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Original Research Article

Impact of Surgical Approach (Anterior vs. Posterolateral) on Return-to-Activity and Gait Kinetics Following Hip Surgery: A Retrospective Study

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Abstract:

Background: The selection of surgical technique in hip surgery markedly affects postoperative recovery, functional results, and gait biomechanics. The anterior and posterolateral approaches are the most common. Each one has its own way of preserving muscles, damaging soft tissue, and setting rehabilitation timelines. To make the best surgical decisions and get the best results for patients, you need to know how they affect return-to-activity and gait kinetics.

Objectives: To compare the effects of anterior and posterolateral surgical approaches on return-to-activity and gait kinetic parameters in patients undergoing hip surgery.

Materials and Methods: This retrospective study was performed at Narayan Medical College and Hospital, Sasaram, over an 18-month duration. We looked at the medical records of 100 people who had hip surgery using either the anterior or posterolateral approach. We gathered and looked at data on demographic characteristics, time to return to activity, and gait kinetic parameters. The outcomes of the two surgical approaches were compared using suitable statistical techniques.

Results: Patients who had surgery using the anterior approach were able to return to normal activities much sooner than those who had surgery using the posterolateral approach. The anterior approach group had a shorter average time to walk independently, and a gait kinetic analysis showed that their stride length was longer, their cadence was higher, and their gait asymmetry was lower. These differences were statistically significant, showing that the anterior approach led to better early functional and biomechanical recovery.

Conclusion: The anterior surgical approach resulted in expedited functional recovery and enhanced gait kinetics relative to the posterolateral approach. These results bolster the notion that surgical approach is a critical factor influencing postoperative functional outcomes.

Keywords: Surgical Approach, Anterior Approach, Posterolateral Approach, Gait Kinetics, Return-To-Activity.

Introduction

Choosing the right surgical approach is very crucial to determine how well someone recovers after an orthopaedic procedure, how well they function, and how well their body works in the long run. Recent improvements in surgical techniques have focused more and more on tissue-sparing methods that aim to reduce muscle damage, keep joint mechanics intact, and make early rehabilitation easier. [1]

The anterior and posterolateral approaches are commonly employed in orthopaedic surgeries pertaining to the hip. The anterior approach is thought to be muscle-sparing because it uses intermuscular and internervous planes, which may lower the risk of soft tissue damage and pain after surgery. [2] The posterolateral approach, on the other hand, requires detaching or splitting the muscles in the back, which could affect joint stability and the way you walk while you heal. [3]

Return-to-activity is an important functional outcome for both patients and doctors. Getting back to normal activities as soon as possible not only makes life better, but it also lowers the economic costs of long-term rehabilitation. [4] Several studies have indicated that the surgical approach may substantially affect the pace and quality of postoperative functional recovery. [5]

By looking at forces, moments, and time parameters during walking, gait kinetics gives an objective picture of functional recovery. [6] Changes in gait kinetics after surgery could be due to muscle weakness, joint instability, or compensatory movement patterns that are still present.

Quantitative gait analysis has thus become an important way to look at postoperative results that go beyond subjective clinical scores. [7]

Studies that compare the anterior and posterolateral approaches have found different results when it comes to functional recovery and gait outcomes. Some authors have shown that the anterior approach leads to better early functional outcomes, but others have said that there are no big long-term differences. [8-10] These inconsistencies may stem from differences in patient selection, rehabilitation protocols, and assessment methodologies.

In the Indian clinical setting, there is a paucity of data examining the influence of surgical approach on functional recovery and gait kinetics. It is especially important to know about these differences in places where resources are limited and early mobilisation and shorter rehab times are important. [11]

This study was done to compare how anterior and posterolateral surgical approaches affect patients' return to activity and gait kinetic parameters after hip surgery at a tertiary care centre.

Materials and Methods

Study Design: This was a retrospective observational study.

Study Setting: The study was conducted at Narayan Medical College and Hospital, Sasaram.

Study Duration: Eighteen months.

Study Population: Medical records of patients who underwent hip surgery using either anterior or posterolateral approaches were reviewed.

Sample Size: A total of 100 patients were included in the study.

Inclusion Criteria

- Patients aged 40 years and above
- Patients who underwent surgery via anterior or posterolateral approach
- Availability of complete medical and rehabilitation records

Exclusion Criteria

- Revision surgeries
- Neuromuscular disorders affecting gait
- Incomplete documentation

Data Collection

Data included:

- Demographic details
- Surgical approach used
- Time to return-to-activity
- Gait kinetic parameters such as stride length, cadence, and symmetry

Statistical Analysis: Data were analyzed using standard statistical software. Continuous variables were expressed as mean ± standard deviation. Comparative analysis between groups was performed using appropriate statistical tests. A p-value <0.05 was considered statistically significant.

