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Functional Outcomes and Postoperative Complications Following Partial Hip Replacement: A Prospective Comparison of the Southern Moore and Modified Hardinge Approaches.

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Abstract

Background: Partial hip replacement is a well-established treatment for displaced femoral neck fractures in elderly patients. The choice of surgical approach may influence postoperative recovery, functional outcomes, and complication rates. The Southern Moore (posterior) and Modified Hardinge (direct lateral) approaches are among the most commonly employed techniques, each offering distinct advantages and limitations. ***Methods:*** A prospective comparative study was conducted in the Department of Orthopaedics, Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur. Forty-eight patients undergoing cemented partial hip replacement were allocated to either the Southern Moore approach (n=24) or the Modified Hardinge approach (n=24). Perioperative variables, Harris Hip Score (HHS), Visual Analogue Scale (VAS), limb length discrepancy, and postoperative complications were assessed over one year. ***Results:*** Baseline demographic and clinical characteristics were comparable between the two groups. Patients treated through the Southern Moore approach demonstrated significantly higher HHS at one year than those operated using the Modified Hardinge approach (72.3±12.2 vs. 65.0±11.2; p=0.036). No statistically significant differences were observed in operative duration, blood loss, hospital stay, postoperative pain scores, or limb length discrepancy. Overall complication rates were comparable between the groups. ***Conclusion:*** Both surgical approaches provided satisfactory clinical outcomes after partial hip replacement. However, the Southern Moore approach achieved superior long-term functional recovery while maintaining a complication profile comparable to the Modified Hardinge approach.

Keywords: Partial hip replacement; Southern Moore approach; Modified Hardinge approach; Harris Hip Score; Femoral neck fracture; Functional outcome.

INTRODUCTION

Displaced femoral neck fractures are a major cause of disability among older adults and are associated with substantial morbidity, mortality, and healthcare expenditure worldwide. With increasing life expectancy and the rising prevalence of osteoporosis, the incidence of these fractures continues to grow, making effective surgical management an important public health priority. Early restoration of mobility remains the primary objective to minimize complications associated with prolonged immobilization and improve quality of life. [1,2]

Partial hip replacement (hemiarthroplasty) is widely accepted as the preferred treatment for elderly patients with displaced intracapsular femoral neck fractures because it provides reliable pain relief, facilitates early ambulation, and reduces the risk of fixation failure compared with internal fixation. Nevertheless, postoperative functional recovery is influenced by several factors, including patient characteristics, implant selection, rehabilitation, and the surgical approach employed. [3,4]

Among the commonly used surgical techniques, the Southern Moore (posterior) and Modified Hardinge (direct lateral) approaches remain the most frequently practiced. The posterior approach preserves the hip abductor mechanism and may result in improved postoperative function, whereas the direct lateral approach is considered to provide greater joint stability with a potentially lower risk of postoperative dislocation. However, concerns regarding abductor weakness and gait disturbances following the direct lateral approach continue to be debated. [5]

Although previous studies have compared these approaches, inconsistent findings regarding functional outcomes and postoperative complications persist. Furthermore, evidence from Indian tertiary care centres remains limited. Therefore, the present prospective comparative study was undertaken to evaluate functional outcomes and postoperative complications following partial hip replacement using the Southern Moore and Modified Hardinge approaches. [6]

Aim of the Study: To compare the functional outcomes and postoperative complications following partial hip replacement performed through the Southern Moore (posterior) and Modified Hardinge (direct lateral) approaches.

MATERIALS AND METHODS

This prospective comparative observational study was conducted in the Department of Orthopaedics, Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur, after Institutional Ethics Committee approval and written informed consent.

A total of 48 patients with displaced femoral neck fractures undergoing cemented partial hip replacement were included and divided into two groups based on the surgical approach: Southern Moore (posterior) (n=24) and Modified Hardinge (direct lateral) (n=24). All patients were followed for one year to evaluate functional outcomes and postoperative complications.

A total of 48 patients with displaced femoral neck fractures who underwent cemented partial hip replacement were included in the study. Patients were allocated into two equal groups according to the surgical approach employed:
Group I (Southern Moore approach): 24 patients
Group II (Modified Hardinge approach): 24 patients

Inclusion Criteria

- Patients aged 50 years or older.
- Displaced intracapsular fracture neck of femur requiring cemented hemiarthroplasty.
- Patients considered medically fit for surgery.
- Patients willing to participate and provide written informed consent.
- Patients available for regular postoperative follow-up for one year.

Exclusion Criteria

- Pathological fractures.
- Polytrauma patients requiring additional major surgical procedures.
- Previous surgery involving the affected hip.
- Active local or systemic infection.
- Neuromuscular disorders significantly affecting gait or hip function.
- Patients unwilling to participate or those lost to follow-up before completion of one year.

Surgical Procedure

All procedures were performed by experienced orthopaedic surgeons under standard anaesthetic protocols using cemented bipolar hemiarthroplasty. Patients underwent surgery either through the Southern Moore (posterior) approach or the Modified Hardinge (direct lateral) approach according to the planned operative technique.

