International Journal of Research in Orthopaedics
Bhaskaran NS et al. Int J Res Orthop. 2026 Jan;12(1):174-178
http://www.ijoro.org

DOI: https://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20254225

Original Research Article

Comparison of functional outcomes of modular bipolar hemiarthroplasty done in direct lateral versus posterior approaches

Navneeth Sushama Bhaskaran[1]*, Mohammed Manzoor Kuriyappulli Ibrahim[2], Nevil Sunny[3], Ashwin Raj[4]

[1]Department of Orthopedics, Ahalia Diabetes Hospital, Palakkad, Kerala, India
[2]Department of Orthopaedic surgeon, Crescent hospital Alathur, Kerala, India
[3]Department of Orthopedics, PKDas Institute of Medical Sciences, Ottapalam, Kerala, India
[4]Department of Community Medicine, MES Medical College, Perinthalmanna, Kerala, India

Received: 29 October 2025
Accepted: 10 December 2025

***Correspondence:**
Dr. Navneeth Sushama Bhaskaran,
E-mail: navneethsb23@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Fracture neck of femur (FNF) is a common osteoporotic injury in the elderly, contributing significantly to morbidity and mortality. Hemiarthroplasty is widely accepted for displaced FNF; however, the optimal surgical approach remains debated. This study compared the functional and radiological outcomes of cemented modular bipolar hemiarthroplasty performed via direct lateral versus posterior approaches.
Methods: A retrospective cohort study was conducted at Kovai Medical Centre and Hospital, Coimbatore, including 100 patients (aged 51–90 years) who underwent cemented modular bipolar hemiarthroplasty for FNF between June 2018 and June 2019, with one-year follow-up. Patients were grouped based on surgical approach: direct lateral (Group L, n=50) and posterior (Group P, n=50). Intraoperative and postoperative parameters, including operative time, blood loss, hospital stay and complications, were recorded. Functional outcome was assessed using the Harris Hip Score (HHS) and radiological assessment included stem alignment, loosening, acetabular erosion and heterotopic ossification. Statistical analysis was performed using Chi-square and t-tests, with $p<0.05$ considered significant.
Results: Baseline demographics and injury characteristics were comparable between groups. Group L had slightly higher mean operative time and blood loss, while hospital stay and time to weight bearing were similar. Functional outcomes favored Group L, with a higher mean HHS (84.04 vs. 80.06) and greater proportion of excellent/good results (90% vs. 68%). Radiological complications were infrequent and comparable across groups.
Conclusions: Cemented modular bipolar hemiarthroplasty is effective in managing FNF in the elderly. The direct lateral approach offers superior functional outcomes, whereas the posterior approach provides shorter operative time but higher dislocation risk. Surgical approach should be individualized.

Keywords: Direct lateral approach, Femoral neck fracture, Functional outcome, Hemiarthroplasty, Harris hip score, Posterior approach

INTRODUCTION

FNF is a major public health problem in the geriatric population, accounting for nearly 20% of all osteoporotic fractures and contributing significantly to morbidity and mortality, with up to one-third of patients dying within a year of fracture.[1] Surgical management is the preferred treatment, but the optimal procedure and surgical approach remain debated.[2] While internal fixation has high rates of non-union and avascular necrosis, hemiarthroplasty has emerged as the treatment of choice for displaced FNF, offering immediate mobilization and reduced complications.[3,4] Among surgical approaches, the direct

lateral and posterior approaches are most commonly practiced.

The lateral approach provides stable fixation with lower dislocation rates, whereas the posterior approach allows easier access and shorter operative time but carries a higher risk of dislocation.[6] One year post operative functional outcome was uniformly assessed with the Harris Hip Score, a widely used scoring system for hip function worldwide.[7] It consists of four domains, pain, function, absence of deformity and range of motion. Although several studies have compared these approaches in hip arthroplasty, evidence specific to cemented modular bipolar hemiarthroplasty is limited and inconclusive.

This study aims to analyze the functional outcome of modular bipolar hemiarthroplasty performed through direct lateral and posterior approaches using the Harris Hip Score and questionnaire, while also comparing intraoperative factors such as blood loss and duration of surgery, postoperative outcomes including hospital stay, time to weight bearing, complications, radiological results and reoperation rates after one year, with findings further correlated to evidence from previous studies.