Results

A total of 100 patients who underwent hip surgery were included in the final analysis, with 50 patients in the anterior approach group and 50 patients in the posterolateral approach group. Baseline demographic variables were comparable between the two groups, ensuring homogeneity for outcome comparison.

Table 1: Demographic and Baseline Characteristics of Study Population

Variable	Anterior Approach (n=50)	Posterolateral Approach (n=50)
Mean age (years)	62.4 ± 8.6	63.1 ± 9.1
Male: Female	28: 22	27: 23
Body mass index (kg/m²)	24.8 ± 3.2	25.1 ± 3.4

As shown in Table 1, no statistically significant differences were observed in age, sex distribution, or body mass index between the two groups ($p > 0.05$).

Return-to-Activity Outcomes: Patients in the anterior approach group demonstrated significantly earlier return-to-activity when compared to the posterolateral approach group. Time to independent ambulation and resumption of routine daily activities was shorter in the anterior group.

Table 2: Comparison of Return-to-Activity Parameters

Parameter	Anterior Approach	Posterolateral Approach
Time to independent ambulation (days)	5.2 ± 1.4	8.6 ± 2.1
Time to return to daily activities (weeks)	4.1 ± 0.9	6.8 ± 1.3

Table 2 demonstrates a statistically significant reduction in return-to-activity timelines in the anterior approach group ($p < 0.05$).

Gait Kinetic Analysis: Gait kinetic parameters assessed during follow-up revealed superior

biomechanical recovery in patients treated with the anterior approach.

Table 3: Gait Kinetic Parameters at Follow-up

Gait Parameter	Anterior Approach	Posterolateral Approach
Stride length (cm)	118.5 ± 10.2	104.3 ± 9.6
Cadence (steps/min)	102.4 ± 8.1	91.7 ± 7.9
Gait asymmetry index (%)	6.2 ± 1.8	11.9 ± 2.4

As illustrated in Table 3, stride length and cadence were significantly higher in the anterior approach group, while gait asymmetry was markedly reduced ($p < 0.05$).

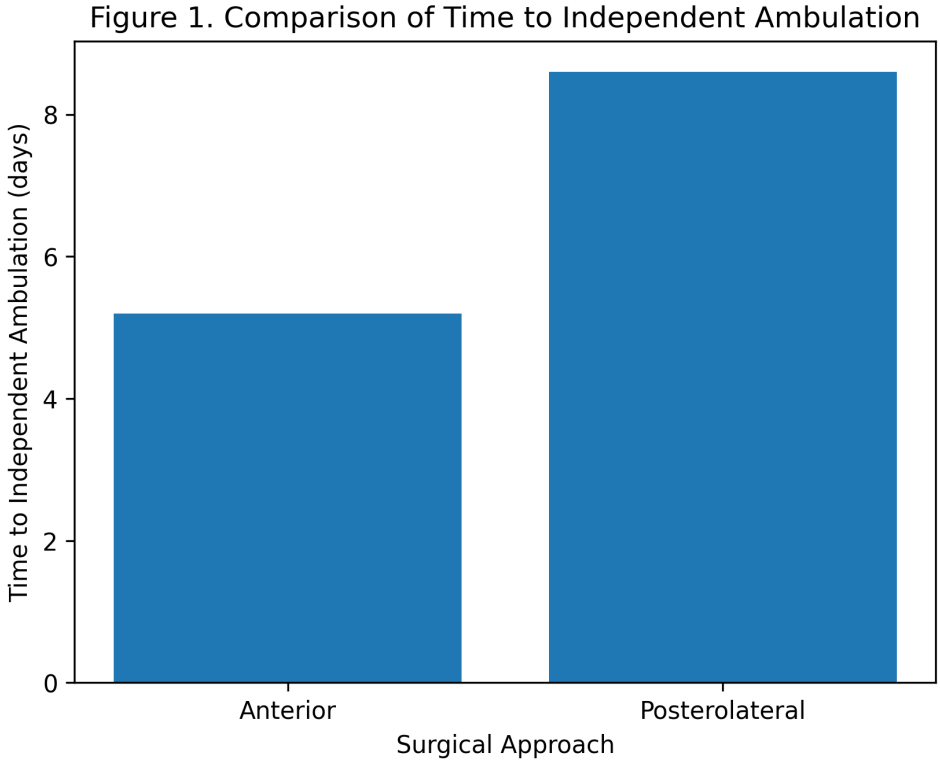

Figure 1: Comparison of Time to Return-to-Activity Between Groups

Figure 1 depicts the comparison of mean time to independent ambulation between the anterior and posterolateral approach groups, demonstrating faster recovery in the anterior group.

