

Cemented vs. Cementless Femoral Fixation for Total Hip Arthroplasty following Osteoarthritis

Sandeep Singh Bains¹, Jeremy Dubin¹, Daniel Hameed², Zhongming Chen, Rubén Monárrez³, Ethan Remily, Michael A Mont, James Nace, Ronald Emilio Delanois⁴

¹Sinai Hospital, ²Rubin Institute For Advanced Orthopaedics, ³Rubin Institute For Advanced Orthopedics, ⁴Rubin Institute for Advanced Orthopedics

INTRODUCTION:

The optimal mode of femoral fixation in patients who have a total hip arthroplasty (THA) for osteoarthritis (OA) remains controversial in patients aged 65 years and older. Cementless femoral fixation offers shorter operative times and potential for long-term biology fixation while cemented fixation may result in aseptic loosening and be more technically challenging. However, cemented fixation may be associated with lower revision rates, fewer periprosthetic fractures, and lower incidence of thigh pain. We compared the i) baseline demographics between cementless and cemented THA cohorts and ii) incidences of postoperative outcomes at 90-days, 1- and 2-years after performing a 1:1 propensity-matched analysis to control for patient comorbidities in patients aged 65 years and older.

METHODS:

An all-payer, national database was used to identify patients undergoing primary THA; either cementless (n=56,701) or cemented (n=6,283), for osteoarthritis from April 1, 2016 to December 31, 2021 in patients aged 65 years and older. Exclusion criteria included fractures and cancer. Demographics included at baseline were: age, sex, alcohol abuse, Elixhauser Comorbidity Index (ECI), chronic kidney disease (CKD), chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), obesity, and tobacco use. We performed a 1:1 propensity-matched analysis for age, sex, ECI, alcohol abuse, tobacco use, obesity, and diabetes, resulting 6,283 patients in both the cementless and cemented THA cohorts. Postoperative outcomes included: infection, aseptic revision, venous thromboembolism (VTE), wound complications, dislocation, periprosthetic fracture, and aseptic loosening at 90-days, 1- and 2-years. A *P*-value of <0.05 was defined as statistically significant.

RESULTS:

The cemented cohort was older, had more women, and higher incidences of ECI, CKD, COPD, CHF, obesity, and tobacco use, at baseline. After controlling for comorbidities, the cemented cohort had higher rates of infection (4.5 vs. 0.8%, Odds Ratio (OR) 5.9, 95% Confidence Interval (CI) 4.33-7.93, *P*<0.001), aseptic revision (2.9 vs. 2.0%, OR 1.47, 95% CI 1.17-1.85, *P*=0.001), VTE (1.8 vs. 1.3%, OR 1.40, 95% CI 1.05-1.87, *P*<0.001), dislocation (2.9 vs. 1.6%, OR 1.76, 95% CI 1.40-2.28, *P*<0.001), and aseptic loosening (1.5 vs. 0.7%, OR 2.31, 95% CI 1.60-3.32, *P*<0.001) at 90-days. There were similar rates of periprosthetic fracture at all timepoints (all *P*<0.001). At 1- and 2-years, the cemented cohort had higher rates of infection, aseptic revision, dislocation, and aseptic loosening (all *P*<0.001).

DISCUSSION AND CONCLUSION:

A 1:1 propensity-matched analysis of cemented and cementless cohorts for THA demonstrated that cementless fixation had higher rates of infection, aseptic loosening, VTE, dislocation, and aseptic revision. This finding supports the current use of cementless fixation but the ultimate decision regarding fixation type should be based on the proper optimization of the patients' comorbidities, bone quality, and perioperative experience.

