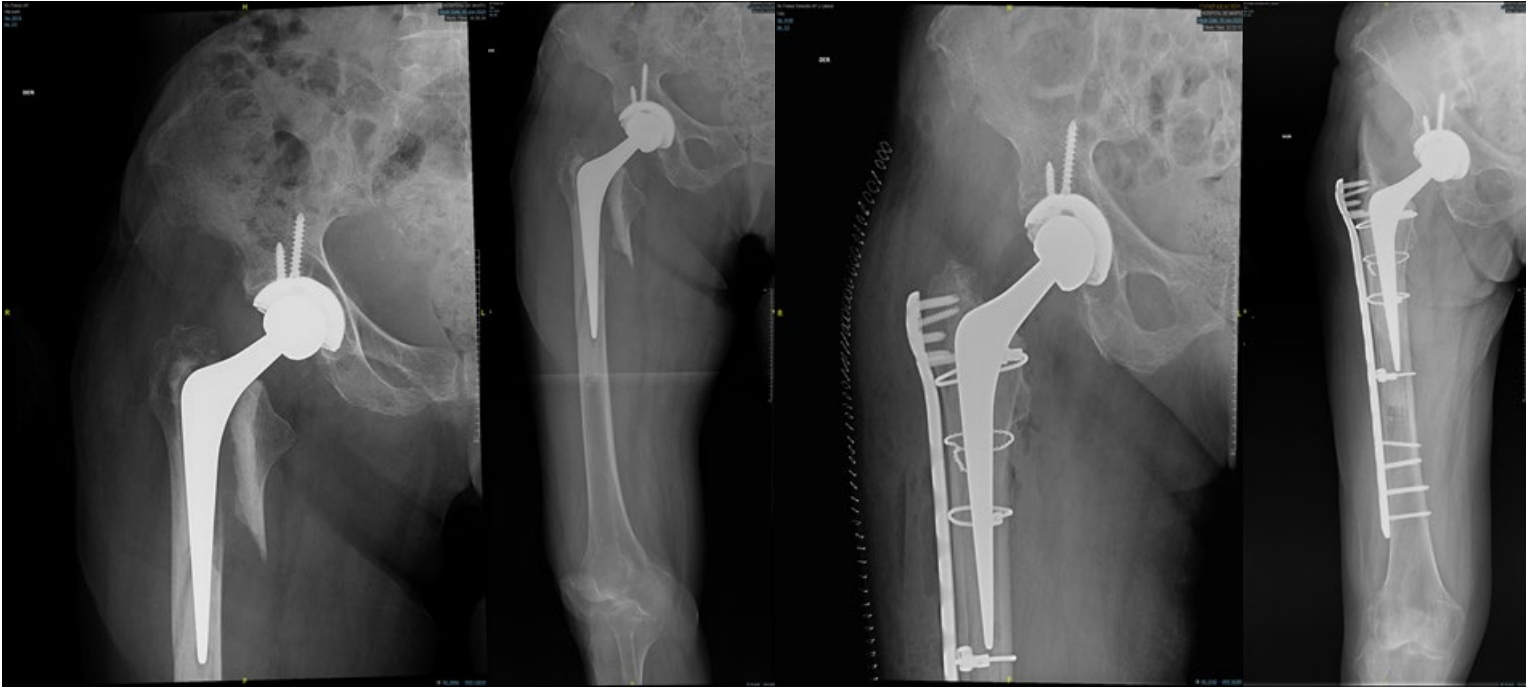
87yo F





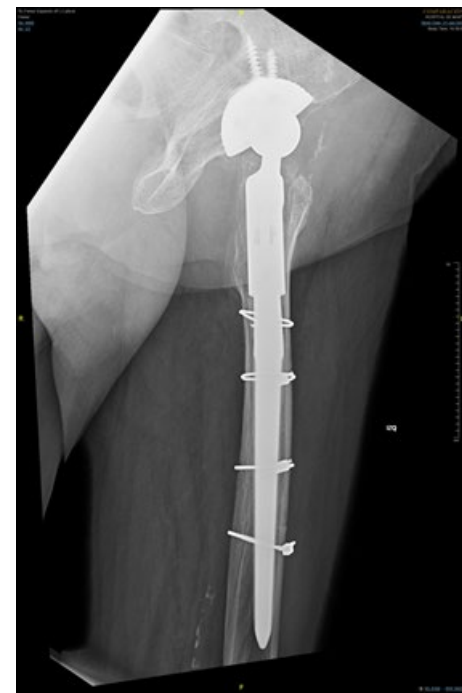


