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Direct Anterior versus Miniposterior THA With the Same Advanced Perioperative Protocols: Surprising Early Clinical Results

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Abstract
Background Although some surgeons strongly advocate for one approach over the other, there are few data directly comparing the direct anterior approach with a miniposterior approach for total hip arthroplasty (THA).
Questions/purposes Using the same advanced pain and rapid rehabilitation protocols for both groups, we compared the direct anterior and miniposterior approaches with respect to (1) return to activities of daily living at 2 days, 2 weeks, or 2 months; (2) risk of intraoperative or early postoperative complications; and (3) component position.
Methods Over a 1-year period we identified all consecutive, primary direct anterior and miniposterior THAs performed by two surgeons at our institution, totaling 242 patients. Of those, 20 did not meet inclusion criteria as a result of prior trauma or surgery about the hip. A total of 222 patients, 126 direct anterior and 96 miniposterior, were retrospectively evaluated. All cases were done by one of two surgeons, one of whom performs THA exclusively through the direct anterior approach and the other who only uses the miniposterior approach. Groups did not differ demographically with mean ± SD age 64 ± 12 years, mean body mass index 30 ± 5.7 kg/m^2, and 50% female. The same rapid rehabilitation protocols were used with no postoperative hip positioning precautions.
Results No differences were seen between the two groups in mean length of stay (2.2 days; range, 1–9 days), operative or in-hospital complications, intravenous breakthrough analgesia, stairs, maximum feet walked in-hospital, or percent discharged to home (80% [177 of 222]; all $p > 0.2$). The direct anterior patients had longer mean operative times (114 minutes; range, 60–251 minutes) than the miniposterior patients (mean, 60 minutes; range, 41–113 minutes; $p < 0.001$). The direct anterior group had a higher maximum visual analog scale pain score (5.3 direct anterior; ± 2, versus 3.8 MP; ± 2; $p < 0.0001$). At 2 weeks, more direct anterior patients required gait aids (92% [116 of 126]) than miniposterior (68% [62 of 96]; $p < 0.0001$). At 8 weeks, direct anterior patients had higher mean Harris hip scores (95 versus 89) but a lower return to work and driving with no difference in their use of gait aids, narcotics, activities of daily living, or walking 0.5 mile. More wound problems occurred in the miniposterior group ($p < 0.01$).

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Each author certifies that his or her institution approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

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With the numbers available, component alignment was not different between the study groups ($p > 0.05$ for all comparisons).

Conclusions There was no systematic advantage of direct anterior THA versus miniposterior THA. Contrary to conventional belief and somewhat surprising were the fewer minor wound problems in the direct anterior group and the higher proportion of patients free of gait aids at 2 weeks and back to driving and working at 8 weeks in the miniposterior group. Factors other than surgical approach, perhaps including attentive pain management, patient selection, surgical volume and experience, careful preoperative templating, and rapid rehabilitation protocols, may be more important in terms of influencing early recovery after THA.

Level of Evidence Level III, therapeutic study. See Instructions for Authors for a complete description of levels of evidence.

Introduction

Over the past decade, substantial clinical and research interest has been focused on the surgical approach for primary THA [4, 6, 7, 21–25, 27–29]. As surgeons have introduced modified surgical approaches, there have also been major improvements in perioperative pain management, marked decreases in blood loss and transfusion, the introduction of rapid rehabilitation protocols, and changes in patient expectations after contemporary THA [7, 9–11, 30]. Sorting out the clinical impact of surgical approach alone has proven difficult with those confounding factors in play. Although some new surgical approaches have subsequently fallen out of favor [4, 14], the direct anterior approach continues to generate interest from surgeons and patients [16].

A potential advantage of the direct anterior approach relative to the direct lateral, anterolateral, or posterior approaches is the direct anterior's sparing of the abductor musculature [8, 12, 18, 19]. Posterior approaches for THA leave the abductors intact but have been associated historically with a higher risk of THA dislocation [24, 26], although most recent reports of posterior approach THA with formal repair of the capsule and/or external rotators have had lower rates of dislocation [5]. One randomized clinical trial of direct anterior THA versus contemporary miniposterior approach THA suggested an early functional advantage for the direct anterior group, but importantly, there were different postoperative instructions given to those two groups of patients, with the miniposterior group alone being cautioned to follow traditional hip dislocation precautions [1]. Finally, direct anterior THA is performed in a supine position and is often accompanied by the use of intraoperative fluoroscopy, which some contend leads to better prosthetic component position and better restoration of parameters such as leg length and hip offset [20].

