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Original Research

A Crossover Cohort of Direct Anterior vs Posterolateral Approach in Primary Total Hip Arthroplasty: What Does the Patient Prefer?

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ABSTRACT

Background: The utilization of the direct anterior approach (DAA) for total hip arthroplasty (THA) continues to markedly increase. Despite proposed advantages, there are limited data regarding outcomes of staged bilateral THA via 2 different approaches in the same patient. The purpose of this study was to elucidate patient perspective on the THA approach in a crossover cohort of patients who underwent consecutive THAs via the posterolateral approach (PLA) followed by a contralateral DAA.

Methods: A retrospective chart review and telephone interview were performed on 37 patients who underwent both THA approaches by a single surgeon from 2009 to 2019. Perioperative outcomes, complications/reoperations, and the patient-preferred approach were collected. The mean clinical follow-up was 105 and 44 months after PLA and DAA, respectively.

Results: After DAA THA, patients demonstrated lower postoperative day 1 visual analog scale pain scores (1.8 vs 2.9, $P = .016$) and ambulation (239 feet vs 31 feet, $P < .001$). The length of stay was significantly less ($P < .001$) for the DAA (1.9 days) compared with the PLA (3.1 days). There were no major complications or reoperations in either cohort. Most patients (26/37, 70%) preferred the DAA and stated that it was easier to recover from (30/37, 81%).

Conclusion: In the same patient direct comparison, the DAA for THA may lead to less pain and improved ambulation in the early postoperative period. Furthermore, most patients prefer the DAA and believe it is easier to recover from than the PLA.

Introduction

Total hip arthroplasty (THA) remains one of the most successful operations in orthopaedic surgery with consistent ability to relieve pain and restore function [1]. Various surgical approaches can be used for the procedure, all of which have demonstrated good patient outcomes [2-4]. Perhaps the most commonly used approach, the posterolateral approach (PLA), was first described by von Langenbeck and later by Kocher in the late nineteenth century [5]. Recently, there has been a trend in primary THA surgery toward using the direct anterior approach (DAA), initially named the Smith-Petersen approach in 1917 but modified by others since that time [6,7].

The proposed benefits of DAA THA have been described extensively including the following: decreased visual analog scale (VAS) pain scores in the immediate postoperative period, reduced hospital length of stay (LOS), greater likelihood of home discharge, improved acute patient-reported outcome scores, lower creatine kinase levels postoperatively, and more accurate acetabular cup placement [8-18]. Furthermore, more rapid functional recovery after the DAA is perhaps the most cited advantage of the DAA. Taunton et al. showed the time to discontinue the walker use and time to discontinue all gait aids (17 vs 24 days for DAA and PLA, respectively) [19]. In addition, mean steps per day were significantly greater for the DAA at 2 weeks; however, there was no difference in activity monitoring at 1 year.

Conversely, others have noted equivocal results and potential disadvantages between the DAA and other common approaches for

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THA. One multicenter study comparing the DAA with both PLA and direct lateral approach found that the DAA was a significant predictor of early femoral failure requiring revision [20]. Another group reported similar results in a large, single-center cohort study with early femoral fracture or loosening occurring significantly more frequently after the DAA [21]. Still, the DAA may be comparable with other approaches in terms of operative time, blood loss, LOS, dislocation rates, readmission rates, and revision rates [22-26].

Despite the growing comparative literature about the DAA, the majority of data originate from heterogeneous and/or matched cohorts, which can only yield limited insight on true patient subjective outcomes. Alternatively, there are very few studies comparing the same patient undergoing staged bilateral THA via 2 different approaches [27]. The purpose of this study was to evaluate outcomes and patients' perspective on the preferred THA approach in a retrospective, single-surgeon, crossover cohort of patients who underwent both a posterolateral and direct anterior THA on contralateral hips. We hypothesized that acute recovery and outcomes would be better and, subsequently, patients would simply prefer the DAA to the PLA at extended follow-up.