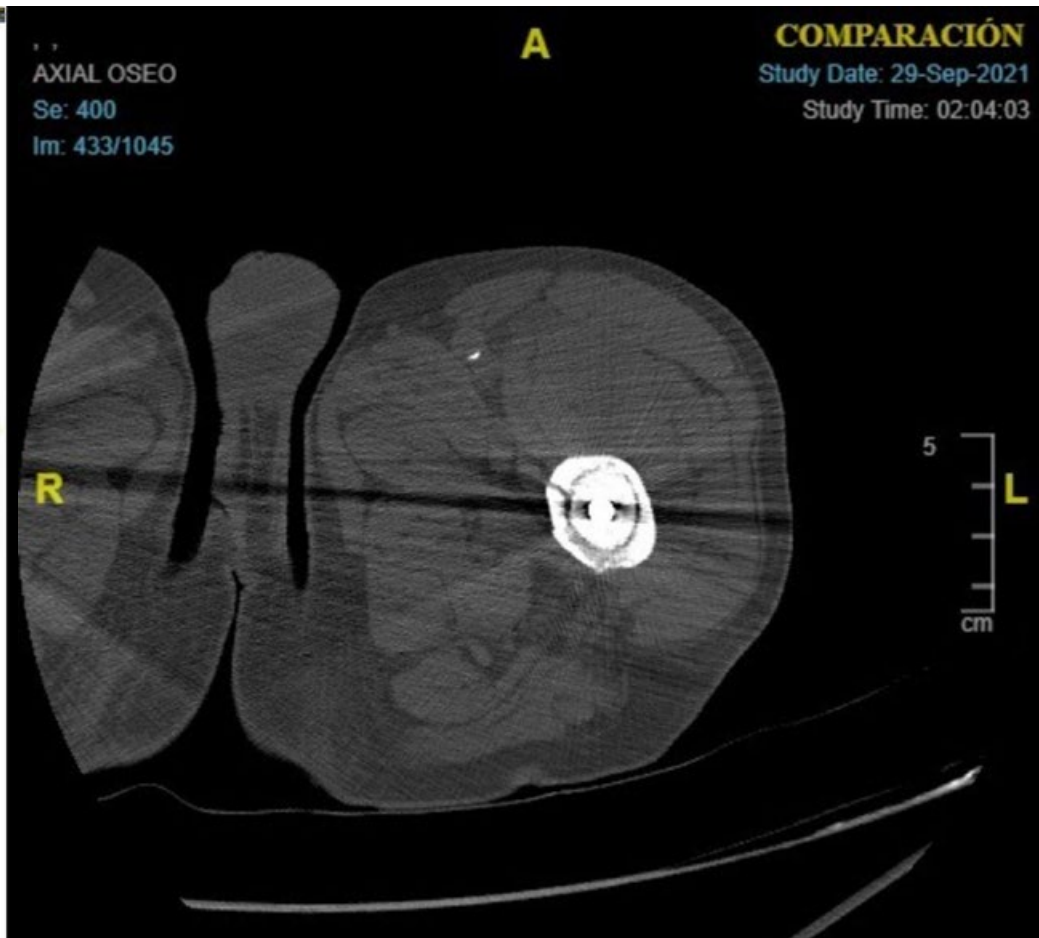
Good Bone cement interface Kwong, Under Review