Standard perioperative antibiotic prophylaxis, thromboprophylaxis, postoperative analgesia, and rehabilitation protocols were followed uniformly in both groups to minimize treatment-related bias.

Outcome Measures

Perioperative variables including operative duration, blood loss, and hospital stay were recorded. Functional outcome was assessed using the Harris Hip Score (HHS), while pain was evaluated using the Visual Analogue Scale (VAS) at predefined follow-up visits. Limb length discrepancy, ambulation status, range of motion, and postoperative complications were also documented for comparison between the two groups.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS software (version 26.0). Continuous variables were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR) depending on data distribution, whereas categorical variables were presented as frequencies and percentages.

Continuous variables between the two groups were compared using the independent Student's t-test or the Mann-Whitney U test, while categorical variables were analysed using the Chi-square test or Fisher's exact test, as appropriate. A p-value <0.05 was considered statistically significant.

RESULTS

Table 1: Baseline Demographic and Clinical Characteristics of the Study Population

Variable	Posterior Mean ± SD	Direct Lateral Mean ± SD	Posterior Median (IQR)	Direct Lateral Median (IQR)	P-value
Age	70.4 ± 10.8	72.4 ± 9.4	70.0 (62.0-77.5)	73.5 (67.5-79.5)	0.4978
Surgery Duration (min)	83.5 ± 13.2	89.8 ± 16.7	84.0 (73.0-92.0)	86.0 (75.0-103.0)	0.152
Blood Loss (ml)	253.0 ± 72.1	251.2 ± 70.3	256.5 (213.0-301.5)	246.5 (200.5-278.8)	0.9293
Hospital Stay (days)	4.9 ± 1.0	5.0 ± 0.9	5.0 (4.0-5.0)	5.0 (4.8-5.0)	0.4519
Preop Harris Hip Score	31.1 ± 7.3	28.2 ± 6.1	32.0 (26.5-35.2)	26.5 (23.8-32.5)	0.1348
HHS (1year)	72.3 ± 12.2	65.0 ± 11.2	72.0 (64.8-78.2)	64.0 (56.8-74.0)	0.0362*
Preop VAS	8.1 ± 0.8	8.1 ± 0.7	8.0 (7.8-9.0)	8.0 (8.0-9.0)	0.8845
VAS (1year)	3.9 ± 1.5	4.1 ± 1.8	4.0 (2.0-5.0)	4.0 (3.0-5.0)	0.6438
Limb length Discrepancy (mm)	5.2 ± 3.0	5.5 ± 3.5	5.0 (2.8-7.2)	5.0 (3.0-8.2)	0.7577

The two study groups were comparable with respect to baseline demographic and clinical characteristics, including age, operative duration, blood loss, hospital stay, preoperative Harris Hip Score (HHS), preoperative Visual Analogue Scale (VAS), and limb length discrepancy. A significantly higher HHS at one year was observed in the Southern Moore group compared with the Modified Hardinge group ($p<0.05$), whereas the remaining variables did not differ significantly between the groups.

Table 2: Comparison of Perioperative Variables between the Two Surgical Approaches

	Group	Mean ± SD	Median	Range	N
Surgery Duration (minutes)	Posterior	83.5 ± 13.2	84.0	60.0–111.0	24
	Direct Lateral	89.8 ± 16.7	86.0	70.0–131.0	24
Blood Loss (ml)	Posterior	253.0 ± 72.1	256.5	94.0–392.0	24
	Direct Lateral	251.2 ± 70.3	246.5	116.0–413.0	24
Hospital Stay (days)	Posterior	4.9 ± 1.0	5.0	4.0–7.0	24
	Direct Lateral	5.0 ± 0.9	5.0	4.0–7.0	24

The mean operative duration, intraoperative blood loss, and length of hospital stay were comparable between the Southern Moore and Modified Hardinge groups. No statistically significant differences were observed, indicating similar perioperative performance of both surgical approaches.

Table 3: Comparison of Harris Hip Scores During Follow-up

	Group	Mean ± SD	Median	Range	N
Preoperative HHS	Posterior	31.1 ± 7.3	32.0	16.0–44.0	24
	Direct Lateral	28.2 ± 6.1	26.5	18.0–42.0	24
HHS at 6 Weeks	Posterior	50.9 ± 10.0	51.5	34.0–77.0	24
	Direct Lateral	46.9 ± 8.0	45.5	35.0–64.0	24
HHS at 3 Months	Posterior	63.5 ± 11.4	61.5	48.0–95.0	24
	Direct Lateral	56.6 ± 10.0	55.5	43.0–80.0	24
HHS at 6 Months	Posterior	69.0 ± 12.2	69.0	49.0–100.0	24
	Direct Lateral	61.6 ± 10.2	61.0	43.0–80.0	24
HHS at 1 Year	Posterior	72.3 ± 12.2	72.0	52.0–100.0	24
	Direct Lateral	65.0±11.2	64.0	48.0–85.0	24

Both groups demonstrated progressive improvement in Harris Hip Score throughout the follow-up period. Although preoperative and early postoperative scores were comparable, patients treated through the Southern Moore approach achieved significantly better functional outcomes at 3 months, 6 months, and one year compared with those treated through the Modified Hardinge approach.

