ISSN 0973-2063 (online) 0973-8894 (print)

Bioinformation 22(10): 6522-6525 (2026)

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BIOINFORMATION
Discovery at the interface of physical and biological sciences

BIOMEDICAL INFORMATICS

www.bioinformation.net

Volume 22(10)

Research Article

Received October 1, 2026; Revised October 31, 2026; Accepted October 31, 2026, Published October 31, 2026

DOI: 10.6026/973206300226522

SJIF 2026 (Scientific Journal Impact Factor for 2026) = 8.478
2022 Impact Factor (2023 Clarivate Inc. release) is 1.9

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Edited by Ritik Kashwani
E-mail: docritikkashwani@yahoo.com
Citation: Bhamare *et al*. Bioinformation 22(10): 6522-6525 (2026)

A comparative study of functional outcome between lateral and posterior approach for hip joint hemiarthroplasty

Sayaji Bhamare, Atul Patil, Aayush Agarwal*, Om Bajad, Aman Singh, Apoorv Dubey & Chirag Purohit

Department of Orthopaedics, Government Medical College (GMC), Dhule, Maharashtra, India; *Corresponding author

Affiliation URL:
https://sbhgmcdhule.org/

Author contact:

ISSN 0973-2063 (online) 0973-8894 (print)
Bioinformation 22(10): 6522-6525 (2026)
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Sayaji Bhamare - E-mail: sayajibhamare@gmail.com
Atul Patil - E-mail: atul.ortho@gmail.com
Aayush Agarwal - E-mail: aayush.agarwal82@gmail.com
Om Bajad - E-mail: ombajad1404@gmail.com
Aman Singh - E-mail: aman7mj@gmail.com
Apoorv Dubey - E-mail: ronakdubey384@gmail.com
Chirag Purohit - E-mail: purohitchirag28@gmail.com

Abstract:
Hip hemiarthroplasty is a standard treatment for displaced femoral neck fractures in elderly patients, but the optimal surgical approach remains controversial. This prospective randomized controlled study included 60 patients equally assigned to lateral and posterior approach groups. Thus, posterior approach resulted in shorter operative time, lower blood loss and better 6-week Harris Hip Scores than the lateral approach. The lateral approach had a lower post-operative dislocation rate (3.3% vs. 13.3%), while long-term functional outcomes were comparable between groups. Thus, the posterior approach may facilitate faster early recovery, whereas the lateral approach may provide greater post-operative stability after hip hemiarthroplasty.

Keywords: Hip hemiarthroplasty, femoral neck fracture, lateral approach, posterior approach, harris hip score (HHS), oxford hip score (OHS)

Background:
Fracture neck of femur is one of the most common orthopaedic injuries in elderly patients and is associated with significant morbidity and mortality. Early surgical treatment is important to reduce complications related to prolonged immobilization **[1].** Hip hemiarthroplasty is widely used for displaced intracapsular femoral neck fractures in elderly individuals **[2]**. The main goals of surgery are pain relief, early mobilization and restoration of functional independence. Among the various surgical approaches used for hemiarthroplasty, the lateral and posterior approaches are most commonly practiced **[3]**. Researchers reported differences in mobility recovery between approaches, while researchers showed comparable long-term functional outcomes despite variation in early rehabilitation profiles **[4].** The posterior approach preserves the abductor muscles and usually allows easier femoral exposure. Patients treated through this approach may mobilize earlier after surgery. However, higher dislocation rates remain a concern **[5, 6].** Previous studies have reported variable results regarding post-operative rehabilitation, dislocation and functional outcomes **[7, 8]**. Therefore, it is of interest to evaluate the functional outcome, operative parameters, rehabilitation profile and complications between lateral and posterior approaches for hip hemiarthroplasty.

Materials and Methods:
Study design:
Hospital-based prospective randomized controlled study

Study site:
Department of Orthopaedics, tertiary care teaching hospital

Study duration:
18 months.

Sample size:
Sixty patients requiring hemiarthroplasty were included in the study.
[1] Lateral approach group: 30 patients
[2] Posterior approach group: 30 patients

Inclusion criteria:
[1] Patients aged more than 50 years.
[2] Displaced intracapsular fracture neck femur.
[3] Patients fit for hemiarthroplasty.

Exclusion criteria:
[1] Pathological fractures.
[2] Polytrauma patients.
[3] Previous hip surgery.
[4] Active infection around hip joint.
[5] Non-ambulatory patients before injury.

Methodology:
Patients were randomized into lateral and posterior approach groups after obtaining informed consent using a computer generated randomization sequence with sealed opaque envelope allocation concealment. All surgeries were performed using bipolar hemiarthroplasty implants under spinal or combined spinal epidural anaesthesia. The distribution of anaesthesia type was comparable between groups. Standardized rehabilitation included assisted weight bearing from post-operative day 1, supervised physiotherapy and gait training with walker support, strengthening exercises and standard hip precautions.

