

Simultaneous versus Staged Bilateral Total Hip Arthroplasty – A Matched Cohort Analysis of Revenue and Contribution Margin

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INTRODUCTION:

Though previous studies have demonstrated improved cost benefits associated with simultaneous vs. staged bilateral total hip arthroplasty (simBTHA and staBTHA), further investigation is needed regarding revenues and contribution margins (CM) of these procedures. In this study, we compared revenue, CM, and surgical outcomes between simBTHA and staBTHA.

METHODS: All patients who underwent simBTHA (both procedures completed the same day) and staBTHA (procedures completed on different days within one year) between 2011 and 2021 at a single high-volume orthopaedic specialty hospital were identified. Of the 1,517 identified patients (n=139 simBTHA, n=1,378 staBTHA), 232 were included in a 1:1 propensity match based on baseline demographics (116 per cohort). Revenue, costs, CM, and surgical outcomes were compared between cohorts.

RESULTS: SimBTHA procedures had significantly lower total costs (p<0.001), direct costs (p<0.001), and patient revenue (p=0.036) than staBTHA procedures. There was no significant difference in CM between groups (p=0.361). Additionally, there were no significant differences in length of stay (p=0.173), operative time (p=0.438), 90-day readmissions (p=0.701), 90-day revisions (p=0.313), or all-cause revisions (p=0.701) between cohorts.

DISCUSSION AND CONCLUSION:

Though simBTHA procedures have lower revenues than staBTHA, they also have lower costs resulting in similar CM between procedures. As both procedures have similar postoperative complication rates, further research is required to evaluate specifically which patients may benefit from simBTHA versus staBTHA regarding clinical and patient-reported outcomes.

Characteristic	simBTHA (%) (n=139)	staBTHA (%) (n=1,378)	p-value
Sex			
Male	85 (61.2)	564 (40.9)	<0.001*
Female	54 (38.8)	814 (59.1)	
Mean Age (range)	55.8 (28 to 84)	65.1 (10 to 91)	<0.001*
Race			
White	95 (68.3)	1012 (73.4)	0.586
African American	29 (21.4)	189 (13.7)	
Asian	9 (6.2)	38 (2.8)	
Other	2 (1.1)	14 (1.0)	
Smoking Status			
Current	17 (12.3)	117 (8.7)	0.525
Former	90 (64.8)	577 (41.9)	
Never	32 (23.0)	693 (50.4)	
Insurance Status			
Medicare	539 (39.1)	539 (39.1)	<0.001*
Medicaid	11 (7.9)	131 (9.5)	
Private	100 (72.1)	694 (50.4)	
Workers' Comp	2 (1.4)	14 (1.0)	
ASA			
1	18 (12.9)	90 (6.6)	<0.001*
2	114 (82.0)	917 (66.9)	
3	7 (5.0)	355 (25.9)	
4	0 (0.0)	9 (0.7)	
Mean BMI (range)	27.4 (17.0 to 40.0)	29.2 (15.0 to 51.0)	<0.001*
CCL (mean, SD)	1.3 (1.3)	2.3 (2.0)	<0.001*

simBTHA, simultaneous bilateral total hip arthroplasty; staBTHA, staged bilateral total hip arthroplasty; ASA, American Society of Anesthesiologists; BMI, body mass index; CCL, Clavien-Corcos Complication Index; SD, standard deviation.

*p-value < 0.05

Characteristic	Bilateral THA (%) (n=116)	Staged THA (%) (n=116)	p-value
Sex			
Male	68 (58.6)	52 (44.8)	0.036
Female	48 (41.4)	64 (55.2)	
Mean Age (range)	54.7 (23 to 74)	55.6 (19 to 76)	0.373
Race			
White	78 (67.2)	76 (65.5)	0.989
African American	17 (14.7)	17 (14.7)	
Asian	2 (1.7)	2 (1.7)	
Other	9 (7.8)	23 (19.8)	
Smoking Status			
Current	13 (11.2)	15 (12.9)	0.849
Former	44 (37.9)	46 (39.7)	
Never	59 (50.9)	55 (47.4)	
Insurance Status			
Medicare	17 (14.7)	12 (10.3)	0.150
Medicaid	11 (9.5)	20 (17.2)	
Private	90 (77.6)	82 (70.7)	
Workers' Comp	0 (0.0)	2 (1.7)	
ASA			
1	12 (10.3)	13 (11.2)	0.697
2	99 (84.5)	94 (81.0)	
3	6 (5.2)	9 (7.8)	
4	0 (0.0)	0 (0.0)	
Mean BMI (range)	27.4 (17.0 to 40.0)	28.1 (17.0 to 44.5)	0.217
CCL (mean, SD)	1.4 (1.3)	1.3 (1.0)	0.502
Mean Follow-up Duration (years, range)	4.8 (1.0 to 10.4)	4.6 (1.0 to 10.1)	0.565

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*p-value < 0.05

Characteristic	Simultaneous (n=116) vs. Staged THA (n=116)	p-value
Patient Revenue	-10.9% [-20.4, -0.7]	0.036*
Total Cost	-20.8% [-27.0%, -14.6]	<0.001*
Direct Cost	-18.5% [-24.6, -12.3]	<0.001*
Contribution Margin	-6.8% [-11.6, -2.0%	0.361

THA, total hip arthroplasty; CI, confidence interval.

*p-value < 0.05

Characteristic	simBTHA (%) (n=116)	staBTHA (%) (n=116)	p-value
Mean LOS (days, range)	3.4 (0.0 to 10.0)	3.0 (0.0 to 36.5)	0.173
Mean Operative Time (min, range)	189.3 (97 to 318)	183.5 (73 to 466)	0.438
90 Day Readmissions			
Superficial SSI	3 (2.6)	4 (3.4)	0.701
SSI	0 (0.0)	1 (0.9)	1.000
Periprosthetic Fracture	2 (1.7)	0 (0.0)	0.156
Non-orthopedic	0 (0.0)	2 (1.7)	0.156
90 Day VTEs			
PE	0 (0.0)	0 (0.0)	1.000
Prosthetic Fracture	1 (0.9)	1 (0.9)	1.000
All-Cause Revisions			
PE	4 (3.4)	3 (2.6)	0.701
Periprosthetic Fracture	1 (0.9)	2 (1.7)	0.561
Acrylic Lin loosening	2 (1.7)	0 (0.0)	0.156
Type of Revision Procedure			
DAIR	1 (0.9)	2 (66.7)	0.270
Aspiric	3 (2.6)	1 (33.3)	

simBTHA, simultaneous bilateral total hip arthroplasty; staBTHA, staged bilateral total hip arthroplasty; LOS, length of stay; min, minutes; SSI, surgical site infection; PE, prosthetic joint infection; VTE, venous thromboembolism; DAIR, debridement, antibiotics, irrigation, and resection.