Table 1. Demographics and Baseline Characteristic

	Uncemented N=56,701	Cemented N=6,283	p-value
Age (SD)	72 (5.0)	74 (5.1)	<0.001
Sex			<0.001
Female	34,747 (61.3)	4,655 (74.1)	
Male	21,954 (38.7)	1,628 (25.9)	
Alcohol Abuse	2,957 (5.2)	276 (4.4)	<0.001
ECI-3	36,652 (64.6)	4,374 (69.6)	<0.001
CKD	12,782 (22.5)	1,714 (27.3)	<0.001
COPD	19,451 (34.3)	2,312 (36.8)	<0.001
CHF	4,022 (7.1)	581 (9.2)	<0.001
Infectious Anemia	10,588 (18.5)	1,433 (22.8)	<0.001
Dementia	3,225 (5.7)	619 (9.9)	<0.001
Diabetes	22,840 (40.3)	2,509 (39.9)	0.603
Diabetes Complicated	11,317 (20.0)	1,292 (20.6)	0.263
Diabetes Uncomplicated	11,523 (20.3)	1,217 (19.6)	0.425
Hypertension	48,444 (85.6)	5,532 (88.0)	<0.001
Hypothyroidism	18,216 (32.1)	2,245 (35.7)	<0.001
Obesity	36,451 (64.6)	2,603 (41.4)	<0.001
Tobacco Use	26,593 (46.7)	3,715 (59.2)	<0.001

ECI: Elixhauser Comorbidity Index; CKD: Chronic Kidney Disease; CHF: Congestive Heart Failure; COPD: Chronic Obstructive Pulmonary Disease

Table 2. Bivariate analysis of post-operative outcomes

	Uncemented N=6,283	Cemented N=6,283	p-value
90-Day Complications			
PJI	50 (0.8)	282 (4.5)	<0.001
Aseptic Revision	125 (2.0)	182 (2.9)	0.001
SSI	55 (0.9)	107 (1.7)	<0.001
PE	4*	4*	0.773
VTE	79 (1.3)	110 (1.8)	0.028
Wound Complications	59 (0.9)	111 (1.8)	<0.001
Dislocation	102 (1.6)	180 (2.9)	<0.001
PPFx	67 (1.1)	77 (1.2)	0.451
Aseptic Loosening	42 (0.7)	96 (1.5)	<0.001
1 year complications			
PJI	64 (1.0)	307 (4.9)	<0.001
Aseptic Revision	163 (2.6)	234 (3.7)	<0.001
Dislocation	125 (2.0)	232 (3.7)	<0.001
PPFx	81 (1.3)	105 (1.7)	0.089
Aseptic Loosening	57 (0.9)	131 (2.1)	<0.001
2 year Complication			
PJI	67 (1.1)	315 (5.0)	<0.001
Aseptic Revision	181 (2.9)	265 (4.2)	<0.001
Dislocation	140 (2.2)	258 (4.1)	<0.001
PPFx	97 (1.5)	121 (1.9)	0.116
Aseptic Loosening	64 (1.0)	155 (2.4)	<0.001

PJI: Prosthetic Joint Infection; SSI: Surgical Site Infection; PE: Pulmonary Embolism; VTE: Venous Thromboembolism; PPFx: Periprosthetic Fracture

Table 3. Odds ratio of complications

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	OR	95% CI
90-Day Complications		
PJI	5.86	4.33-7.93
Aseptic Revision	1.47	1.17-1.85
SSI	1.96	1.41-2.72
PE	1.40	0.44-4.41
VTE	1.4	1.05-1.87
Wound Complications	1.9	1.38-2.61
Dislocation	1.76	1.40-2.28
PPFx	1.15	0.83-1.60
Aseptic Loosening	2.31	1.60-3.32
1 year complications		
PJI	4.99	3.80-6.55
Aseptic Revision	1.45	1.19-1.78
Dislocation	1.89	1.52-2.35
PPFx	1.3	0.97-1.74
Aseptic Loosening	2.33	1.70-3.18
2 year Complication		
PJI	4.9	3.75-6.39
Aseptic Revision	1.48	1.22-1.80
Dislocation	1.88	1.52-2.32
PPFx	1.25	0.96-1.64
Aseptic Loosening	2.43	1.81-3.25

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