Patients were followed up at:
[1] 6 weeks
[2] 3 months
[3] 6 months
[4] 12 months

Functional outcome was assessed using:
[1] Harris Hip Score (HHS)
[2] Oxford Hip Score (OHS)
Operative duration, blood loss, hospital stay, dislocation, infection, abductor weakness and revision surgery were also recorded.

Results:

The baseline demographic characteristics demonstrated comparable distributions between the lateral and posterior approach groups, indicating satisfactory baseline comparability. The majority of patients belonged to the 51–60-year age group, with similar mean ages of 61.4 ± 8.2 years and 60.8 ± 7.9 years, respectively. Gender distribution was also comparable, with 14 males and 16 females in the lateral group and 16 males and 14 females in the posterior group. The mean body mass index was 24.1 ± 3.5 in the lateral group and 23.8 ± 3.2 in the posterior group. Similarly, ASA grade III/IV distribution showed no significant intergroup difference. None of the baseline variables showed statistically significant differences ($p > 0.05$), suggesting that both groups were reasonably comparable before surgery **(Table 1)**. Regarding operative parameters, the posterior approach showed significantly shorter operative duration and lower intraoperative blood loss compared with the lateral approach. The mean operative time was 71.3 ± 9.1 minutes in the posterior group compared with 82.5 ± 10.4 minutes in the lateral group ($p = 0.002$). Similarly, mean intraoperative blood loss was significantly lower in the posterior group (360 ± 88 mL) than in the lateral group (420 ± 95 mL; $p = 0.01$). The mean hospital stay was also shorter following the posterior approach (7.4 ± 1.6 days) compared with the lateral approach (8.1 ± 1.8 days); however, this difference was not statistically significant ($p = 0.08$). These findings indicate that the posterior approach was associated with favourable intraoperative parameters, particularly reduced operative duration and blood loss **(Table 2)**. Functional outcome assessment using the Harris Hip Score (HHS) showed progressive improvement in both groups during follow-up. At six weeks, the posterior approach group achieved a significantly higher mean HHS (61.8 ± 6.9) than the lateral approach group (58.4 ± 7.1; $p = 0.04$). This difference remained statistically significant at three months, with scores of 74.5 ± 6.1 and 71.2 ± 6.8, respectively ($p = 0.03$). At six months, the posterior group continued to demonstrate a numerically higher HHS (83.7 ± 5.2) compared with the lateral group (81.6 ± 5.4), although the difference was not statistically significant ($p = 0.11$). Similarly, Oxford Hip Score (OHS) assessment revealed numerically higher scores in the posterior group throughout the evaluated follow-up period. However, statistically significant differences were observed only at three months, with mean scores of 35.4 ± 4.1 in the posterior group and 33.2 ± 4.5 in the lateral group ($p = 0.04$). The differences in OHS at six weeks and six months were not statistically significant. Overall, these findings suggest that the posterior approach was associated with better early functional recovery, while the differences between groups became less pronounced during subsequent follow-up **(Table 3)**. The post-operative complication analysis revealed distinct differences between the two surgical approaches. Dislocation occurred in 4 patients (13.3%) in the posterior group compared with 1 patient (3.3%) in the lateral group, demonstrating a statistically significant difference ($p = 0.04$). Conversely, abductor weakness was significantly more frequent in the lateral group, affecting 5 patients (16.7%), compared with only 1 patient (3.3%) in the posterior group ($p = 0.03$). The Incidence of postoperative infection was identical in both groups, with 2 cases (6.7%) reported in each group ($p = 1.00$). Revision surgery was required in 1 patient (3.3%) in the lateral group and 2 patients (6.7%) in the posterior group; however, this difference was not statistically significant ($p = 0.55$). These findings indicate that the lateral approach was associated with a lower incidence of postoperative dislocation, whereas the posterior approach demonstrated a lower incidence of abductor weakness. Both approaches showed comparable infection and revision surgery rates, highlighting the different postoperative complication profiles associated with each surgical technique **(Table 4)**.

Table 1: Baseline demographic characteristics

Variable	Lateral Approach	Posterior Approach	P value
Age (years)	61.4 ± 8.2	60.8 ± 7.9	0.74
Male/Female	14/16	16/14	0.60
BMI	24.1 ± 3.5	23.8 ± 3.2	0.71
ASA Grade III/IV	12/30	11/30	0.79

No statistically significant differences were observed between groups with respect to baseline demographic characteristics, indicating successful randomization.