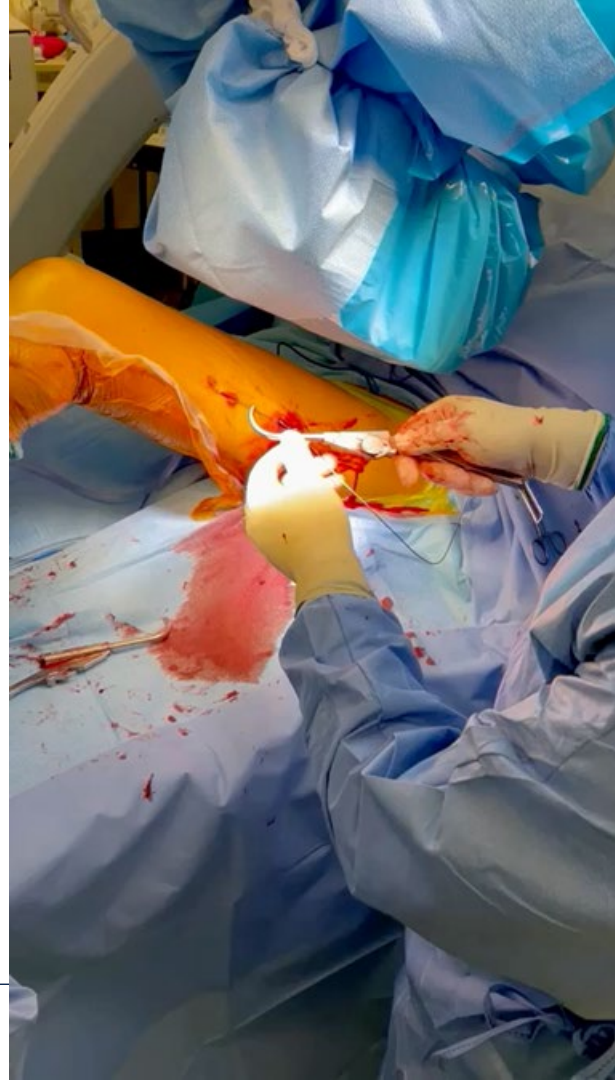


Poor BC interface









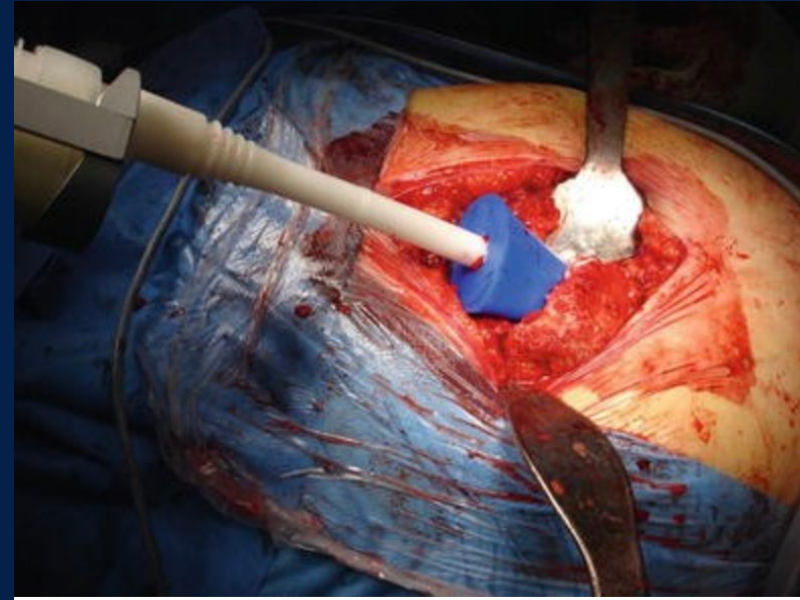
DAA: Some cemented designs perform better than others, scarce data

Which is The Optimal Cemented Stem in Direct Anterior Approach THA? A Systematic Review of Current Evidence. Ghanta, Under Review

Author	Year Published	Journal	Level of Evidence	MINORS	Study Period	No. of Hips	Female Patients (%)	Mean Age	BMI	Mean Follow-up (yrs)	Stem (Cassar-Gheiti Classification)	All-Cause Revision rate (%)	Femoral Aseptic Loosening Revision rate (%)	Periprosthetic fracture rate (%)
Kawarai	2017	International Orthopaedics	IV	18	2013-2015	106	89.6	67.3	23.7	1	Type 3 (Line to Line)	0	0	2
Cidambi	2018	JOA	IV	10	2007-2011	16	-	-	-	-	Type 2 (Shape Closed)	-	6.3	-
Kenanidis	2020	Arthroplasty Today	IV	11	2016-2019	116	57	76	24.8	0.08	Type 3 (Line to Line)	-	-	-
Nizam	2021	SICOT-J	IV	10	2013-2018	215	-	77	28.6	2.9	Type 1 (Force Closed)	-	-	0.5
Ennin	2021	BJJ	III	18	2016-2018	157	70	76	-	1.3	Type 3 (Line to Line)	-	0	0
McGodrick	2021	BJJ	IV	20	2018-2021	58	39	72.8	26.9	0.12	Type 1 (Force Closed)	0	0	0
Miyamoto	2022	JOA	IV	11	2009-2011	151	88.7	62.9	23.8	10.7	Type 3 (Line to Line)	5.3	0	2.6
Pomeroy	2022	JOA	III	20	2016-2021	147	82.3	75.1	27.5	-	Type 1 (Force Closed)	-	-	-
Moskal	2022	JOA	III	10	2013-2020	473	64.7	76	27.3	3.2	Type 1 (Force Closed)	2	0	1.1
Menken	2022	JOA	IV	19	2009-2019	161	91.9	78	22	0.9	Type 2 (Shape Closed)	-	-	0
Shichman	2023	AOTS	IV	20	2016-2021	204	-	-	-	0.12	Type 1 (Force Closed)	-	-	-
Hoskins	2024	Hip International	III	22	2015-2021	10,742	67.1	73.9	27.9	6	Type 1 (Force Closed)	1.6	0.2	0.4
Melman	2024	JOSR	IV	9	2009-2013	175	77	70	28	7	Type 4 (Anatomical)	4.6	3.4	4.6
Simon	2024	AOTS	IV	18	2013-2022	1042	39	-	-	3.9	Type 1 vs 3	1.9	-	-
Vargas-Meouchi	2024	EJOST	III	18	2018-2019	50	60	85.4	28.2	12.4	Type 1 (Force Closed)	6	0	0
Laboudie	2024	BJJ	III	11	2018-2022	416	72.8	77.4	25.3	2.6	Type 3 (Line to Line)	0	0	0
Chadayammuri	2025	JOA	III	19	2016-2018	101	82.9	75	27.2	1.7	Type 3 (Line to Line)	0	0	0

It remains unknown

- The number of cemented stems you have to do annually to be proficient in the current US scenario





Osteoporosis should be recognized as a substantial comorbidity requiring careful **assessment and consideration** during THA planning.

Use the stem you have the more experience with
CTTS are, so far, an excellent alternative to cemented stems
Possibly better than all other cementless designs

39 yo F, Rheum Arthritis

Femur Neck
BMD values= 0.551 T-score= -2.7 Z-score= -2.5

