

Direct Anterior Approach Associated with Lower Dislocation Risk after Primary Total Hip Arthroplasty in Patients with Prior Lumbar Spine Fusion

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INTRODUCTION:

Total hip arthroplasty (THA) is a highly successful operation and is among the most common elective surgical procedures performed in the United States (US). The volume of THAs performed in the US is expected to grow from 370,770 annually in 2014 to 635,000 annually in 2030, an increase of 71%. Similar to the steady expansion in demand for THA, the number of elective lumbar spine fusions (LSF) performed annually has increased 62.3% between 2004 and 2015 and is projected to consistently grow in the coming years. Given the increase in patients undergoing both surgeries, it is increasingly important to understand how these surgeries interrelate in terms of postoperative complications.

Recent research has investigated THA dislocation risk in patients with LSF, and multiple studies have reported significantly higher rates of dislocation in this patient population. In prior studies the direct anterior approach (DA) approach has demonstrated a low dislocation rate for patients without a stiff or fused spine. The purpose of our study was to determine the rate of THA dislocation in patients with a spinal fusion dependent on both the THA surgical approach and the level of fusion. Our hypothesis was that the DA approach would demonstrate a lower dislocation rate compared to the anterolateral and posterior approaches in patients with LSF, and that fusions that included L5 or S1 would have higher rates of dislocation compared to fusions at higher lumbar levels.

METHODS:

A retrospective review was performed of 6,554 THAs performed at our institution from 1/2011 – 5/2021. 352 (5.4%) patients had a concomitant LSF, verified by radiographs, and were included in the analysis (**Table 1**). The surgical approach, timing of LSF in relation to THA, vertebral levels fused, timing of THA dislocation, and the need for revision surgery were recorded for statistical analysis.

RESULTS:

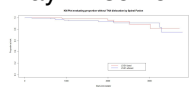
In total, 40.3% of patients underwent a DA approach (n=142), 25.9% underwent an anterolateral approach (n=91), and 33.8% underwent a posterior approach (n=119). 294 patients (84%) underwent LSF prior to the THA procedure.

There was a total of 15 (4.3%) THA dislocation events, 13 of which (87%) occurred in the cohort who underwent THA after LSF. The average time from surgery to dislocation was 11 months (0.3 – 80 months). Among those who dislocated, 10 (66.7%) suffered multiple dislocations and ultimately required a revision surgery. There were fewer dislocations in the DA cohort (0.7%) in comparison to both the anterolateral (5.5%, P=0.035) and posterior groups (7.6%, P=0.006) (**Table 2**).

The average number of vertebral levels fused was 2.43 (SD 2.36). There was no significant difference in levels fused between cohorts using either univariate analysis or logistic regression analysis (all P > 0.05) (**Tables 3 and 4**). In addition, there was no significant difference in THA dislocation rates when the L5 or S1 levels were fused (P > 0.05) (**Table 5**). Similarly, there was no significant difference on the Kaplan-Meier curve evaluating proportion at risk without THA dislocation when comparing presence of L5 or S1 fusion (log-rank test P-value = 0.56) (**Figure 1**).

DISCUSSION AND CONCLUSION:

While there are several unavoidable limitations in this study, we found a significantly lower THA dislocation rate when using the DA approach compared to the anterolateral and posterior approaches in patients with LSF. The DA approach may serve to mitigate the higher dislocation risk observed in this patient population.



Variable	n (%)
Approach	
Anterior	142 (40.3%)
Anterolateral	91 (25.9%)
Posterior	119 (33.8%)
Laterality	
Left	166 (47.2%)
Right	186 (52.8%)
Gender	
Female	348 (97.7%)
Male	4 (1.1%)
Number of levels of fused LSF	2.43 (2.36)
THA dislocation	
No	337 (95.7%)
Yes	15 (4.3%)
THA revision due to dislocation	
No	5 (13.3%)
Yes	10 (66.7%)

Table 1. Study patients' clinical and demographic characteristics.

Variable	n (%)	OR	95% CI	P-value
Approach				
Anterior	142	1.0		
Anterolateral	91	1.8	0.8 - 4.0	0.15
Posterior	119	2.1	1.0 - 4.5	0.04
Gender				
Female	348	1.0		
Male	4	0.1	0.0 - 1.0	0.99
Number of levels of fused LSF	2.43	1.0		
THA dislocation				
No	337	1.0		
Yes	15	0.1	0.0 - 1.0	0.10

Table 2. Variables based on surgical approach.

Model	OR	95% CI	P-value
Univariate	1.8	0.8 - 4.0	0.15
Logistic regression	2.1	1.0 - 4.5	0.04

Table 3. Logistic regression predicting the probability of dislocation adjusting for approach and quantitative number of levels fused.

Model	OR	95% CI	P-value
Univariate	1.8	0.8 - 4.0	0.15
Logistic regression	2.1	1.0 - 4.5	0.04

Table 4. Logistic regression predicting the probability of dislocation adjusting for approach and qualitative number of levels fused.

Model	OR	95% CI	P-value
Univariate	1.8	0.8 - 4.0	0.15
Logistic regression	2.1	1.0 - 4.5	0.04

Table 5. Logistic regression predicting the probability of dislocation adjusting for approach and qualitative number of levels fused.