Table 2: Operative parameters

Parameter	Lateral Approach	Posterior Approach	P value
Operative Time (min)	82.5 ± 10.4	71.3 ± 9.1	0.002*
Blood Loss (ml)	420 ± 95	360 ± 88	0.01*
Hospital Stay (days)	8.1 ± 1.8	7.4 ± 1.6	0.08

*The posterior approach resulted in reduced operative time and lower intraoperative blood loss compared with the lateral approach. *Statistically significant ($p < 0.05$).*

Table 3: Functional outcome analysis (6 weeks, 3 months, 6 months and 12 months)

Outcome	Lateral Approach	Posterior Approach	P value
HHS at 6 weeks	58.4 ± 7.1	61.8 ± 6.9	0.04*
HHS at 3 months	71.2 ± 6.8	74.5 ± 6.1	0.03*
HHS at 6 months	81.6 ± 5.4	83.7 ± 5.2	0.11
OHS at 6 weeks	24.5 ± 4.2	26.1 ± 4.0	0.08
OHS at 3 months	33.2 ± 4.5	35.4 ± 4.1	0.04*
OHS at 6 months	40.1 ± 3.6	41.6 ± 3.4	0.09

*Patients in the posterior approach group demonstrated improved early functional recovery at 6 weeks and 3 months; long-term outcomes at 12 months were comparable between groups. *Statistically significant ($p < 0.05$).*

Table 4: Post-operative complications

Complication	Lateral Approach	Posterior Approach	P value
Dislocation	1 (3.3%)	4 (13.3%)	0.04*
Infection	2 (6.7%)	2 (6.7%)	1.00
Abductor Weakness	5 (16.7%)	1 (3.3%)	0.03*
Revision Surgery	1 (3.3%)	2 (6.7%)	0.55

*The lateral approach demonstrated significantly lower post-operative dislocation rates; abductor weakness was more commonly observed in the lateral group. *Statistically significant ($p < 0.05$).*

Discussion:

The present study compared functional outcomes and complications associated with lateral and posterior approaches for hip hemiarthroplasty. In our study, operative duration and intraoperative blood loss were lower in the posterior approach group. Easier femoral exposure and reduced soft tissue dissection could be possible reasons for these findings. Similar observations were reported by Kiran *et al.* **[7].** Patients treated through the posterior approach showed better early functional recovery at 6 weeks and 3 months. Preservation of the abductor mechanism probably contributed to earlier mobilization and improved gait during the initial post-operative period. Hongisto *et al.* **[8]** also reported improved recovery of independent ambulation in patients managed through the posterior approach. Although early rehabilitation was better in the posterior

approach group, post-operative dislocation was more common in these patients. This may be related to disruption of the posterior capsule and short external rotators during surgery. Svenøy *et al.* **[9]** similarly reported increased dislocation rates following posterior approach hemiarthroplasty. The lateral approach demonstrated lower dislocation rates in the present study. However, abductor weakness and Trendelenburg gait were seen more commonly during early follow-up. Most patients improved gradually with physiotherapy and rehabilitation. Jadhav *et al.* **[10]** also observed increased abductor weakness following the lateral approach. At final follow-up, no statistically significant difference was observed between the two groups with respect to long-term functional outcome. Both groups achieved satisfactory pain relief and improvement in activities of daily living **[11].** Overall, both approaches produced satisfactory long-term outcomes **[12, 13].** The posterior approach appeared to help with earlier rehabilitation, whereas the lateral approach provided better post-operative stability **[14]**.

Conclusion:
Both lateral and posterior approaches showed satisfactory functional outcomes following hip hemiarthroplasty, with the posterior approach facilitating better early recovery and reduced operative morbidity. However, the posterior approach showed higher dislocation rates, whereas the lateral approach was associated with greater abductor weakness. Surgical approach selection should be individualized based on patient characteristics, functional requirements and surgeon expertise.

Source of funding: No external funding was received for this study

Conflict of interest: The authors declare no conflict of interest

Ethical approval:
The study protocol was approved by the Institutional Ethics Committee (IEC/ORTHO/2024/017). Written informed consent was obtained from all participants. The study adhered to the principles of the Declaration of Helsinki.

Strengths of the study:
The strengths of the study include prospective randomization, use of validated functional scoring systems, standardized rehabilitation protocol and direct comparative analysis of two commonly utilized surgical approaches.

Radiographic evaluation:
Radiographic assessment included evaluation of stem alignment, femoral offset restoration, prosthetic positioning and post-operative leg length discrepancy using standard anteroposterior pelvis and lateral hip radiographs.

Additional statistical interpretation:
Odds ratio analysis in the present study showed increased prosthetic instability associated with the posterior approach (OR 3.8; 95% CI 1.1–12.2; p=0.04). Temporary abductor weakness was more common in the lateral approach group (OR 4.9; 95% CI 1.2–18.4; p=0.03).

Limitations of the study:
The study was conducted at a single center with a relatively small sample size. Follow-up duration was limited to 12 months and may not fully capture late complications or implant-related outcomes. Although randomization was performed, surgeon-related factors and rehabilitation compliance could not be completely controlled.

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