

Total Hip Arthroplasty (THA): Direct Anterior Approach Versus Posterior Approach

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Abstract

Background: Total hip arthroplasty (THA) is a highly successful orthopedic procedure for the management of end-stage hip disorders. The Direct Anterior Approach (DAA) has gained increasing popularity because of its muscle-sparing nature and potential for accelerated recovery, while the Posterior Approach (PA) remains widely utilized because of its familiarity and excellent surgical exposure. The relative benefits of these approaches continue to be debated.

Aim: To evaluate whether the posterior and direct anterior approaches to total hip arthroplasty differ in functional performance outcomes, perioperative characteristics, radiological findings, and complication rates.

Methods: This retrospective cohort study included 150 patients who underwent primary total hip arthroplasty between January 2021 and December 2025. Patients were divided equally into DAA (n=75) and PA (n=75) groups. Demographic variables, operative time, intraoperative blood loss, implant fixation method, hospital stay, complications, radiological findings, and Harris Hip Scores were assessed. Follow-up evaluations were performed during the immediate postoperative period, at two weeks, six weeks, and six months. Statistical analysis was performed using SPSS version 26.0, and a p-value less than 0.05 was considered statistically significant.

Results: Baseline demographic characteristics were comparable between the groups. Mean operative time was 91.4±13.5 minutes in the DAA group and 83.6±12.1 minutes in the PA group (p=0.081). Mean blood loss was 268.5±74.2 mL and 284.8±79.5 mL respectively (p=0.194). Hospital stay was significantly shorter in the DAA group (2.8±0.9 days) compared with the PA group (3.4±1.1 days; p=0.018). Harris Hip Scores were significantly higher in the DAA group at two weeks (68.4±7.2 vs 63.8±7.5; p=0.001) and six weeks (81.9±6.8 vs 77.2±7.1; p=0.002). At six months, both groups demonstrated comparable outcomes (92.3±4.5 vs 90.8±4.8; p=0.057). Complication rates and radiological outcomes were comparable between groups.

Conclusion: Both DAA and PA provided excellent clinical and functional outcomes following total hip arthroplasty. The Direct Anterior Approach offered superior early functional recovery and shorter hospital stay, whereas long-term functional outcomes, radiological findings, and complication rates were comparable between the two approaches.

Keywords: Total hip arthroplasty; Direct anterior approach; Posterior approach; Harris Hip Score.

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Introduction

Total hip arthroplasty (THA) is widely recognized as one of the most successful orthopedic procedures for the treatment of end-stage hip disorders, including osteoarthritis, avascular necrosis of the femoral head, rheumatoid arthritis, and selected hip fractures. The primary goals of THA are pain relief, restoration of hip function, improvement of mobility, and enhancement of quality of life. Advances in implant design, surgical techniques, perioperative care, and rehabilitation protocols have significantly improved the survivorship and clinical outcomes of THA, leading to an increasing number of procedures being performed worldwide [1].

Among the various factors influencing postoperative outcomes, the choice of surgical approach remains a topic of considerable debate. Several approaches have

been described for THA, including the posterior, direct lateral, anterolateral, and direct anterior approaches. Of these, the posterior approach (PA) and direct anterior approach (DAA) are currently the most commonly employed techniques. While both approaches provide reliable access to the hip joint and satisfactory long-term outcomes, they differ substantially in terms of soft tissue handling, surgical exposure, learning curve, postoperative recovery, complication profile, and functional performance [2]. The posterior approach has historically been the most frequently utilized technique for total hip arthroplasty. This approach provides excellent visualization of both the acetabulum and proximal femur, facilitating accurate implant positioning and femoral preparation. The procedure involves splitting the gluteus maximus muscle and detaching the short external rotators to

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gain access to the hip joint. The posterior approach is familiar to most orthopedic surgeons and is associated with a relatively shorter learning curve. However, disruption of posterior soft tissue structures has been associated with concerns regarding postoperative dislocation, delayed functional recovery, and soft tissue trauma [3].

In contrast, the direct anterior approach has gained substantial popularity over the last decade and is currently regarded as one of the most rapidly expanding techniques in primary THA. The DAA utilizes an internervous and intermuscular plane between the tensor fascia lata and sartorius muscles, thereby minimizing muscle detachment and preserving surrounding soft tissues. Because of its muscle-sparing nature, proponents of the DAA suggest that patients experience less postoperative pain, earlier mobilization, shorter hospital stays, and faster functional recovery when compared with traditional approaches [4]. These potential benefits have contributed to the increasing adoption of DAA in contemporary orthopedic practice.