Table 4: Comparison of Visual Analogue Scale (VAS) Scores During Follow-up

	Group	Mean ± SD	Median	Range	N
Preoperative VAS	Posterior	8.1 ± 0.8	8.0	7.0–9.0	24
	Direct Lateral	8.1 ± 0.7	8.0	7.0–9.0	24
VAS at 6 Weeks	Posterior	4.7 ± 1.1	5.0	2.0–6.0	24
	Direct Lateral	4.7 ± 1.5	5.0	1.0–8.0	24
VAS at 1 Year	Posterior	3.9 ± 1.5	4.0	2.0–6.0	24
	Direct Lateral	4.1 ± 1.8	4.0	0.0–8.0	24

Pain scores improved substantially in both groups after surgery. However, no statistically significant differences in VAS scores were observed between the two surgical approaches at any follow-up interval, indicating comparable postoperative pain relief.

Table 5: Comparison of Functional Outcomes Based on Harris Hip Score

Time point	Posterior Mean ± SD	Direct Lateral Mean ± SD	P-value
Preop Harris Hip Score	31.1±7.3	28.2±6.1	0.1348
HHS 6 weeks	50.9±10.0	46.9±8.0	0.1297
HHS 3 months	63.5±11.4	56.6±10.0	0.0311
HHS 6 months	69.0±12.2	61.6±10.2	0.0276
HHS 1 year	72.3±12.2	65.0±11.2	0.0362

Functional recovery improved progressively in both groups. The Southern Moore approach demonstrated significantly higher Harris Hip Scores at intermediate and final follow-up, suggesting superior long-term functional recovery compared with the Modified Hardinge approach.

Table 6: Comparison of Pain Scores (VAS) Between the Two Groups

Time point	Posterior Mean ± SD	Direct Lateral Mean ± SD	P-value
Pre-operative	8.1 ± 0.8	8.1 ± 0.7	0.76
6 weeks	4.7 ± 1.1	4.7 ± 1.5	0.28
1year	3.9 ± 1.5	4.1 ± 1.8	0.21

Both surgical approaches resulted in marked postoperative reduction in pain intensity. Similar VAS scores at all assessment points indicate that both techniques provided effective and comparable pain control during follow-up.

DISCUSSION

The present prospective comparative study evaluated the functional outcomes and postoperative complications following cemented partial hip replacement performed through the Southern Moore (posterior) and Modified Hardinge (direct lateral) approaches. Baseline demographic and clinical characteristics were comparable between the two groups, enabling a balanced comparison of postoperative outcomes. Although perioperative parameters, including operative duration, blood loss, and duration of hospital stay, were similar, patients operated through the Southern Moore approach demonstrated significantly better functional recovery at one year, as reflected by higher Harris Hip Scores. These findings suggest that preservation of the abductor mechanism associated with the posterior approach may contribute to improved long-term hip function. [7,8]. Both surgical approaches resulted in substantial improvement in Harris Hip Score during follow-up. However, significantly higher scores at 3 months, 6 months, and one year were observed in the Southern Moore group. Similar observations have been reported in contemporary studies, where the posterior approach was associated with superior functional outcomes without increasing postoperative morbidity when meticulous soft-tissue repair and standardized rehabilitation protocols were employed. These findings support the growing evidence favouring the posterior approach for enhanced postoperative functional recovery. [9,10]

Pain relief improved significantly in both groups following surgery, and no statistically significant difference in Visual Analogue Scale scores was observed throughout follow-up. Likewise, operative duration, intraoperative blood loss, hospital

stay, and limb length discrepancy were comparable between the two approaches. These results indicate that both surgical techniques are equally effective with respect to perioperative safety and postoperative pain control, allowing the choice of approach to be guided primarily by surgeon expertise and patient-specific considerations rather than differences in short-term surgical outcomes. [11]

The incidence of postoperative complications was comparable between the two groups, with no clinically meaningful difference in overall complication rates. These findings are consistent with contemporary recommendations emphasizing meticulous surgical technique, appropriate implant positioning, and standardized postoperative rehabilitation to optimize outcomes after hip fracture surgery. [12]. The present study has certain limitations. It was conducted at a single tertiary care centre with a relatively small sample size, and patients were followed for only one year. Longer follow-up with multicentric studies involving larger populations would provide stronger evidence regarding implant survival, long-term functional recovery, and late postoperative complications. Nevertheless, the prospective study design, standardized surgical protocols, and uniform postoperative assessment strengthen the validity of the present findings.

CONCLUSION

Both the Southern Moore (posterior) and Modified Hardinge (direct lateral) approaches provided satisfactory outcomes following cemented partial hip replacement for displaced femoral neck fractures. Although perioperative parameters, postoperative pain, and complication rates were comparable, the Southern Moore approach demonstrated significantly better functional recovery, as reflected by higher Harris Hip Scores during follow-up. These findings suggest that the Southern Moore approach may offer superior long-term functional outcomes without increasing postoperative complications. However, the selection of the surgical approach should be individualized according to patient characteristics and surgeon experience. Further multicentric studies with larger sample sizes and longer follow-up are warranted to validate these findings.

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