For the past 5 years at our institution, we have used the same advanced pain management, rapid rehabilitation, blood management, and preoperative patient education protocols for contemporary THA performed with all surgical approaches. Given that, we felt it possible to compare the approaches in a way that might mitigate some of the confounding variables present in some prior studies [16, 19, 24]. Specifically, we compared the direct anterior approach with the miniposterior approach using the same advanced pain and rapid rehabilitation protocols for both groups with respect to (1) return to activities of daily living at 2 days, 2 weeks, or 2 months; (2) risk of intraoperative or early postoperative complications; and (3) component position.

Patients and Methods

Study Design

Using our total joint registry we identified all consecutive THAs performed by two surgeons (MJT, MWP) at our institution between April 1, 2011, and March 31, 2012. One surgeon (MJT) performs exclusively direct anterior THA and had performed more than 300 direct anterior THAs before initiation of this study. One surgeon (MWP) performs exclusively miniposterior THA and has extensive clinical experience in this approach. A total of 242 patients were identified. Of those, 20 patients did not meet inclusion criteria as a result of a previous procedure on or around the operative femur or acetabulum, including prior arthroplasty, trauma, or corrective procedures, or because they did not have 2- and 8-week followup data. This left 222 patients for review, 126 direct anterior and 96 miniposterior.

The two groups did not differ in age, sex, body mass index (BMI), or preoperative Harris hip score (Table 1). For the study cohort (two groups combined), the mean ± SD age was 64 ± 12 years, mean BMI was 30 ± 5.7 kg/m^2, mean preoperative Harris hip score was 55 ± 12, and 50% of patients were female.

Surgical Techniques

Every patient received the same formal preoperative class educating them on perioperative expectations. All received the same comprehensive multimodal pain management approach, including an indwelling psoas nerve catheter for 36 hours postoperatively, and an oral pain regimen, including scheduled acetaminophen, with tramadol and

Table 1. Patient demographics

Variable	DA THA group (n = 126)	MP THA group (n = 96)	Total (n = 222)
Number of patients	126 (56%)	96 (43%)	222 (100%)
Sex (number of patients)			
Female	67 (53%)	44 (45%)	111 (50%)
Male	59 (46%)	52 (54%)	111 (50%)
Age at surgery (years)			
Mean (SD)	64.8 (12.4)	63.9 (12.5)	64.4 (12.4)
Median	66.0	65.0	65.5
Q1, Q3	59.0, 75.0	56.0, 74.0	58.0, 74.0
Range	29.0–89.0	35.0–91.0	29.0–91.0
Height (cm)			
Mean (SD)	170.2 (10.0)	171.1 (10.8)	170.6 (10.3)
Median	169.0	170.5	169.5
Q1, Q3	163.0, 178.0	163.0, 179.5	163.0, 178.0
Range	151.0–199.0	150.0–195.0	150.0–199.0
Weight (kg)			
Mean (SD)	87.4 (19.0)	89.8 (21.4)	88.4 (20.1)
Median	85.5	89.5	87.5
Q1, Q3	71.0, 98.0	75.0, 100.5	74.0, 99.0
Range	52.0–141.0	54.0–155.0	52.0–155.0
BMI (kg/m^2)			
Mean (SD)	30.0 (5.5)	30.5 (6.0)	30.2 (5.7)
Median	29.0	29.9	29.3
Q1, Q3	25.8, 34.0	26.7, 33.6	26.0, 33.9
Range	20.2–48.8	19.8–49.4	19.8–49.4

DA = direct anterior approach; MP = miniposterior approach; Q1, Q3 = first, third quartiles; BMI = body mass index.

short-acting opioid medication on an as-needed basis. All received aspirin for deep vein thrombosis prophylaxis unless they reported a history of previous venous thromboembolism or were on preoperative anticoagulation. All wounds were closed by the midlevel provider for that surgeon using the same suture and closure method. Patients were treated on the same ward and seen by the same physical therapy team. All patients received the same hemispherical uncemented acetabular component (Pinnacle®; DePuy Orthopaedics Inc, Warsaw, IN, USA) and the same uncemented hydroxyapatite-coated femoral stem (Corail®; DePuy Orthopaedics Inc) with a chrome-cobalt femoral head and highly crosslinked polyethylene acetabular bearing surfaces. All components were FDA-approved.