Several comparative studies have evaluated the outcomes of DAA and PA in THA. Moerenhout et al. demonstrated that patients undergoing the direct anterior approach exhibited superior early postoperative functional recovery while maintaining comparable overall clinical outcomes to the posterior approach [1]. Similarly, systematic reviews and meta-analyses have reported that DAA may facilitate earlier ambulation and shorter hospitalization without compromising implant positioning or long-term functional outcomes [2,3]. Nevertheless, the magnitude and clinical significance of these benefits remain subjects of ongoing investigation.

Despite the reported advantages of DAA, several concerns limit its universal adoption. The technique is technically demanding and is associated with a considerable learning curve. Adequate femoral exposure may be challenging, particularly during the initial stages of surgical experience. In addition, studies have reported increased risks of lateral femoral cutaneous nerve injury, intraoperative femoral fractures, and wound-related complications during the learning phase [5,6]. These factors have led some surgeons to continue favoring the posterior approach despite the growing popularity of DAA.

The posterior approach, although associated with greater soft tissue disruption, continues to offer several practical advantages. The approach provides excellent femoral exposure, facilitates accurate implant placement, and is technically less demanding than DAA. Furthermore, advances in posterior soft tissue repair techniques have reduced dislocation rates and improved postoperative stability, thereby narrowing the differences between the two approaches [7].

Consequently, both approaches continue to be widely utilized, with the choice often depending on surgeon preference, experience, and patient characteristics.

Functional recovery following THA has become increasingly important with the implementation of enhanced recovery after surgery protocols and growing patient expectations. Early restoration of mobility, rapid return to daily activities, and improved patient-reported outcomes are now considered critical indicators of procedural success. The Harris Hip Score (HHS) remains one of the most widely used and validated tools for assessing pain relief, function, range of motion, and overall hip performance after arthroplasty [8]. Comparison of HHS between different surgical approaches provides valuable insight into the functional effectiveness of each technique.

In addition to functional outcomes, perioperative variables such as operative time, intraoperative blood loss, implant fixation method, and complication rates are important considerations when evaluating surgical approaches. Recent studies have demonstrated varying results regarding these parameters, with some reporting reduced blood loss and faster recovery following DAA, while others have found no clinically significant differences between approaches [9,10]. Such inconsistencies in the literature highlight the need for further evaluation using real-world clinical data.

Given the increasing utilization of both direct anterior and posterior approaches and the continued debate regarding their relative advantages, a comprehensive comparison of perioperative outcomes, complications, radiological findings, and functional performance is warranted. Therefore, the present study was undertaken to evaluate whether the posterior and direct anterior approaches to total hip arthroplasty differ in operative characteristics, complication rates, radiological outcomes, and functional performance outcomes as assessed by the Harris Hip Score.

Material and Methods

This retrospective cohort study was conducted in the Department of Orthopaedics of a tertiary care teaching hospital after obtaining approval from the Institutional Ethics Committee. The study involved a review of hospital records of patients who underwent primary total hip arthroplasty between January 2021 and December 2025. Ethical clearance was obtained prior to data collection, and all patient information was handled confidentially in accordance with institutional and ethical guidelines. As the study was based on retrospective review of existing medical records, the requirement for informed consent was waived by the Institutional Ethics Committee.

A total of 150 patients who underwent primary total hip arthroplasty during the study period were included in the analysis. Patients were categorized into two

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groups according to the surgical approach employed. The Direct Anterior Approach group consisted of patients who underwent THA through the direct anterior approach, while the Posterior Approach group included patients who underwent THA using the conventional posterior approach. (Figure 1)

Patients aged 18 years or older who underwent primary unilateral THA for osteoarthritis, avascular necrosis, rheumatoid arthritis, or femoral neck fracture and who had complete perioperative and follow-up records were included in the study. Patients undergoing revision arthroplasty, bilateral procedures, surgery for malignant conditions, active hip infections, pathological fractures, or those with incomplete medical records were excluded from the study.

Demographic data including age, gender, body mass index, indication for surgery, and operated side were collected from hospital records. Operative variables recorded included surgical approach, duration of surgery, estimated intraoperative blood loss, implant fixation method (cemented or uncemented), and intraoperative complications. Postoperative variables included duration of hospital stay, time to mobilization, postoperative complications, and need for revision procedures.

