



ORIGINAL RESEARCH PAPER

Orthopaedics

A PROSPECTIVE STUDY COMPARING THE
EARLY FUNCTIONAL OUTCOME AND GAIT
BETWEEN LATERAL AND POSTERIOR
APPROACHES IN TOTAL HIP ARTHROPLASTY

KEY WORDS: Total Hip Arthroplasty (THA), Functional Outcome, Gait Analysis, Surgical Approaches

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ABSTRACT

Background: Total Hip Arthroplasty (THA) is a well-established procedure for managing arthritis and related hip joint conditions. However, the optimal surgical approach—whether lateral or posterior—remains a subject of debate. **Objective:** This prospective study aims to compare the early functional outcomes and gait analysis between the lateral and posterior approaches in patients undergoing THA. **Methods:** Mata Gujri Memorial Medical College & L.S.K. Hospital, Kishanganj, Bihar, 23 patients (16 male, 7 female) were evaluated over a period of 3 months. The primary outcomes measured included functional improvement assessed by the Harris Hip Score (HHS), Trendelenburg test, and Rivermead Visual Gait Assessment (RVGA). Pre- and post-operative electromyographic (EMG) evaluations of the gluteus medius and maximus muscles were also performed. **Results:** Findings showed significant improvement in the HHS, with the posterior approach showing superior outcomes in terms of pain relief and functional recovery ($p < 0.05$). Gait analysis revealed better outcomes in the posterior group, though the difference was not statistically significant ($p = 0.115$). The Trendelenburg test also favoured the posterior approach, but this result was not significant ($p = 0.131$). There was no significant difference in nerve injury, with EMG results remaining normal in both groups. **Conclusion:** The study concludes that while both approaches offer excellent functional recovery, the posterior approach may have a slight advantage in early post-operative outcomes, particularly concerning pain and function. However, factors such as femoral offset were critical in influencing gait and abductor muscle strength post-operatively.

INTRODUCTION

Total Hip Arthroplasty (THA) is a widely performed surgical intervention for various hip conditions, including arthritis, avascular necrosis, and fractures. The main goal is to create a stable, functional, and painless hip joint. Despite the extensive success of THA, the choice between different surgical approaches—primarily lateral or posterior—remains debated among orthopaedic surgeons. While the posterior approach is known for better exposure and reduced blood loss, the lateral approach is associated with reduced rates of dislocation but may involve more extensive dissection. This study aims to prospectively compare the early functional outcomes and gait differences between these two approaches, offering insights into the choice of technique based on clinical outcomes.

Aims And Objectives

The objectives of this study are to compare the early functional outcomes, gait patterns, and gluteal muscle function between the lateral and posterior approaches in primary THA. Specific parameters measured include:

- 1. Functional outcome (Harris Hip Score).
- 2. Gait analysis (Rivermead Visual Gait Assessment).
- 3. Trendelenburg test.
- 4. Electromyographic assessment of gluteus medius and maximus muscles.

MATERIALS AND METHODS

This prospective study was conducted at Mata Gujri Memorial Medical College & L.S.K. Hospital, Kishanganj, Bihar, from April 2024 to June 2024. A total of 30 patients undergoing primary THA were initially included, but 7 patients were excluded due to insufficient follow-up. The final sample consisted of 23 patients (16 male, 7 female). Patients were divided into two groups based on the surgical approach: 13 underwent the lateral approach, and 10 underwent the posterior approach.

Inclusion Criteria

- Patients over 20 years of age with hip arthritis or unstable hips.
- Normal preoperative electromyography results.

Exclusion Criteria

- Age below 20 or over 80.
- Abnormal nerve function signs.
- Neurological disease or history of sciatica with neurological signs.

Surgical Procedure

- **Lateral Approach:** The modified Hardinge approach was used, involving abductor muscle splitting and anterior hip dislocation.^{[2][3]}
- **Posterior Approach:** Involved splitting the gluteus maximus and cutting the short external rotators, with posterior hip dislocation.

Postoperative protocols included weight-bearing exercises, pain management, and regular follow-ups for gait assessment and electromyography.

RESULTS

Harris Hip Score

The Harris Hip Score (HHS) was used to measure overall functional improvement.^[1] Preoperative HHS in the lateral group was 44.62, compared to 32.70 in the posterior group. Postoperatively, HHS increased to 79.85 for the lateral group and 89.30 for the posterior group [Table 1]. The mean improvement was significantly greater in the posterior approach (56.6 points) compared to the lateral approach (38.35 points), with a p-value of 0.004, indicating a significant difference in overall functional recovery.

