Cemented vs. Cementless Femoral Fixation for Total Hip Arthroplasty following Femoral Neck Fracture

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INTRODUCTION:

Femoral neck fractures remain one of the most common fractures in the elderly population aged 65 years and older, demanding early mobilization as soon as possible to maximize patient outcomes. Optimal fixation following femoral neck fracture remains controversial between cementless and cemented primary total hip arthroplasty (THA). Recent data has shown that cementless primary total hip arthroplasty (THA) is used exclusively in more than 93% of primary THAs with the United States. However, cemented fixation may be associated with lower revision rates, fewer periprosthetic fractures, lower incidence of thigh pain, and superior long-term implant survival in the elderly. As such, 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 and older.

METHODS:

A review of an all-payer, national database was used to identify patients undergoing primary THA, either cementless (n=2,842) or cemented (n=1,124) for femoral neck fracture from April 1, 2016 to December 31, 2021 in patients aged 65 and older. Baseline demographics included: 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. A 1:1 propensity matched-analysis was performed for age, sex, ECI, alcohol abuse, tobacco use, obesity and diabetes, resulting in n=1,124 in both the cementless and cemented THA cohorts. Postoperative outcomes included: infection, aseptic revision, venous thromboembolism (VTE), wound complication, 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:

At baseline, the cemented cohort was older, had more women, and higher incidences of ECI>3, CKD, COPD, CHF, and obesity. The cementless and cemented cohorts had similar rates of infection, wound complication, dislocation, and aseptic loosening (*P*>0.05). The cemented cohort had lower rates of periprosthetic fracture (2.5 vs. 4.4%, odds ratio (OR) 0.56, 95% Confidence interval (CI) 0.35-0.90, *P*=0.02) and higher rates of VTE (2.9 vs. 1.2%, OR 2.4, 95% CI 1.28-4.51, *P*=0.01) at 90-days. At 1-year and 2-years, the cementless cohort had higher rates of aseptic revision, 3.0 vs. 1.4%, *P*=0.02 and 3.4% vs. 1.8%, p=0.024, respectively.

DISCUSSION AND CONCLUSION: A large, nationally representative database of propensity-matched cohorts showed that cemented fixation for THA had lower rates of periprosthetic fracture and aseptic revision. This data may provide additional information to guide surgeons toward cemented fixation following femoral neck fracture.

Table 1. Demographics and Baseline characteristic

	Hip Fracture Uncemented	Hip Fracture Cemented	p-value
	N=2,842	N=1,124	
Age (SD)	75 (5.3)	76 (4.6)	<0.001
Sex			0.002
Female	1,908 (67.1)	812 (72.2)	
Male	934 (32.9)	312 (27.8)	
Alcohol Abuse	294 (10.3)	91 (8.1)	0.036
ECI > 3	2,221 (78.1)	908 (80.8)	0.003
CKD	916 (32.2)	420 (37.4)	0.002
COPD	1,200 (42.2)	530 (47.2)	0.005
CHF	352 (12.4)	193 (17.2)	<0.001
Deficiency Anemia	842 (29.6)	382 (34.0)	0.008
Dementia	679 (23.9)	343 (30.5)	<0.001
Diabetes	1,158 (40.7)	461 (41.0)	0.905
Diabetes Complicated	686 (24.1)	282 (25.1)	0.557
Diabetes Uncomplicated	933 (32.8)	373 (33.2)	0.859
Hypertension	2,533 (89.1)	992 (88.3)	0.465
Hypothyroidism	971 (34.2)	439 (39.1)	0.004
Obesity	727 (25.6)	234 (20.8)	0.002
Tobacco Use	1,379 (48.5)	512 (45.6)	0.098

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

	Hip Fracture Uncemented	Hip Fracture Cemented	p-value
	N=1,124	N=1,124	
90-Day Complications			
PJI			
Aseptic Revision	24 (2.1)	12 (1.1)	0.065
SSI	21 (1.9)	16 (1.4)	0.507
PE	*(*)	*(*)	
VTE	14 (1.2)	33 (2.9)	0.008
Wound Complications	15 (1.3)	19 (1.7)	0.604
Dislocation	47 (4.2)	46 (4.1)	1.000
PPFx	49 (4.4)	28 (2.5)	0.020
Aseptic Loosening	*(*)	*(*)	0.371
1 year complications			
PJI			
Aseptic Revision	34 (3.0)	16 (1.4)	0.015
Dislocation	48 (4.3)	53 (4.7)	0.684
PPFx	56 (5.0)	40 (3.6)	0.118
Aseptic Loosening	*(*)	*(*)	0.070
2 year Complication			
PJI			
Aseptic Revision	38 (3.4)	20 (1.8)	0.024
Dislocation	50 (4.4)	57 (5.1)	0.552
PPFx	64 (5.7)	41 (3.6)	0.028
Aseptic Loosening	12 (1.1)	*(*)	0.038

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

Table 3. Odds ratio of complications

	Hip Fracture Cemented	
	OR	95% CI
90-Day Complications		
PJI		
Aseptic Revision	0.49	0.25-0.99
SSI	0.76	0.39-1.46
PE	1.00	0.06-16.01
VTE	2.4	1.28-4.51
Wound Complications	1.27	0.64-2.51
Dislocation	0.98	0.65-1.48
PPFx	0.56	0.35-0.90
Aseptic Loosening	0.25	0.03-2.23
1 year complications		
PJI		
Aseptic Revision	0.46	0.25-0.84
Dislocation	1.11	0.74-1.65
PPFx	0.7	0.46-1.07
Aseptic Loosening	0.22	0.05-1.02
2 year Complication		
PJI		
Aseptic Revision	0.52	0.30-0.90
Dislocation	1.15	0.78-1.69
PPFx	0.63	0.42-0.94
Aseptic Loosening	0.25	0.07-0.88

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