Complications and Costs in Simultaneous Versus Staged Bilateral Total Hip Arthroplasty Within a 90-Day Period

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INTRODUCTION:

Patients seeking bilateral total hip arthroplasty (THA) in a short timeframe might consider surgery simultaneously (sim bTHA) or in a staged, compressed fashion (sc bTHA) with <90 days between procedures. This study examines complications and facility costs associated with simultaneous vs staged bTHA.

METHODS:

Retrospective analysis using the PINC AI Healthcare Database (2016-2022), compared patients undergoing (1) sim bTHA with (2) sc bTHA. Outcomes included CMS-defined complications, facility costs from the index hospitalization(s), and length of stay for sim bTHA or the combined hospitalizations for sc bTHA. Statistical analyses included chi-square tests for categorical variables and t-tests for continuous measures. Regression analysis was used to determine the association between timing of bilateral surgery and complications and costs while controlling for age, payer status, sex, race/ethnicity, and Elixhauser comorbidity index.

RESULTS:

We included 7,403 patients: 2,331 underwent sim bTHA, and 5,072 underwent sc bTHA. Simultaneous THA patients were younger (59 vs. 62 years, p<0.001) with fewer comorbidities (Elixhauser Index: 1.37 vs. 2.24, p<0.001). In univariate analysis, complication rates differed significantly (simultaneous: 2.9%, staged primary: 1.1%, staged secondary: 3.7%, p<0.001). In regression analysis, no significant difference in complications was observed (OR 0.96, 95% CI: 0.72-1.29, p=0.79). Simultaneous THA had longer length of stay (2.33 vs. 1.63/1.55 days, p<0.001), higher non-home discharge rates (19.2% vs. 8.7%/7.3%, p<0.001), and lower total index costs ($25,114 vs. $15,083/$14,951, p<0.001). Multivariable regression confirms lower index costs for simultaneous THA ($4,348 lower, 95% CI: -4,857 to -3,838, p<0.001).

DISCUSSION AND CONCLUSION:

Sim bTHA showed no increased complication risk compared to sc bTHA in adjusted analyses. Index costs were significantly lower for sim bTHA compared to combined costs of sc bTHA. Proper patient selection remains paramount.

Table-1: Baseline demographics, clinical characteristics, hospital characteristics, complications, and outcomes after primary bilateral total hip arthroplasty by simultaneous and staged cohorts in the PINC AI Healthcare Database (2016-2022, N=7,403)

Variable	Simultaneous Bilateral THA (N=2,331)	Staged THA – Primary (N=5,072)	Staged THA – Secondary (N=5,072)	p-value
Age in years (Mean ± SE)	59 (0.2)	62 (0.1)	-	<0.001
Sex				<0.001
Male	1298 (55.7)	2496 (49.2)	-	
Female	1033 (44.3)	2576 (50.8)	-	
Payer status				<0.001
Medicaid	119 (5.1)	342 (6.7)	-	
Medicare	676 (29)	1971 (38.9)	-	
Other	117 (5)	195 (3.8)	-	
Private	1392 (59.7)	2536 (50)	-	
Uninsured	27 (1.2)	28 (0.6)	-	
Race				<0.001
Asian	119 (5.1)	49 (1)	-	
Black	218 (9.4)	442 (8.7)	-	
Other	61 (2.6)	142 (2.8)	-	
White	1933 (82.9)	4439 (87.5)	-	
Ethnicity				<0.001
Hispanic	79 (3.4)	130 (2.6)	-	
Non-Hispanic	2252 (96.6)	4942 (97.4)	-	
Elixhauser Comorbidity Index (Mean ± SE)	1.37 (0.03)	2.24 (0.02)	-	<0.001
Length of Stay (Mean ± SE)	2.33 (0.03)	1.63 (0.01)	1.55 (0.01)	<0.001
Non-Home Discharge	448 (19.2)	440 (8.7)	368 (7.3)	<0.001
Index Cost	25,114 (189)	15,083 (76)	14,951 (78)	<0.001
90 Day Readmissions	40 (5.4)	-	77 (3.2)	<0.001
Complications	68 (2.9)	56 (1.1)	190 (3.7)	<0.001
Acute Myocardial Infarction	5 (0.2)	4 (0.1)	14 (0.3)	0.51
Pneumonia	7 (0.3)	12 (0.2)	29 (0.6)	0.03
Sepsis or Shock	21 (0.9)	5 (0.1)	26 (0.5)	0.15
Surgical Site Bleed	1 (0.0)	8 (0.2)	15 (0.3)	0.01
Pulmonary Embolism	7 (0.03)	8 (0.2)	13 (0.3)	0.98
Mechanical	14 (0.6)	11 (0.2)	53 (1.0)	0.05
Joint or Wound Infection	15 (0.6)	14 (0.3)	59 (1.2)	0.01

-Column data reported as number of patients (% proportion) or mean ± standard error (SE)

Table-2: Multivariable logistic regression for patient demographics and clinical characteristics on complications in patients simultaneous versus staged primary bilateral total hip arthroplasty in the PINC AI Healthcare Database (2016-2022, N=7,403)

Variable	Odds Ratio	95% Confidence Interval	p-value
Simultaneous THA	**0.96**	**0.72-1.29**	**0.79**
Age in years (Unit of Change 10)	0.93	0.79-1.08	0.33
Sex			
Male	Ref		
Female	0.81	0.63-1.03	0.09
Payer status			
Medicaid	2.07	1.36-3.15	<0.001
Medicare	1.47	1.06-2.02	0.02
Private	Ref		
Other	1.24	0.67-2.29	0.49
Uninsured	1.14	0.27-4.85	0.86
Race			
Asian	1.17	0.50-2.72	0.71
Black	0.85	0.55-1.31	0.45
Other	1.23	0.62-2.43	0.56
White	Ref		
Ethnicity			
Hispanic	0.87	0.41-1.87	0.73
Non-Hispanic	Ref		
Elixhauser Comorbidity Index (Mean ± standard error)	1.38	1.30-1.47	<0.001

Table-3: Multivariable logistic regression for patient demographics and clinical characteristics on index costs in patients simultaneous versus staged primary bilateral total hip arthroplasty in the PINC AI Healthcare Database (2016-2022, N=7,403)

Variable	Coef	95% Confidence Interval	p-value
Simultaneous THA	**-4,348**	**-4,857 – -3,838**	**<0.001**
Age in years (Unit of Change 10)	-219	-519 – 81	0.15
Sex			
Male	Ref		
Female	448	-11 – 906	0.06
Payer status			
Medicaid	1,624	655 – 2,593	0.001
Medicare	429	-190 – 1,049	0.17
Private	Ref		
Other	-392	-1,536 – 753	0.50
Uninsured	-479	-3,122 – 2,164	0.72
Race			
Asian	-652	-2,193 – 888	0.41
Black	1,837	1,031 – 2,643	<0.001
Other	1,528	110 – 2,947	0.04
White	Ref		
Ethnicity			
Hispanic	3,139	1,735 – 4,544	<0.001
Non-Hispanic	Ref		
Elixhauser Comorbidity Index (Mean ± standard error)	611	467 – 754	<0.001