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Complications - Other

Same-Day Surgery Does Not Increase Deep Infection Risk in Bilateral Total Hip Arthroplasty Patients

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ABSTRACT

Background: Patients with bilateral hip disease may undergo same-day or staged bilateral total hip arthroplasty (THA). Our purpose was to compare the odds and identify risk factors for deep periprosthetic joint infection (PJI) among patients undergoing same-day vs staged bilateral THA (within 1 year or more than 1 year apart).

Methods: Administrative data for patients subjected to same-day and staged bilateral THA between January 1999 and December 2013 were retrieved. Patients with subsequent PJI were identified. Mean follow-up was 112.6 months (range, 23-201). A logistic regression model was constructed to determine differences in odds for infection between groups and risk factors for PJI.

Results: We identified 1808 patients treated with same-day bilateral THA, 2082 patients treated with staged THAs within 1 year, and 2760 patients treated with staged THAs more than 1 year apart. Patients treated with same-day procedures had similar odds for PJI compared to those treated with staged THAs within 1 year (odds ratio [OR] = 0.632, 95% confidence interval [CI] [0.203, 1.962]), or more than 1 year apart (OR = 1.391, 95% CI [0.516, 3.746]). Women had 66.1% lower odds for PJI than men (OR = 0.339, 95% CI [0.16, 0.72]). Patients with inflammatory arthritis had 632% higher odds for PJI than patients with degenerative arthritis (OR = 7.321, 95% CI [1.912, 28.028]). Allogeneic transfusion was associated with 166% higher odds for PJI (OR = 2.661, 95% CI [1.198, 5.911]).

Conclusion: Same-day bilateral THA is not associated with increased odds for PJI compared to staged procedures. Male gender, inflammatory etiology, and allogeneic transfusion are significant risk factors for PJI in patients undergoing same-day or staged bilateral THA.

Many patients experiencing degenerative arthritis of the hip present with involvement of both sides [1]. These patients may be treated with same-day or staged bilateral total hip arthroplasty (THA). The decision to perform same-day procedures is usually based on appropriate preoperative patient screening. Younger patients with better health are commonly candidates for same-day bilateral THA [2]. This selected population may be benefited by same-day bilateral THA, by means of shorter hospitalization, single anesthesia for both procedures, faster recovery, and favorable rehabilitation [3]. Moreover, this approach has been associated with similar morbidity [2-8] and lower costs [9] compared to staged procedures.

On the other hand, for patients not qualified for same-day surgery, there is limited evidence to support specific guidelines with regard to the optimal staging interval [10,11]. Generally, this decision is individualized, after careful evaluation of surgical risk before each procedure.

As expectations after THA are high [12], the occurrence of a periprosthetic joint infection (PJI) can be overwhelming to the

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patient. Both the condition itself and its treatment, consisting of serial interventions and antibiotic administration, have an enormous psychosocial and economic impact [13]. Despite our increased knowledge and available preventive measures, including prophylactic antibiotics, body exhaust suits, laminar air flow rooms, and so forth, PJI prevalence continues to range between 1% and 3% [14,15]. Risk factors for infection after THA have been previously reported [16-18]. However, there is insufficient evidence regarding risk factors for PJI in the subgroup of patients with bilateral hip arthritis undergoing same-day or staged bilateral THA.

Therefore, the objectives of the present study were to: (1) compare the odds and (2) identify risk factors for deep PJI of the hip among patients undergoing same-day bilateral THA vs staged procedures, within 1 year or more than 1 year apart.

Methods

Using our institution's administrative database, all admissions with a principal procedure of primary total hip arthroplasty (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] 81.51) were sorted, in a period spanning from January 1999 to December 2013. An institutional review board approval was obtained for the present study. Patients with two 81.51 procedure codes as per ICD-9-CM coding system on the same procedure date were included in the same-day bilateral THA group. In addition, patients with two 81.51 procedures on different dates were divided into 2 groups: (1) staged bilateral THA within 1 year and (2) staged bilateral THA with the 2 procedures being more than 1 year apart. We excluded patients with a single THA, patients with 2 procedures within the same hospital stay, and patients submitted to revision surgery for a reason other than PJI of the hip in the period between the 2 primary THAs.

All ICD-9-CM codes referring to primary and secondary diagnoses, as well as procedures were recorded. Data regarding patient demographics, including age and sex, and length of stay (LOS) were also collected. In patients undergoing staged procedures, the cumulative LOS of both hospitalizations was taken into account. The Deyo modification of the Charlson Comorbidity Index was calculated, using the ICD-9-CM diagnosis codes. The number of blood transfusion units was determined using ICD-9-CM codes 99.0X. In addition, allogeneic blood units transfused were calculated and included in the analysis.

We identified patients from all aforementioned groups that subsequently developed a deep PJI of the hip, requiring either irrigation/debridement with modular part exchange or 2-stage exchange arthroplasty. This was done using a prospectively collected database of deep PJIs of the hip, treated in our institution during the same period. The infection rates in the 3 groups (same-day, staged within 1 year, and staged more than 1 year apart) were calculated and compared.