Direct Anterior THA Technique

The patient was positioned in a supine position on an orthopaedic table that allows hyperextension and adduction of the operative extremity. An oblique incision was made over the anterior margin of the tensor muscle at a point approximately 2 cm lateral from the anterosuperior iliac spine and extending 8 to 12 cm. The fascia of the tensor muscle was identified and incised. The muscle was swept digitally laterally and a retractor was placed over the superior aspect of the femoral neck. The ascending branch of the lateral femoral circumflex artery was identified and cauterized. The hip capsule was then incised and retracted. Measured resection of the femoral neck was performed with the assistance of fluoroscopy and preoperative templates. Acetabular reaming and final component positioning were performed with fluoroscopic assistance and direct visualization. For femoral preparation, the operative extremity was externally rotated, extended, and adducted, allowing axial access to the proximal femur. Capsular releases were performed as needed for exposure. The surgical implantation of the femoral implant trial was followed by trial reduction. The final femoral component sizing, offset, and leg length were evaluated fluoroscopically. After appropriate sizing, the final femoral implants were placed.

Miniposterior THA Technique

The miniposterior approach involved a 7- to 10-cm incision along the posterior aspect of the femur starting at the tip of the greater trochanter and proceeding distally. The fascia of the gluteus maximus was split, and blunt dissection revealed the underlying abductor and external rotator musculature. The external rotators and the hip capsule were incised and preserved as one layer with an attempt made to preserve the insertion of the quadratus femoris on the femur. The hip was dislocated posteriorly, and the femoral neck was cut in accordance with the preoperative plan. The hip was then flexed, and retractors were placed around the femoral neck to allow reaming, broaching, and trial insertion of the femoral component. Acetabular retractors were positioned, the acetabulum was reamed, and the real acetabular component was placed. A trial reduction was then carried out to assess leg length, offset, and hip stability. The trial implant was removed and the femoral component was then impacted into place, the femoral head was assembled, and the hip was reduced. The hip capsule and the external rotators were repaired using a single Number 5 nonabsorbable suture that was placed in a figure-of-eight locking-looped fashion through the superior capsule and posterior border of the gluteus minimus and not through bone of the greater trochanter in a fashion described previously [5].

Aftercare

Patients sat on the edge of the bed or in a chair the evening of surgery and were seen twice daily by physical therapists beginning on Postoperative Day 1. All were allowed to bear weight as tolerated with gait aids and followed the same rapid rehabilitation protocol that allowed them to eliminate gait aids whenever comfortable. Traditional hip precautions were not used and instead patients were instructed to proceed with activities as tolerated, allowing their hip symptoms to be the guide.

Followup Routine

After hospital discharge, patients were followed with a standard telephone call at 2 weeks from the date of surgery, performed by the midlevel provider to the surgeon, to assess their progress through a standardized format. They then returned to the outpatient clinic at 2 months for physical examination and radiographic evaluation.

Study Endpoints

The 222 patient records were evaluated for surgical parameters, complications, and study endpoints intraoperatively, immediately postoperatively while hospitalized, at 2 weeks postoperatively through a telephone call documented in the patient clinical record as part of our routine postoperative care, and at 8 weeks postoperatively in the clinic. We compared operative time (both from incision to closure and from entrance into the operating room to exit) and intraoperative complications. In-hospital endpoints included hospital length of stay, number of stairs climbed with physical therapy, maximum number of feet walked per one physical therapy encounter, need for breakthrough intravenous opiates, visual analog scale pain score, discharge status home versus skilled nursing facility, and in-hospital complications. Postdischarge study endpoints included the Harris hip score (compared preoperatively and at the 8-week visit) as well as time to weaning from narcotic pain medicines and gait aids, ability to drive, return to work, ability to navigate stairs and walk 0.5 mile (0.8 km), return to activities of daily living, and complications. A separate radiographic analysis was performed at the 8-week return visit. Measurements of leg length, offset, acetabular abduction, and anteversion were calculated using validated techniques [28, 33]. Two independent reviewers (KLP-M, AFK) who had not performed the surgeries used calibrated 8-week postoperative radiographs and digital templating software for analysis.