METHODS

This retrospective cohort study was conducted in the Department of Orthopaedic Surgery at Kovai Medical Centre and Hospital, Coimbatore, Tamil Nadu, after obtaining institutional ethical clearance and written informed consent. The study included 100 patients aged 51–90 years who underwent cemented modular bipolar hemiarthroplasty for fracture neck of femur between June 2018 and June 2019, with a minimum of one-year follow-up during the study period (June 2019–June 2020). Patients were categorized into two groups of 50 each, based on the surgical approach (direct lateral or posterior). Inclusion criteria were patients admitted with fracture neck of femur treated with cemented modular bipolar hemiarthroplasty and available for one-year follow-up. Patients with dementia, cognitive impairment, neuromuscular disorders, pathological fractures, prior non-ambulatory status or procedures other than cemented modular bipolar hemiarthroplasty were excluded.

All surgeries were performed by consultant orthopaedic surgeons, with intraoperative parameters (blood loss, operative duration) and immediate postoperative factors (hospital stay, time to weight bearing and complications such as DVT, PE, fractures or dislocation) collected from hospital records. At one-year follow-up, functional outcome was assessed using the Harris Hip Score, which evaluates pain, function, deformity and range of motion, with scores categorized as excellent (90–100), good (80–89), fair (70–79) or poor (<70). Radiological assessment included AP view of the operated hip with 15–20° internal rotation, evaluated for stem position, stem loosening (Gruen zones), acetabular erosion (graded 0–3) and heterotopic ossification (Brooker classification).

Data were analyzed using Microsoft Excel and R software. Descriptive statistics were expressed as mean±standard deviation for continuous variables and percentages for categorical variables. Comparisons between groups were performed using Chi-square test for categorical variables, unpaired t-test and Fisher's exact test for continuous variables, with a p value <0.05 considered statistically significant.

RESULTS

A total of 100 patients with fracture neck of femur were included in the study, with 50 patients each in the direct lateral (Group L) and posterior (Group P) approach groups. The majority of patients were in the age group of 71–80 years (41%), followed by 81–90 years (31%), with comparable age distribution between the two groups. Gender distribution was nearly equal across both groups (Male: 48%, Female: 52%). The left hip was more commonly involved (53%) compared to the right (47%), with no significant group-wise difference. Slip and fall/low-velocity trauma was the predominant mode of injury (81%), while road traffic accidents (13%) and falls from height (6%) contributed less frequently.

Transcervical fractures constituted the majority of cases (71%), followed by basicervical (16%) and subcapital (13%) fractures, with a similar distribution in both surgical approach groups. Overall, the baseline demographic and injury-related characteristics were comparable between Group L and Group P, indicating homogeneity of study population across groups (Table 1).

The intraoperative and immediate postoperative parameters were comparable between the two groups. The mean operating time was slightly longer in Group L (77.08±13.24 minutes) compared to Group P (71.3±9.44 minutes). Intraoperative blood loss was higher in Group L (195.64±15.95 mL) than in Group P (176.66±15.78 ml). The mean duration of hospital stay was marginally longer in Group L (6.00±0.925 days) than in Group P (5.76±0.715 days). Time to weight bearing was comparable in both groups, with Group L at 1.82±0.56 days and Group P at 1.92±0.528 days (Table 2). Although numerical differences were observed, these variations did not appear to be clinically significant, suggesting that both interventions offered similar intraoperative efficiency and postoperative recovery profiles.

The functional outcomes assessed by the Harris Hip Score (HHS) demonstrated overall good recovery in both groups, with some variations across specific parameters. The mean pain score was almost identical between Group L (40.28±4.41) and Group P (40.04±3.80), indicating comparable pain relief. Similarly, gait pattern/limp scores and need for support showed minimal differences between the groups (9.5±2.03 vs. 9.92±1.57 and 8.08±2.29 vs. 7.7±1.87, respectively). Group L showed slightly better performance in parameters such as distance walked (7.7±2.03 vs. 7.16±1.72) and climbing stairs (2.38±1.19

vs. 1.64±0.875), suggesting improved mobility and functional independence. Sitting comfort and ability to use public transport were similar in both groups. Absence of deformity scores were also comparable (3.76±0.959 vs. 3.68±1.09). Notably, Group L demonstrated a higher mean range of motion (ROM) score (4.42±0.609) compared with Group P (3.72±0.572), indicating a functional advantage in joint mobility. The overall mean total HHS score was higher in Group L (84.04±11.019) compared to Group P (80.06±8.13), suggesting slightly better functional outcomes with the intervention in Group L (Table 3). While the differences between groups were modest, the trend consistently favored Group L in terms of mobility-related parameters and overall hip function.