Using the criteria mentioned previously, a total number of 6650 patients were included in our study. There were 2925 men and 3725 women, with a mean age of 61.3 ± 12.2 years. More specifically, 1808 patients (27.2%) underwent same-day bilateral THA, 2082 patients (31.3%) had staged procedures within 1 year, whereas 2760 patients (41.5%) were staged more than 1 year apart (Table 1). The mean follow-up was 112.60 ± 48.13 months (range: 23-201). Mean LOS was 5.2 ± 2.5 days for same-day bilateral THA patients, 8.1 ± 2.6 days for patients staged within 1 year, and 8.1 ± 2.9 days for patients staged more than 1 year apart. Degenerative arthritis was the primary diagnosis for 5912 patients (88.9%) (Table 1). There were 3966 patients (59.6%) receiving blood transfusions. In addition, 994 patients (14.9%) were transfused with allogeneic blood (Table 1). The mean time between stages was 248.9 ± 76.6 days for patients staged within 1 year and 1710 ± 849.4 days for patients staged more than 1 year apart.

Table 1
Clinical Characteristics of Patients Treated With Same-Day Bilateral THA and Staged Bilateral THA Within 1 Year or More Than 1 Year Apart.

Variable[a]	Same Day	Staged Within 1 y	Staged More than 1 y Apart	*P*-Value
Patient age (y)	56.3 ± 12.1	63.8 ± 12.5	62.8 ± 11.0	.0455*
Gender				
Male	930 (51.4)	835 (40.1)	1160 (42.0)	<.0001*
Female	878 (48.6)	1247 (59.9)	1600 (58.0)	
Deyo index	0.3 ± 0.9	0.4 ± 1.0	0.4 ± 0.9	.1485
LOS (d)	5.2 ± 2.5	8.1 ± 2.6	8.1 ± 2.9	.0004*
Primary diagnosis				
Degenerative	1540 (85.2)	1840 (88.4)	2532 (91.7)	<.0001*
Inflammatory	52 (2.9)	38 (1.8)	43 (1.5)	
Aseptic necrosis	140 (7.7)	118 (5.7)	79 (2.9)	
Traumatic arthropathy	6 (0.3)	14 (0.7)	46 (1.7)	
Other[b]	70 (3.9)	72 (3.4)	60 (2.2)	
Patients transfused	1461 (80.8)	931 (44.7)	1574 (57.0)	<.0001*
Units of transfused blood	1.2 ± 1.1	1.1 ± 1.2	1.1 ± 1.1	.9598
Patients transfused with allogeneic blood	523 (28.9)	288 (13.8)	183 (6.6)	<.0001*

THA, total hip arthroplasty; LOS, length of stay; SD, standard deviation.
Statistically significant values are marked with an asterisk.
[a] Continuous variables are expressed as mean ± SD. Categorical variables are expressed as n (%).
[b] Other diagnoses include congenital hip dislocation, multiple epiphyseal dysplasia, localized secondary osteoarthritis, and so forth.

Twenty-eight patients (0.4%) of our study population developed a deep PJI. Patients with infection included 17 men and 11 women, with a mean age of 64.4 ± 15.1 years (Table 2). Of those, 9 patients (0.5%) were from the same-day bilateral THA group, 5 patients (0.25%) from the staged within 1 year group, and 14 patients (0.51%) from the staged more than 1 year apart group (Table 3). The mean time to infection was 708.0 ± 897.6 days for the same-day bilateral THA group, 830.0 ± 946.2 days for the staged THA within 1 year and 989.0 ± 1042.1 days for the patients staged more than 1 year apart. In the staged within 1 year group, 1 infection (20%) developed before the second procedure, whereas in the staged more than 1 year apart group there were 11 infections (57.89%) occurring before second stage. Among infected patients, there was no bilateral

Table 2
Clinical Characteristics of Noninfected and Infected Patients.

Variable[a]	Noninfected	Infected	*P*-Value
Patient age (y)	61.3 ± 12.2	64.4 ± 15.1	.131
Gender			
Male	2908 (43.9)	17 (60.7)	.0739
Female	3714 (56.1)	11 (39.3)	
Deyo index	0.3 ± 0.9	0.5 ± 1.2	.2934
LOS (d)	7.3 ± 3.0	6.9 ± 2.6	.4625
Primary diagnosis			
Degenerative	5889 (88.9)	23 (82.1)	.0418*
Inflammatory	131 (2.0)	2 (7.2)	
Aseptic necrosis	337 (5.1)	0 (0.0)	
Traumatic arthropathy	66 (1.0)	0 (0.0)	
Other[b]	199 (3.0)	3 (10.7)	
Patients transfused	3949 (59.6)	17 (60.7)	.9075
Units of transfused blood	1.1 ± 1.1	1.4 ± 1.7	.7774
Patients transfused with allogeneic blood	986 (14.9)	8 (28.6)	.058

LOS, length of stay; SD, standard deviation.
Statistically significant values are marked with an asterisk.
[a] Continuous variables are expressed as mean ± SD. Categorical variables are expressed as n (%).
[b] Other diagnoses include congenital hip dislocation, multiple epiphyseal dysplasia, localized secondary osteoarthritis, and so forth.