Statistical Analysis

Data were reported as mean (SD) for continuous variables and count (percentage) for discrete, categorical outcomes. Outcomes measured on a continuous scale were compared using two-sample t-tests; Wilcoxon rank-sum tests were used when the data were not sufficiently normally distributed. Study outcomes comprised of categorical variables were compared using chi-square tests. All statistical tests were two-sided and the threshold of statistical significance was set at an α of 0.05. Statistical analyses were performed using SAS® Version 9.2 (SAS Institute Inc, Cary, NC, USA).

Results

Direct anterior THA did not result in a faster return to activities of daily living at 2 days, 2 weeks, or 2 months as compared with miniposterior THA. No differences were seen in length of stay (mean, 2.3 ± 0.7 days), operative or in-hospital complications (3% [seven of 222]), intravenous breakthrough analgesia, the ability to climb stairs with physical therapy (78% yes [173 of 222]), maximum feet walked in-hospital (mean, 160 ± 79 feet), or discharge disposition (80% home [177 of 222]; all $p > 0.2$). The direct anterior patients had longer mean operative times (114 minutes; range, 60–251 minutes) than the miniposterior patients (mean, 60 minutes; range, 41–113 minutes; $p < 0.001$). The visual analog scale pain score was higher in the direct anterior group (5.3 ± 2) than in the miniposterior group (3.8 ± 2; $p < 0.001$) while in the hospital (Table 2). At 2 weeks, more patients with direct anterior THA required gait aids (92% [116 of 126] versus 68% [62 of 96]; $p < 0.001$). At 8 weeks, the direct anterior group had a higher Harris hip score (95 versus 89; $p < 0.001$), but fewer patients in the direct anterior group who had previously held employment had returned to work (69% [25 of 36] versus 97% [34 of 35]; $p = 0.002$) and driving (90% [90 of 99] versus 100% [68 of 68]; $p = 0.011$). No difference was seen in the use of gait aids or narcotics, ability to perform activities of daily living, or walking 0.5 mile (93% able [201 of 216]; Table 3).

Patients undergoing direct anterior THA did not have a higher risk of intraoperative or early postoperative complications. The prevalence of intraoperative complications in both groups was low and none of those complications resulted in a change in postoperative care. The proportion of patients with a minor wound problem was lower in the direct anterior group (0%) than in the miniposterior group (11% [10 of 96]; $p < 0.001$; Table 3). None of these minor wound problems required additional surgical intervention.

Table 2. Intraoperative and early postoperative results

Variable	DA THA group (n = 126)	MP THA group (n = 96)	p value
Anesthesia time (minutes)			< 0.0001
Mean (SD)	192.8 (43.9)	136.8 (23.4)	
Median	187.0	135.5	
Q1, Q3	169.0, 204.0	122.5, 144.5	
Range	136.0–490.0	99.0–225.0	
Operative time (minutes)			< 0.0001
Mean (SD)	114.6 (28.2)	60.5 (13.5)	
Median	111.0	58.0	
Q1, Q3	98.0, 127.0	50.0, 68.0	
Range	60.0–251.0	41.0–113.0	
Operative complications (number of patients)			0.8753
Missing	1	0	
No	122 (97%)	94 (97%)	
Yes	3 (2%)	2 (2%)	
Length of stay (days)			0.2997
Mean (SD)	2.5 (0.9)	2.3 (0.5)	
Median	2.0	2.0	
Q1, Q3	2.0, 3.0	2.0, 3.0	
Range	1.0–9.0	2.0–5.0	
Stairs with physical therapy (number of patients)			0.3585
No	25 (19%)	24 (25%)	
Yes	101 (80%)	72 (75%)	
Maximum walking distance with physical therapy (feet)			0.1688
Mean (SD)	170.3 (83.3)	152.3 (75.0)	
Median	155.0	150.0	
Q1, Q3	100.0, 200.0	110.0, 200.0	
Range	0.0–650.0	4.0–400.0	
Intravenous opiate breakthrough (number of patients)			0.6103
No	113 (89%)	84 (87%)	
Yes	13 (10%)	12 (12%)	
VAS pain score (points)			< 0.0001
Number	126	95	
Mean (SD)	5.3 (2.3)	3.8 (1.8)	
Median	5.0	4.0	
Q1, Q3	4.0, 7.0	3.0, 5.0	
Range	0.0–10.0	0.0–8.0	
Discharge status (number of patients)			0.8555
Home	101 (80%)	76 (79%)	
Skilled nursing facility	25 (19%)	20 (20%)	
Hospital complications (number of patients)			0.4259
No	121 (96%)	94 (97%)	
Yes	5 (4%)	2 (2%)	

DA = direct anterior approach; MP = miniposterior approach; Q1, Q3 = first, third quartiles; VAS = visual analog scale.