Radiological evaluation was performed using standard anteroposterior and lateral radiographs obtained during the immediate postoperative period and at the six-week follow-up visit. Implant position, fixation status, radiographic alignment, and evidence of complications were assessed from available imaging records.

Functional outcomes were evaluated using the Harris Hip Score. Scores were recorded from clinical follow-up records during the immediate postoperative period, at two weeks, six weeks, and six months following surgery. (Figure 2 and 3) Comparative assessment of functional recovery between the two groups was performed using these follow-up measurements. Clinical photographs documenting the surgical approach and postoperative mobilization were reviewed where available in institutional records.

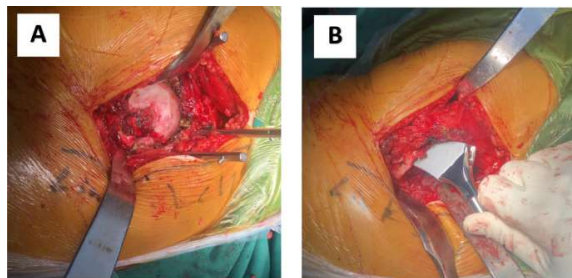


Figure 1. Operative approach images
(A) Direct Anterior Approach (DAA) –
intraoperative exposure

(B) Posterior Approach (PA) – intraoperative
exposure



Figure 2: Six Weeks postoperative pelvic
anteroposterior radiograph



Figure 3 a: Post-Operative Follow up at 6 Months
(Right side)



Figure 3 b: Post-Operative Follow up at 6 Months
(Left side)

Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Continuous variables were expressed as mean \pm standard deviation, while

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categorical variables were presented as frequencies and percentages. The normality of continuous data was assessed using the Shapiro–Wilk test. Continuous variables between the two groups were compared using the independent sample t-test for normally distributed data and the Mann–Whitney U test for non-normally distributed data. Categorical variables were analyzed using the Chi-square test or Fisher’s exact test as appropriate. Repeated comparisons of Harris Hip Scores across follow-up periods were performed using repeated-measures analysis where applicable. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 150 patients who underwent primary total hip arthroplasty were included in the study, with 75 patients each in the Direct Anterior Approach (DAA) and Posterior Approach (PA) groups. The baseline demographic characteristics of both groups were comparable. The mean age was 61.8±8.7 years in the DAA group and 62.4±9.1 years in the PA group (p=0.712). Male patients constituted 42 (56.0%) cases in the DAA group and 39 (52.0%) cases in the PA group. The prevalence of diabetes mellitus was 17.3% in the DAA group and 20.0% in the PA group. Similarly, smoking history, body mass index, and previous history of deep vein thrombosis were comparable between the groups with no statistically significant differences (Table 1). These findings indicate that both groups were well matched prior to surgery and suitable for comparison of perioperative and functional outcomes.

Perioperative outcomes demonstrated several differences between the two surgical approaches. The mean operative time was lower in the posterior approach group (83.6±12.1 minutes) compared to the direct anterior group (91.4±13.5 minutes), although the difference did not reach statistical significance (p=0.081). Estimated intraoperative blood loss was 268.5±74.2 mL in the DAA group and 284.8±79.5 mL in the PA group (p=0.194). The average hospital stay was shorter in patients undergoing DAA (2.8±0.9 days) compared to PA (3.4±1.1 days), showing a statistically significant difference (p=0.018). Cementless implants were predominantly used in both groups, accounting for 84.0% and 81.3% of cases in the DAA and PA groups respectively (Table 2).

Functional assessment using the Harris Hip Score revealed progressive improvement in both groups during follow-up. Immediately after surgery, mean HHS was 54.2±6.1 in the DAA group and 52.9±6.4 in the PA group (p=0.216). At two weeks, patients in the DAA group demonstrated significantly higher HHS values compared to the PA group (68.4±7.2 vs 63.8±7.5; p=0.001). Similar findings were observed at six weeks, where DAA patients achieved a mean HHS

of 81.9±6.8 compared to 77.2±7.1 in the PA group (p=0.002). At six months, both groups demonstrated excellent outcomes with mean HHS values of 92.3±4.5 and 90.8±4.8 respectively; however, the difference was not statistically significant (p=0.057). These findings suggest that the direct anterior approach provided superior early functional recovery while long-term outcomes were comparable between both approaches (Table 3).