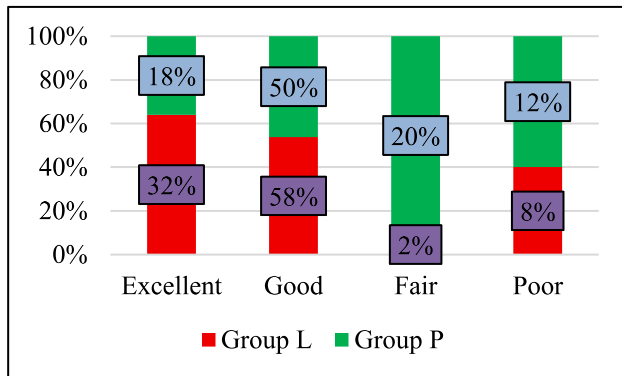

Figure 1: Bar diagram showing distribution of HHS between group L & group.

Radiological assessment revealed generally favorable outcomes in both groups. Acetabular erosion was observed in 2 cases (4%) in Group L and 4 cases (8%) in Group P, while stem loosening was reported in 3 patients (6%) in Group L and 2 patients (4%) in Group P. Heterotopic ossification occurred in a small proportion of cases, with comparable distribution between the groups (4% vs. 6%). Analysis of stem positioning demonstrated a predominantly central alignment in both groups, achieved in 45 patients (90%) in Group L and 46 patients (92%) in Group P. Malpositioning in varus was noted in 3 patients (6%) in each group, while valgus alignment was seen in 2 patients (4%) in Group L and 1 patient (2%) in Group P (Table 4). Overall, radiological complications were infrequent and comparable between the two groups. Stem positioning was satisfactory in the majority of patients, with over 90% achieving central placement, indicating good surgical accuracy and implant stability across both interventions.

Functional outcomes, as assessed by the Harris Hip Score (HHS), demonstrated differences in the distribution of results between the two groups. In Group L, 16 patients (32%) achieved excellent outcomes and 29 patients (58%) had good outcomes, with only 1 patient (2%) showing a fair and 4 patients (8%) a poor result. In contrast, Group P showed 9 patients (18%) with excellent and 25 patients (50%) with good outcomes, while a higher proportion of patients demonstrated fair (20%) and poor (12%) results (Figure 1).

Overall, 90% of patients in Group L had either excellent or good outcomes compared to 68% in Group P, suggesting a trend towards better functional recovery in Group L. Although fair and poor results were observed in both groups, their higher frequency in Group P indicates relatively less favorable outcomes in this cohort.

Table 1: Baseline characteristics of study population (n=100).

Variable	Category	Group L (n=50)	Group P (n=50)	Total (n=100)
Age group (in years)	51–60	4 (8%)	2 (4%)	6 (6%)
	61–70	12 (24%)	10 (20%)	22 (22%)
	71–80	18 (36%)	23 (46%)	41 (41%)
	81–90	16 (32%)	15 (30%)	31 (31%)
Gender	Male	24 (48%)	24 (48%)	48 (48%)
	Female	26 (52%)	26 (52%)	52 (52%)
Side	Left	28 (56%)	25 (50%)	53 (53%)
	Right	22 (44%)	25 (50%)	47 (47%)
Mode of injury	Slip & fall / low velocity	39 (78%)	42 (84%)	81 (81%)
	Road traffic accident (RTA)	8 (16%)	5 (10%)	13 (13%)
	Fall from height	3 (6%)	3 (6%)	6 (6%)
Anatomical type of fracture	Subcapital	6 (12%)	7 (14%)	13 (13%)
	Transcervical	35 (70%)	36 (72%)	71 (71%)
	Basicervical	9 (18%)	7 (14%)	16 (16%)

Table 2: Intraoperative and immediate postoperative parameters.