Materials and methods

Institutional review board approval was obtained before the initiation of this study. The senior author's registry of 690 patients who underwent DAA THA performed from 2013 to 2019 was cross-referenced to identify 44 patients who had also previously received a contralateral PLA THA from 2009 to 2015. Six patients could not be reached for follow-up despite multiple attempts, and one patient was deceased, yielding 37 patients who participated in the telephone survey (37/43, 86%).

A comprehensive, retrospective chart review was performed collecting the following: basic demographic descriptions, perioperative data (postoperative day 1 [POD1] pain score as recorded by orthopaedic nursing and distance ambulated on initial attempt with physical therapy, hospital LOS, and discharge disposition), major 90-day complications (fracture, dislocation, periprosthetic joint infection, venous thromboembolism, readmissions), and any reoperations. To illuminate the patient's subjective perspective, a phone survey was performed with the following verbiage: "Which approach for hip replacement do you prefer?" and/or if rephrasing was required, "If you had to have another hip replacement, which approach would you want performed?" In addition, the question "Which operation was easier to recover from?" was asked. For each patient, the telephone interview and the chart review were conducted by different authors to minimize bias.

Surgical indications and technique

All surgeries were performed by a single, fellowship-trained arthroplasty surgeon with multiple decades of THA experience, including after "learning curve" for the new approach. The transition from the PLA to DAA was performed secondary to increasing patient request for the approach and potential for more rapid recovery. For the PLA, the indication for surgery was degenerative joint disease in 32 (86%) patients and avascular necrosis in 4 (11%) patients. Thirty-one (84%) patients underwent the DAA for degenerative joint disease, while 4 (11%) did so for avascular necrosis and 1 (3%) for femoral neck fracture. A combination of regional anesthesia (lumbar plexus) block and spinal anesthesia was used for all procedures. For the DAA, patients were positioned supine on a specialized table, and fluoroscopy was used [7]. For the PLA, patients were placed in the lateral decubitus position, and intraoperative radiographs were used. For all but one patient, the same uncemented implants were used for both operations: Zimmer Trilogy acetabular component and Zimmer M-L Taper femoral stem (Zimmer Biomet, Warsaw, IN). One patient received a Stryker Accolade HFx femoral stem (Stryker, Kalamazoo, MI). All patients were admitted to the hospital with an unchanged, contemporary postoperative recovery protocol, which included multimodal pain control and rapid physical therapy mobilization beginning on POD1. Patients were given posterior hip precautions after PLA THA but no precautions after DAA THA.

Statistical analysis

Data were reported as means with standard deviations for continuous variable and counts with percentages for categorical variables. Continuous variables were compared using a paired t-test, and categorical data were analyzed using a chi-squared test. A threshold of statistical significance was set at an alpha of <0.05. All statistical analyses were carried out using Microsoft Excel formula calculations (Microsoft, Redmond, WA).

Results

There were 16 (43%) males and 21 (57%) females with the average age of 66 (range, 43-82) years at the first surgery (PLA) and 71 (range, 45-87) years at the second surgery (DAA). The mean time interval between surgeries was 90 (range, 2-171) months. The body mass index, American Society of Anesthesiologists (ASA) classification, and indication for surgery were similar for each patient despite the interval between the 2 operations (Table 1). The average clinical and radiographic follow-up for the posterolateral group was 105 months (standard deviation [SD] = 31) and for the direct anterior group was 44 months (SD = 19).