Complication rates were low in both groups. Intraoperative complications occurred in 4.0% of patients in the DAA group and 6.7% in the PA group (p=0.465). Trochanteric fractures were observed in three patients in the DAA group and four patients in the PA group. Postoperative dislocation occurred in one patient (1.3%) following DAA and four patients (5.3%) following PA. Postoperative infections were noted in two patients in the DAA group and five patients in the PA group. Revision surgery was required in two patients (2.7%) in the DAA group and four patients (5.3%) in the PA group. None of the complication categories demonstrated statistically significant differences between the groups (Table 4), although a trend toward lower dislocation and revision rates was observed in the direct anterior approach cohort.

Table 1. Baseline demographic characteristics of study participants (n=150)

Variable	Direct Anterior THA (n=75)	Posterior THA (n=75)	p Value
Age (years)	61.8 ± 8.7	62.4 ± 9.1	0.712
Gender (Male)	42 (56.0%)	39 (52.0%)	0.624
Gender (Female)	33 (44.0%)	36 (48.0%)	0.624
Diabetes Mellitus	13 (17.3%)	15 (20.0%)	0.673
History of DVT	3 (4.0%)	4 (5.3%)	0.698
Smokers	10 (13.3%)	12 (16.0%)	0.640
BMI (kg/m ²)	27.8 ± 3.9	28.2 ± 4.2	0.581

Table 2. Perioperative characteristics and implant profile

Variable	Direct Anterior THA (n=75)	Posterior THA (n=75)	p Value
Operative Time (minutes)	91.4 ± 13.5	83.6 ± 12.1	0.081

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Estimated Blood Loss (mL)	268.5 ± 74.2	284.8 ± 79.5	0.194
Length of Hospital Stay (days)	2.8 ± 0.9	3.4 ± 1.1	0.018
Cemented Implant	12 (16.0%)	14 (18.7%)	0.665
Uncemented Implant	63 (84.0%)	61 (81.3%)	0.665

Table 3. Harris Hip Score comparison during follow-up

Follow-up Period	Direct Anterior THA (n=75)	Posterior THA (n=75)	p Value
Immediate Postoperative	54.2 ± 6.1	52.9 ± 6.4	0.216
2 Weeks	68.4 ± 7.2	63.8 ± 7.5	0.001
6 Weeks	81.9 ± 6.8	77.2 ± 7.1	0.002
6 Months	92.3 ± 4.5	90.8 ± 4.8	0.057

Table 4. Intraoperative and postoperative complications

Complication	Direct Anterior THA (n=75)	Posterior THA (n=75)	p Value
Trochanteric Fracture	3 (4.0%)	4 (5.3%)	0.698
Acetabular Fracture	1 (1.3%)	2 (2.7%)	0.559
Postoperative Dislocation	1 (1.3%)	4 (5.3%)	0.170
Postoperative Infection	2 (2.7%)	5 (6.7%)	0.245
Wound Complications	3 (4.0%)	4 (5.3%)	0.698
Revision Surgery	2 (2.7%)	4 (5.3%)	0.404
Total Complications	12 (16.0%)	23 (30.7%)	0.058

Discussion

The present retrospective cohort study compared the clinical, perioperative, and functional outcomes of Direct Anterior Approach (DAA) and Posterior Approach (PA) total hip arthroplasty in 150 patients. The findings demonstrated that both approaches provided excellent functional recovery and satisfactory clinical outcomes. However, patients undergoing DAA experienced significantly shorter hospital stay and superior early postoperative functional recovery as evidenced by higher Harris Hip

Scores at two and six weeks of follow-up. Although operative time was slightly longer in the DAA group, blood loss and complication rates were comparable between the two approaches. At six months, both groups achieved excellent functional outcomes with no statistically significant difference in Harris Hip Scores, suggesting that the primary advantages of DAA are observed during the early postoperative period.

One of the important findings of the present study was the superior early functional recovery observed in patients undergoing DAA. Harris Hip Scores at two weeks and six weeks were significantly higher in the DAA group compared to the PA group, whereas scores became comparable at six months. These findings are consistent with the systematic review and meta-analysis conducted by Jin et al. [11], who reported that the muscle-sparing nature of the anterior approach facilitates earlier mobilization, reduced postoperative discomfort, and improved short-term functional outcomes. The authors concluded that while long-term outcomes are generally equivalent, DAA offers advantages during the early recovery phase, which may contribute to improved patient satisfaction and accelerated return to daily activities.