Direct anterior THA (which used intraoperative fluoroscopy) did not result in more reproducible component position, but component position was generally good in both groups. Both the direct anterior and miniposterior groups demonstrated appropriate acetabular inclination (39° ± 5° versus 40° ± 6°), acetabular anteversion with two different radiographic measures (36° ± 7° versus 33° ± 7° and 53° ± 9° versus 51° ± 9°), restoration of leg length (1 mm short versus 1 mm long), and restoration of hip offset (1-mm increase versus 3-mm increase) with few outliers (Table 4).

Discussion

Over the past decade, surgeons have introduced modified surgical approaches for THA [2, 31, 32], but other progressive changes have also been introduced sequentially or in tandem, including major improvements in perioperative pain management, marked decreases in blood loss and transfusion, the introduction of rapid rehabilitation protocols, and changes in patient expectations after contemporary THA. Sorting out the clinical impact of surgical approach alone on the outcome for today's typical patient undergoing THA has proved somewhat difficult. At our institution, we have held those confounding factors largely constant over the past 5 years and so sought to compare miniposterior THA with direct anterior THA. We were somewhat surprised to find that direct anterior THA did not result in a faster return to activities of daily living at 2 days, 2 weeks, or 2 months as compared with miniposterior THA; that direct anterior THA had a lower risk of minor wound problems early after surgery; and there was not a difference seen in the radiographic parameters of component position, leg length, or hip offset when direct anterior with fluoroscopy was compared with miniposterior THA without intraoperative fluoroscopy.

This study was a retrospective cohort study that is subject to some limitations. First, although we reviewed the patient demographics and demonstrated similarities in regard to patient age, sex, and BMI, it is possible that there were subtle differences in patient characteristics between the two groups not adequately captured by those criteria. Second, the surgical procedures were performed by two different surgeons. Although one of the surgeons had been in practice for a longer period of time, both surgeons were subspecialty-trained experts in hip arthroplasty and each surgeon was able to perform his procedure of choice. The low frequency of major intraoperative or early postoperative complications is

Table 3. Outcomes 2 weeks and 8 weeks postoperatively

Variable	DA THA group (n = 126)	MP THA group (n = 96)	p value
Two weeks			
Narcotic use (number of patients)			0.2530
Missing	4	0	
No	87 (71%)	75 (78%)	
Yes	35 (28%)	21 (21%)	
Gait aid use (number of patients)			< 0.0001
Missing	1	5	
No	9 (7%)	29 (31%)	
Yes	116 (92%)	62 (68%)	
Stairs (number of patients)			0.1890
Missing	15	13	
No	5 (4%)	1 (1%)	
Yes	106 (95%)	82 (98%)	
Complications (number of patients)			0.0001
Missing	1	0	
No	125 (100%)	85 (88%)	
Yes	0 (0%)	11 (11%)	
Eight weeks			
Narcotic use (number of patients)			0.2851
Missing	1	0	
No	119 (95%)	88 (91%)	
Yes	6 (4%)	8 (8%)	
Gait aid use (number of patients)			0.1159
Missing	1	0	
No	112 (89%)	79 (82%)	
Yes	13 (10%)	17 (17%)	
Return to work (number of patients)			0.0018
Missing	90	61	
No	11 (30%)	1 (2%)	
Yes	25 (69%)	34 (97%)	
Walk 0.5 mile (number of patients)			0.3693
Missing	6	0	
No	10 (8%)	5 (5%)	
Yes	110 (91%)	91 (94%)	
Drive car (number of patients)			0.0112
Missing	27	28	
No	9 (9%)	0 (0%)	
Yes	90 (90%)	68 (100%)	
Able to perform activities of daily living (number of patients)			0.4541
Missing	2	1	
No	3 (2%)	1 (1%)	
Yes	121 (97%)	94 (98%)	
Complications (number of patients)			0.0209
Missing	1	2	
No	122 (97%)	85 (90%)	
Yes	3 (2%)	9 (9%)	
Harris hip score (points)			
Preoperative			0.2819
Number	60	50	
Mean (SD)	55.4 (10.5)	56.4 (14.3)	
Median	58.5	59.0	
Q1, Q3	51.5, 62.0	45.0, 66.0	
Range	22.0–89.0	27.0–89.0	
Eight weeks			< 0.0001
Number	112	40	
Mean (SD)	95.3 (6.1)	87.8 (12.4)	
Median	98.0	92.0	
Q1, Q3	93.0, 100.0	83.0, 97.0	
Range	70.0–100.0	49.0–100.0	