Acute perioperative outcomes were improved for the DAA compared with the PLA for THA (Table 2). The average VAS on POD1 was significantly lower ($P = .0016$) for DAA THA at 1.8 (SD = 1.78; range, 0-6) than for the PLA at 2.9 (SD = 2.18; range 0-8). The maximum average ambulation distance on POD1 was 239 feet (SD = 192; range, 1-720) for the patients who underwent the DAA and 31 feet (SD = 30; range, 0-110) for the patients who underwent the PLA ($P < .001$). The mean LOS was also significantly less ($P < .001$) for the DAA (1.9 days, SD = 0.8, range, 1-3) compared with the PLA (3.1 days, SD = 0.5, range, 1-5). Sixty-two percent of patients were discharged home after PLA THA vs 78% of home discharge after DAA THA, which was not statistically significant ($P = .065$). There were no 90-day acute complications including fracture, dislocation, periprosthetic joint infection, venous thromboembolism, or readmission for both cohorts. One patient in each group

Table 1
Preoperative characterization of patients.

Patient demographics	Posterolateral approach (PLA)	Direct anterior approach (DAA)	*P*-value
Sex			
Male	16 (43%)		
Female	21 (57%)		
Age at surgery (years)[a]	66 (range, 43-82)	71 (range, 45-87)	$P < .01$
Average BMI	29.5 (range, 20.4-43.0)	29.4 (range, 22.2-39.0)	$P = .74$
ASA score			
ASA 1[a]	2 (5.4%)	0 (0%)	$P = .03$
ASA 2	19 (51.4%)	26 (70.3%)	$P = .61$
ASA 3	16 (43.2%)	11 (29.7%)	$P = .37$
Indication			
Osteoarthritis	33 (89%)	32 (86%)	$P = .90$
AVN	4 (11%)	4 (11%)	$P = 1.00$
Fracture	0 (0%)	1 (3%)	$P = .32$

[a] Statistically significant, $P < .05$.

Table 2
Perioperative outcomes in total hip arthroplasty.

Perioperative outcome	Posterolateral approach (PLA)	Direct anterior approach (DAA)	*P*-value
Estimated blood loss (mL)	185.3	210.3	$P = .39$
Received transfusion	3 (8.1%)	2 (5.4%)	$P = .32$
Average POD#1 VAS[a]	2.9 (SD = 2.8)	1.8 (SD = 1.8)	$P = .02$
Average POD#1 Ambulation (feet)[a]	31 (SD = 30)	239 (SD = 192)	$P < .01$
Average LOS (days)[a]	3.1 (SD = 0.5)	1.9 (SD = 0.8)	$P < .01$
Discharge disposition			
Home	23 (62.2%)	29 (78.4%)	
Nonhome	14 (37.8%)	8 (21.6%)	

[a] Statistically significant, $P < .05$.

experienced nondisplaced greater trochanteric fracture after a fall more than 5 years from the index procedure—both treated nonoperatively with no further sequelae. No reoperations or revisions after either approach had been performed at the time of final follow-up.

The primary outcome was the midterm follow-up of patients' answers to their preferred approach questions (Table 3). At the final follow-up, the DAA was the significantly ($P < .01$) preferred approach, including 26 (70%) patients choosing the DAA, whereas 10 (27%) patients chose the PLA. One patient stated there was no difference in the 2 approaches. In addition, 30 (81%) patients stated that the DAA was easier to recover, whereas 4 (11%) patients thought the PLA was the easier recovery ($P < .0001$). There were 3 patients who did not note any difference in recovery between the 2 approaches.

Discussion

Both the PLA and DAA to THA have been used successfully, but the surgical approach remains a topic of contention among arthroplasty surgeons. Literature has suggested that the DAA provides better outcomes of postoperative pain, LOS, functional recovery, and patient-reported outcome measures [8-19]. However, there are studies suggesting that this approach offers no benefit compared with other approaches for THA and potential increased risk of periprosthetic fracture or early reoperation [3,20-26].