The present study also demonstrated a significantly shorter duration of hospital stay among patients undergoing DAA. The average hospital stay was reduced by approximately 0.6 days compared with PA. Similar observations were reported by Wang et al. [12], who found that patients treated with DAA experienced earlier ambulation, shorter hospitalization, and faster achievement of rehabilitation milestones. Preservation of periarticular musculature and reduced soft tissue disruption associated with DAA were considered the primary factors contributing to accelerated postoperative recovery. These findings support the growing utilization of DAA within enhanced recovery after surgery protocols aimed at reducing hospitalization and optimizing patient outcomes.

Operative time was found to be longer in the DAA group compared with the PA group, although the difference was not statistically significant. This observation is in agreement with the findings reported by Nassar et al. [13], whose umbrella review demonstrated that DAA is frequently associated with longer operative duration, particularly during the surgeon's learning curve. The technical complexity of femoral exposure and implant positioning through the anterior approach may account for increased operative times. Nevertheless, the authors emphasized that operative duration tends to decrease significantly with increasing surgeon experience, eventually approaching that of conventional posterior approaches.

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Estimated intraoperative blood loss was slightly lower in the DAA group than in the PA group, although the difference did not reach statistical significance. Similar findings were reported by Xu et al. [14], who observed that blood loss differences between the two approaches are generally modest and may not be clinically meaningful when contemporary surgical techniques and perioperative blood management strategies are employed. Their meta-analysis further suggested that both approaches are associated with acceptable perioperative safety profiles and comparable rates of transfusion requirements.

Complication analysis in the present study demonstrated low rates of adverse events in both groups. Although postoperative dislocation, infection, and revision surgery occurred less frequently in the DAA group, the differences were not statistically significant. Hamilton et al. [15] similarly reported that both approaches provide excellent implant survivorship and low complication rates when performed by experienced surgeons. Their study suggested that while DAA may offer a lower tendency toward postoperative instability due to preservation of posterior soft tissues, overall complication rates are largely influenced by surgical expertise, patient selection, and perioperative care rather than the surgical approach alone.

The lower incidence of postoperative dislocation observed in the DAA group of the present study may be explained by preservation of posterior capsular structures and external rotator musculature. Although statistical significance was not achieved, this trend has been described in several contemporary investigations evaluating anterior approach arthroplasty. Preservation of stabilizing soft tissues may contribute to improved joint stability during the early postoperative period and potentially reduce the need for postoperative movement restrictions. Conversely, the posterior approach continues to provide excellent visualization of the acetabulum and femur, facilitating accurate component placement and maintaining its popularity among orthopedic surgeons worldwide. Radiological assessment performed immediately after surgery and at six weeks demonstrated satisfactory implant positioning and fixation in both groups. No significant radiographic differences were identified between DAA and PA. These findings are consistent with recent literature suggesting that modern implant designs and improved surgical techniques allow reliable component placement regardless of surgical approach. Consequently, functional recovery and perioperative outcomes rather than radiographic parameters may represent the primary distinguishing factors between these techniques.

The findings of the present study support the growing body of evidence indicating that DAA offers

advantages in terms of early functional recovery and reduced hospital stay while maintaining comparable safety and long-term functional outcomes. Nevertheless, both approaches achieved excellent Harris Hip Scores at six months, suggesting that the choice of surgical approach should be individualized according to surgeon expertise, institutional resources, and patient-specific factors. Further prospective randomized studies with longer follow-up periods are warranted to determine whether early functional benefits associated with DAA translate into sustained long-term clinical advantages.

Conclusion

Both Direct Anterior Approach and Posterior Approach total hip arthroplasty provided excellent clinical and functional outcomes in patients undergoing primary THA. The Direct Anterior Approach was associated with significantly better early postoperative functional recovery and shorter hospital stay, whereas operative time, blood loss, implant fixation method, radiological outcomes, and complication rates were comparable between the two groups. Although DAA demonstrated advantages during the early postoperative period, both approaches achieved excellent Harris Hip Scores at six months. Therefore, both surgical techniques remain effective options for total hip arthroplasty, with the Direct Anterior Approach offering potential benefits in accelerated recovery while maintaining a comparable safety profile.

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