DA = direct anterior approach; MP = miniposterior approach; Q1, Q3 = first, third quartiles.

a reflection of each surgeon's mastery of his preferred operative approach for THA. A commonly cited limitation of randomized clinical trials in surgery is that there is often a major mismatch in experience with the new technique versus the control technique and thus a predilection for complications or technical errors to make the new technique look inferior [3]. In this study, both surgeons were well beyond any substantive learning curve effect with their preferred approaches as reflected by low rates of complications and the highly reproducible radiographic outcomes in both groups. Other limitations that were not quantifiable on a case-by-case basis here included the fixed costs associated with the table used for the direct anterior approach and radiation exposure, which in general was low but certainly not zero. Longer-term followup on endpoints like dislocations, readmissions, and reoperations also needs to be performed and compared in cohorts like the one we studied here to draw firmer conclusions.

A purported advantage of the direct anterior approach is a faster recovery and some studies support this contention [15, 17]. In our study, we found no such advantage. Many prior studies reporting results of direct anterior THA either used historical controls, in which disparities in pain management and rehabilitation goals were common [8, 15], or compared the direct anterior approach with a direct lateral or an anterolateral approach to THA, in which variable amounts of abductor musculature were taken down and then repaired as part of the technique [29]. By contrast, another study was a randomized clinical trial of 100 patients comparing direct anterior THA with direct lateral THA [24]; direct comparison of our results with that study is difficult because of different outcome measures, but we

Table 4. Eight-week radiographic outcomes

Variable	DA THA group (n = 126)	MP THA group (n = 96)	p value
Cup abduction (°)			0.1270
Mean (SD)	39.1 (5.0)	40.2 (5.7)	
Median	39.0	40.1	
Range	26.0–51.0	27.0–55.0	
Cup anteversion (ischiolateral) (°)			0.0490
Mean (SD)	52.7 (9.0)	50.2 (9.5)	
Median	53.0	50.7	
Range	23.2–77.0	29.9–75.0	
Cup anteversion (Woo-Morrey) (°)			0.0009
Mean (SD)	35.8 (6.9)	32.5 (7.4)	
Median	36.0	32.9	
Range	15.0–53.1	10.3–52.6	
Femoral offset (mm)			0.0009
Mean (SD)	0.6 (4.4)	3.0 (5.6)	
Median	0.0	1.2	
Range	−14.7 to 14.8	−10.5 to 19.1	
Leg length discrepancy (mm)			0.0099
Mean (SD)	1.0 (4.1)	−0.9 (6.0)	
Median	0.0	0.0	
Range	−9.0 to 13.4	−21.5 to 16.1	
Stem position AP (number of patients)			0.0809
Missing	1	0	
Neutral	88 (70%)	80 (83%)	
Valgus	3 (2%)	1 (1%)	
Varus	34 (27%)	15 (15%)	
Stem position lateral (number of patients)			< 0.0001
Missing	1	0	
Extended	0 (0%)	1 (1%)	
Flexed	48 (38%)	12 (12%)	
Neutral	77 (61%)	83 (86%)	

DA = direct anterior approach; MP = miniposterior approach.