Trendelenburg Test

The Trendelenburg test was used to assess gluteal muscle strength and function. The preoperative score was 5.38 for the lateral group and 5.7 for the posterior group [Table 1]. Postoperatively, the scores improved to 3.31 and 2.8, respectively. Although the posterior group showed greater improvement, the results were not statistically significant ($p = 0.131$). However, patients with a higher femoral offset ratio showed better Trendelenburg test outcomes, with a p-value of 0.001, indicating the importance of femoral offset in postoperative gait and muscle strength.

Table 1 Preoperative and Postoperative Harris Hip Score (HHS) and Trendelenburg Test Comparison

APPROACH	PRE_H HS	POS_H HS	PRE_T T	POST_ TT
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lateral	N	13	13	13	13
Valid		0	0	0	0
Missing		44.62	79.85	5.38	3.31
Mean	Median	46.00	80.00	5.00	3.00
Std. Deviation	Range	9.553	6.902	.650	.947
Minimum		40	24	2	3
Maximum		23	66	4	2
		63	90	6	5
posterior	N	10	10	10	10
Valid	Missing	0	0	0	0
Mean	Median	32.70	89.30	5.70	2.80
Std. Deviation	Range	32.50	91.00	6.00	3.00
Minimum		13.736	9.105	.483	.789
Maximum		37	28	1	2
		15	70	5	2
		52	98	6	4

Gait Analysis

Gait was evaluated preoperatively and postoperatively using the Rivermead Visual Gait Assessment (RVGA). Preoperative gait scores were 23.77 for the lateral group and 24.3 for the posterior group [Table 2]. Postoperative gait scores were 9.0 for the lateral group and 6.8 for the posterior group. While the posterior group showed more significant improvement, the difference was not statistically significant ($p = 0.115$). Gait disturbances, such as limp, were more prevalent in the lateral group, but the difference was also statistically insignificant.

Table 2 Preoperative and Postoperative Rivermead Visual Gait Assessment				
APPROACH			PRE_G AIT	POS_ GAIT
lateral	N	Valid Missing	13	13
			0	0
	Mean		23.77	9.00
	Median		24.00	8.00
	Std. Deviation		5.199	2.380
	Range		17	7
	Minimum		13	7
posterior	N	Valid Missing	10	10
			0	0
	Mean		24.30	6.80
	Median		26.50	6.00
	Std. Deviation		5.478	2.741
	Range		18	9
	Minimum		13	3
	Maximum		31	12

Electromyography

Electromyographic (EMG) studies were conducted preoperatively and postoperatively on the gluteus medius and maximus muscles. There were no significant changes in EMG findings in either group, indicating that the risk of nerve injury was minimal with both approaches.

DISCUSSION

The debate surrounding the optimal surgical approach for THA revolves around achieving the best functional outcome with minimal complications. The posterior approach is often favoured for its ease of exposure and reduced blood loss, while the lateral approach is preferred for its lower dislocation rates.^[4]

In this study, the posterior approach demonstrated superior outcomes in terms of functional recovery and pain relief, with statistically significant improvements in the Harris Hip Score. The posterior approach also resulted in better, though not significant, gait outcomes. This may be attributed to the preservation of the abductor muscles, which are critical for maintaining normal gait and preventing limp. The lateral approach, while effective, was associated with a higher

incidence of postoperative limp, possibly due to the dissection of the abductor muscles and potential damage to the superior gluteal nerve.

The Trendelenburg test results further supported the superior muscle strength recovery in the posterior group. However, both approaches provided excellent results in terms of overall functional recovery, with no significant differences in nerve injuries or postoperative complications. The study also highlights the importance of femoral offset in achieving optimal postoperative outcomes. Patients with a femoral offset ratio greater than 20% had better Trendelenburg test results and gait scores, suggesting that careful attention to implant positioning and femoral offset can significantly impact postoperative recovery.

Limitations

- The study was not randomized or double-blinded, which may introduce selection bias.
- The sample size was relatively small, limiting the power of the study.
- was variability in the implants used, which could influence outcomes.
- The follow-up period was short, limiting the assessment of long-term outcomes.

CONCLUSION

This study demonstrates that both the lateral and posterior approaches in THA can yield excellent early functional outcomes. However, the posterior approach offers a slight advantage in terms of pain relief and functional recovery. Femoral offset also plays a critical role in determining postoperative muscle strength and gait. Surgeons should consider these factors when selecting the surgical approach for THA to optimize patient outcomes.

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