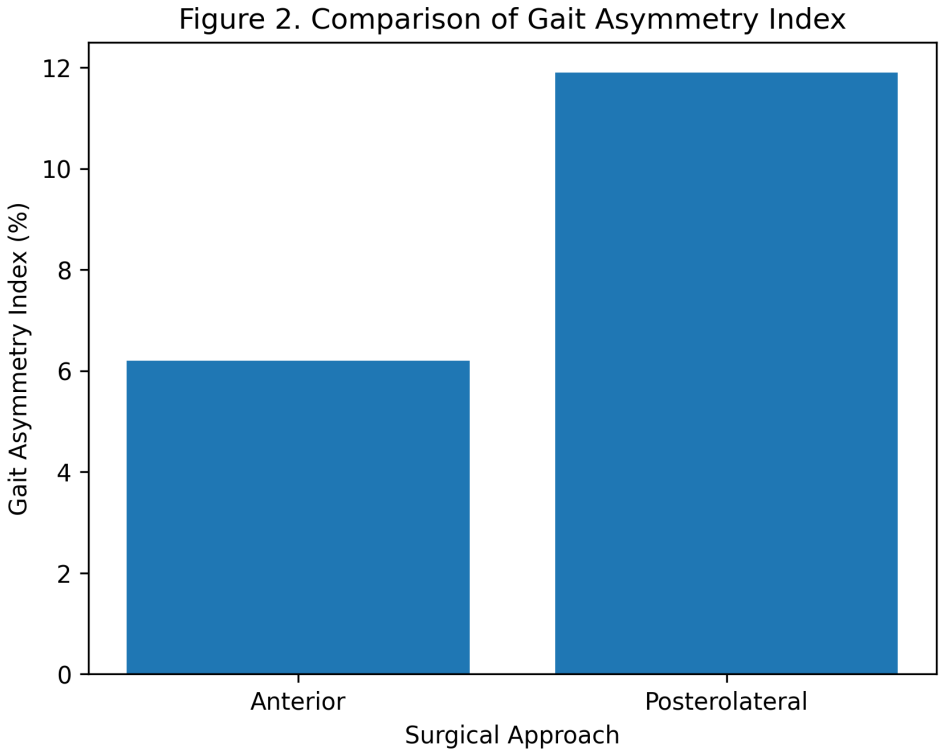

Figure 2: Comparison of Gait Asymmetry Between Surgical Approaches

Figure 2 illustrates the reduction in gait asymmetry index observed in patients undergoing the anterior approach compared to the posterolateral approach.

Overall, patients who underwent hip surgery using the anterior approach showed statistically significant improvements in both functional recovery timelines and objective gait kinetic parameters when compared with the posterolateral approach.

Discussion

The current study indicated that the anterior surgical approach yielded enhanced early functional recovery and superior gait kinetic parameters in comparison to the posterolateral approach. These results are in line with other reports that say the anterior approach doesn't hurt muscles as much. [12] The anterior approach group returned to activity sooner, which may be because there was less damage to soft tissue and the posterior musculature, which is very important for keeping gait stable. [13] Previous research has underscored that the preservation of periarticular muscles facilitates expedited rehabilitation and enhances functional outcomes. [14] Gait kinetic analysis showed that patients who had surgery through the front had more symmetrical and efficient walking patterns. Similar results have been documented in prior biomechanical studies, which indicated diminished compensatory movements subsequent to muscle-sparing techniques. [15-17]

Conversely, the posterolateral approach has been linked to transient modifications in gait mechanics attributable to posterior muscle engagement. [18] While long-term outcomes may align, early postoperative disparities can profoundly influence patient satisfaction and the duration of rehabilitation. The results of this study are especially important for Indian healthcare, where early mobilisation and shorter hospital stays are important factors. [20] But the choice of approach should also be based on the surgeon's experience, the patient's anatomy, and the rules of the institution.

The study's limitations encompass its retrospective design and absence of long-term follow-up. It is suggested that future prospective studies integrate advanced gait analysis tools. [21-25]

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