note that both groups of patients in our study had markedly shorter lengths of stay and that the typical time off gait aids was similar to that found in that report [24]. More recently, Barrett et al. [1] reported the results of a randomized controlled trial of 87 patients comparing direct anterior THA with posterolateral approach THA. In that study, there was a difference in the postoperative care of each patient group with the posterolateral group subject to traditional ROM restrictions as a precaution against dislocation, whereas the direct anterior group was given no such restriction. The direct anterior group was reported to have performed better during the early postoperative period with lower visual analog scale pain scores on the first postoperative day and more patients climbing stairs normally and walking unlimited at 6 weeks. It is interesting to contrast our findings to those of Barrett et al. [1] with the most striking difference being that our direct anterior group performed nearly identically to theirs (early pain scores, distance walked in-hospital, length of stay, etc), but our miniposterior group outperformed theirs. Of particular note is the large increase in operative time for the patients in the direct anterior group, whose operative times were nearly twice as long as their miniposterior counterparts. This discrepancy has been noted in previous studies, however [1, 17, 20], and our mean direct anterior operative time remains on par with other reports [13, 16, 17]. Many surgeons continue to query the safety of eliminating restrictive hip precautions after miniposterior THA [5], but the contrast in outcomes between Barrett et al. [1] and our findings suggest that hip precautions may have a lingering psychologic and physical impact on patients that slows their early recovery. More data on the safety of eliminating traditional hip precautions after contemporary posterior approach THA with formal repair of the capsule and/or external rotators are warranted.

Most surgeons would support the contention that direct anterior THA is a more technically demanding procedure than miniposterior THA and the available literature has delineated some of the unique patterns of complications that can occur with direct anterior THA [27]. Intraoperative perforation of the lateral cortex of the femur during femoral implant preparation is the most serious widely recognized complication and is reported in many, but not all, series that include consecutive cases of direct anterior THA [13]. However, it is possible that after a suitable learning curve, direct anterior THA can be performed with an acceptably low risk of intraoperative and early postoperative complications. Our data add some support to that position, because the direct anterior THA in our study did not have a higher risk of intraoperative or early postoperative complications in the hands of a surgeon over 1 year out of the learning curve, having performed over 150 previous direct anterior procedures. Also surprising was the lower proportion of patients with direct anterior THA who had a minor wound complication in this study. Many surgeons have expressed concern about the vulnerability of an incision placed anteriorly near the groin or hip flexion crease. Jewett and Collis [13], reporting on 800 direct anterior THAs, found 37 had a wound healing issue and 13 had required a return to the operating room for local débridement and wound closure. The direct anterior incision used in our study was typically placed as far laterally over the tensor fascia muscle as feasible and not directly over the interval between the tensor and sartorius. That slightly more lateral skin incision simultaneously helps protect some branches of the lateral femoral cutaneous nerve from inadvertent injury and moves the incision further from the groin and hip flexor crease where it may be subject to a less favorable environment for healing. Barrett et al. [1] reported one wound dehiscence with the direct anterior approach but did not describe the incision placement in detail.

The technical demands of the direct anterior approach often warrant the use of fluoroscopy, particularly early in the learning curve, but some surgeons believe fluoroscopy gives the direct anterior approach a systematic advantage over more traditional THA approaches in hitting targets for component orientation, leg length, and hip offset [16]. In our study, however, direct anterior THA with intraoperative fluoroscopy did not result in a more reproducible component position. Much recent attention has been focused on the ability to reproducibly hit specific target values for acetabular cup position in particular with some substantial variability being reported [28, 33]. In our study, we found that reliable, reproducible, and similar component alignment was obtained with both the direct anterior/fluoroscopy and miniposterior/no-fluoroscopy surgical techniques. We could not find any systematic advantage to the use of intraoperative imaging in hitting target values for acetabular cup position, leg length, or hip offset as compared with a method relying on careful preoperative templating. For those who do use intraoperative fluoroscopy, it is important to obtain appropriately oriented images during the procedure, because it is easy to be led astray when images are off-axis or out of the intended plane. It is our contention that having a well-defined preoperative and intraoperative plan may be more important than the specific surgical techniques in obtaining tight radiographic outcomes after THA.

In conclusion, determining the effect of surgical approach alone on the early outcome after contemporary THA is confounded when advances in pain management, rapid rehabilitation, or patient education are introduced or applied asynchronously. In this study in which those confounders were largely controlled, there was no systematic advantage of direct anterior THA over miniposterior THA with excellent early functional and radiographic outcomes seen at 2 days, 2 weeks, and 2 months in both groups. Contrary to conventional belief and somewhat surprising were the fewer minor wound problems in the direct anterior group and the higher proportion of patients free of gait aids at 2 weeks and back to driving and back to work at 8 weeks in the miniposterior group. Additional randomized controlled trials with standardized perioperative protocols are warranted to further explore this comparison. In the interim, surgeons should be advised that factors other than surgical approach—attentive pain management, patient selection, surgical volume and experience, careful preoperative templating, and rapid rehabilitation protocols—may be more important in influencing early recovery after THA.

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