Variable	Group L (n=50)	Group P (n=50)
Operating time (minutes)	77.08±13.24 (Range: 60–120)	71.3±9.44 (Range: 58–90)
Blood loss (ml)	195.64±15.95 (Range: 167–232)	176.66±15.78 (Range: 148–210)

Hospital stay (days)	6.00±0.925 (Range: 4–9)	5.76±0.715 (Range: 5–8)
Time to weight bearing (days)	1.82±0.56 (Range: 1–3)	1.92±0.528 (Range: 1–3)

Table 3: Assessment of Harris hip score (HHS) parameters and total score in group L and group P.

Parameter	Group L (Mean±SD)	Group P (Mean±SD)	Total (Mean±SD)
Pain	40.28±4.41	40.04±3.80	40.16±4.09
Gait pattern / limp	9.5±2.03	9.92±1.57	9.71±1.82
Need for Support	8.08±2.29	7.7±1.87	7.89±2.09
Distance walked	7.7±2.03	7.16±1.72	7.43±1.89
Climbing stairs	2.38±1.19	1.64±0.875	2.01±1.105
Sitting in chair	4.08±1.006	4.28±0.969	4.18±0.988
Use of public transport	0.52±0.504	0.44±0.501	0.48±0.502
Absence of deformity	3.76±0.959	3.68±1.09	3.72±1.025
Range of motion (ROM)	4.42±0.609	3.72±0.572	4.07±0.685
Total HHS score	84.04±11.019	80.06±8.13	82.05±9.839

Table 4: Comparison of radiological outcomes and stem position between group L and group P.

Parameter	Group L n (%)	Group P n (%)	Total n (%)
Radiological outcomes			
Acetabular erosion	2 (4)	4 (8)	6 (6)
Stem loosening	3 (6)	2 (4)	5 (5)
Heterotopic ossification	2 (4)	3 (6)	5 (5)
Stem position			
Central	45 (90)	46 (92)	91 (91)
Varus	3 (6)	3 (6)	6 (6)
Valgus	2 (4)	1 (2)	3 (3)

DISCUSSION

In this prospective cohort study comparing 1-year functional outcomes of cemented modular bipolar hemiarthroplasty via direct lateral (DL) and posterior (P) approaches, we observed that the DL approach resulted in significantly better functional outcomes as measured by HHS compared to the posterior approach. Patients in the DL group demonstrated higher mean HHS (84.04±11.02) than those in the posterior group (80.06±8.13, p=0.0425), with superior performance in components such as stair climbing and range of motion. These findings are consistent with prior studies by Jeyaraman et al and Divya et al, which reported better functional outcomes and patient compliance with the lateral (Hardinge) approach.[1,8]

Although intraoperative blood loss and surgical duration were significantly higher in the DL group, these factors did not affect the final 1-year functional outcomes. Increased blood loss in the DL approach has been attributed to elevation and reattachment of the anterior muscle flap, a finding corroborated by Hongisto et al and Hovelius et al.[6,9] Conversely, shorter operative time in the posterior approach is due to limited muscle detachment.

Complication rates were comparable between groups, except for prosthetic dislocation, which occurred exclusively in the posterior approach group (4%). This aligns with the established literature indicating an increased risk of dislocation following posterior approach hemiarthroplasty study by Parker et al and Baber et al.[10,11] Other complications, including infection, aseptic loosening and periprosthetic fractures, did not differ significantly between approaches. Radiological outcomes, including acetabular erosion, stem positioning and heterotopic ossification, were similar in both groups, indicating that surgical approach did not influence structural implant integrity.

Demographic factors such as age and gender distribution were comparable between groups, with a slight female predominance due to higher prevalence of osteoporosis, a known risk factor for femoral neck fracture.[12-14] Mechanism of injury and fracture type were also comparable, reflecting similar baseline characteristics that could influence postoperative recovery. Overall, our findings suggest that the direct lateral approach provides superior functional outcomes at 1 year postoperatively with a lower risk of dislocation, despite longer surgical duration and greater intraoperative blood loss. These results support the selection of the direct lateral approach for bipolar hemiarthroplasty in elderly patients with femoral neck fractures, particularly where postoperative stability is a priority.