Despite the contradictory nature of the literature, quicker immediate postoperative recovery seems to be the most widely held benefit of the DAA over the PLA [11,18,19]. Both improved POD1 ambulation distance and pain scores were significantly corroborated for the DAA, while more frequent discharge home status was trending toward significance in this study. The average ambulation distance was 239 feet for the DAA, a sevenfold improvement over the PLA. There are a multitude of variables that affect immediate postoperative physical therapy activity including the following: pain, patient-related factors (most commonly reported was orthostatic hypotension and nausea/vomiting), and patient/therapist motivation. VAS pain scores were significantly lower statistically for the DAA, but clinically remained very low for both approaches after surgery likely representing a minimal clinically important difference. Perhaps more significant was that 7 patients did not ambulate on POD1 after PLA, while only one patient failed to ambulate after DAA. However, even when patients who did not ambulate were removed from the analysis, the distance ambulated remained comparatively low at only 38 feet after the PLA. Certainly, patient and therapist motivation for recovery can also play a critical role in recovery; however, the psychological effect remains difficult to quantify.

Table 3
Patient preference in total hip arthroplasty.

Question of patient preference	Posterolateral approach (PLA)	Anterior approach (DAA)	No difference	*P* value
Which approach do you prefer?[a]	10 (27.0%)	26 (70.3%)	1 (2.7%)	$P < .01$
Which approach was easier to recover from?[a]	4 (10.8%)	30 (81.1%)	3 (8.1%)	$P < .01$

[a] Both questions are statistically significant, $P < .05$, in favor of DAA THA.

Both hospital LOS and discharge home after THA can generally be considered a marker for improved functional recovery but are also influenced by overall health status [4,10,28]. The present crossover cohort studied maintained a similar ASA status for both procedures, and patients were older at the time of index DAA operation. Despite the advanced age, there was a shorter LOS and a trend toward patients being discharged home after the DAA. Furthermore, the majority (8/10) of patients who underwent DAA THA with different discharge dispositions between their surgeries were actually discharged home instead of an extended care facility. Although there are many factors including previous patient experience and expectation that could lead to such a dramatic change, the authors experienced improved patient ease of recovery seen after the DAA compared with that after the PLA.

Perhaps most supportive of DAA THA is the fact that 70% of these patients who received both approaches preferred the DAA, including 81% recalling an easier recovery than that from PLA THA. Radoicic et al performed the only other crossover cohort analysis of 21 patients undergoing both a PLA and contralateral DAA THA [27]. There were no significant differences between the 2 approaches for the functional outcome, LOS, cup position, or complication rate. Sixteen of 21 (76%) patients actually preferred the posterior approach THA to DAA THA, which is in contrast to the present study results. This group attributed the unexpected outcome to both a small sample and significantly greater number of wound complications with the DAA that required reoperation (1.4% vs 0.2%, respectively). Although a small patient sample size, our study demonstrated improved LOS, functional recovery, and no difference in complications or reoperations, all of which likely improved patient perception of the DAA for THA.

There are multiple limitations of the study including those inherent to retrospective research and smaller cohort of patients. Surgeon bias, whether conscious or unconscious, could exist but is difficult to quantify. In addition, it is also possible that patients received opinions that DAA THA was "better" via information delivered through marketing and external influencers, thereby motivating them in their recovery. Further weaknesses that may influence confounding variables include order and carryover effects. Specifically, all patients underwent DAA THA after the PLA without a predetermined "washout period" between the operations; thus, patient-perceived recovery and results from the second surgery (DAA) could be affected by experience from the first surgery (PLA). Still, the unique single-surgeon, crossover design during a contemporary period may improve the consistency of the study as the same patient underwent similar preoperative and postoperative protocols at the same institution.

THA will remain an extremely successful operation with the majority of patients very satisfied after surgery, regardless of the surgical approach. The present study represents one of the first single-surgeon, crossover cohorts that prefer the DAA to the PLA for THA, with improved immediate postoperative results. This study can be used by arthroplasty surgeons to educate THA candidates and participate in shared decision-making for the patient subjective preference for the surgical approach. The authors recommend additional preoperative discussion to include other critical factors including the surgeon-preferred approach and more common risk factors attributed to each approach.

Conflict of interest

The authors declare there are no conflicts of interest.

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