In 100 elderly patients undergoing cemented modular bipolar hemiarthroplasty, the direct lateral approach resulted in better 1-year functional outcomes (Harris Hip Score) than the posterior approach, particularly in stair climbing and range of motion. Although operative time and blood loss were higher with the lateral approach, radiological outcomes and overall complications were comparable. Dislocation occurred only in the posterior approach group.[15] Limitations include single-centre design, retrospective data collection and reliance on previously recorded intraoperative details; functional assessment using Harris Hip Score may also vary among elderly patients.

CONCLUSION

Cemented modular bipolar hemiarthroplasty is safe and effective for femoral neck fractures in the elderly. The direct lateral approach provides superior functional recovery, while the posterior approach has shorter surgery time but higher dislocation risk. Future studies with larger, multicentre cohorts are recommended to better evaluate patient-specific factors influencing the choice of surgical approach. Improved haemostatic techniques in the direct lateral approach and meticulous capsular repair with activity guidance in the posterior approach may optimize outcomes. Surgical approach can be tailored to patient activity status.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Divya V, Reddy PK. A study of comparitive analysis of the outcome of Hardinge's and Moore's approach of hemi arthroplasty of hip. International J Res Orthopaed. 2018;4(1):72.
2. Lausten GS, Vedel PE, Nielsen PM. Fractures of the femoral neck treated with a bipolar endoprosthesis. Clin Orthopaed Rel Res. 1987;(218):63-7.
3. Filipov O. Epidemiology and social burden of the femoral neck fractures. J IMAB–Annual Proceed Scient Papers. 2014;2;20(4):516.
4. Lönnroos E, Kautiainen H, Sund R, Karppi P, Hartikainen S, Kiviranta I, et al. Utilization of inpatient care before and after hip fracture: a population-based study. Osteop Int. 2009;20(6):879.
5. Chammout G, Kelly-Pettersson P, Hedbeck CJ, Stark A, Mukka S, Sköldenberg O. HOPE-trial: hemiarthroplasty compared with total hip arthroplasty for displaced femoral neck fractures in octogenarians: a randomized controlled trial. JBJS Open Access. 2019;4(2):856.
6. Hongisto MT, Nuotio MS, Luukkaala T, Väistö O, Pihlajamäki HK. Lateral and posterior approaches in hemiarthroplasty. Scandinavian J Surg. 2018;107(3):260-8.
7. Nilsdotter A, Bremander A. Measures of hip function and symptoms: Harris hip score (HHS), hip disability and osteoarthritis outcome score (HOOS), Oxford hip score (OHS), Lequesne index of severity for osteoarthritis of the hip (LISOH) and American Academy of orthopedic surgeons (AAOS) hip and knee questionnaire. Arthritis Care Res. 2011;63(11):200-7.
8. Jeyaraman M, Ravinath TM, Ajay SS, Sabarish K, Ravi Weera AV. Lateral Hardinge's versus Posterior Southern Moore's Approach in Total Hip Arthroplasty- A Prospective Cohort Study. J Clin Exp Orthop. 2019;5(2):67.
9. Hovelius L, Hussenius Å, Thorling J. Posterior versus lateral approach for hip arthroplasty. Acta Orthopaedica Scandinavica. 1977;48(1):47-51.
10. Parker MJ. Lateral versus posterior approach for insertion of hemiarthroplasties for hip fractures: A randomised trial of 216 patients. Injury. 2015;46(6):1023-7.
11. Biber R, Brem M, Singler K, Moellers M, Sieber C, Bail HJ. Dorsal versus transgluteal approach for hip hemiarthroplasty: an analysis of early complications in seven hundred and four consecutive cases. Int Orthopaed. 2012;36(11):2219-23.
12. Senohradski K, Markovic-Denic L, Lesic A, Bumbasirevic V, Bumbasirevic M. Trends in the incidence of hip fractures. Osteo Int. 2013;24(5):1759-63.
13. D'Arcy JO, Devas MI. Treatment of fractures of the femoral neck by replacement with the Thompson prosthesis. The J Bone Joint Surg. 1976;58(3):279-86.
14. Mukherjee DL, Puri HC. Early hemiarthroplasty for fresh fractures of the neck of the femur in geriatric patients. Indian J Surg. 1986;48:77-80.
15. Tol MC, van Beers LW, Willigenburg NW, Gosens T, Heetveld MJ, Willems HC, et al. Posterolateral or direct lateral approach for hemiarthroplasty after femoral neck fractures: a systematic review. HIP International. 2021;31(2):154-65.

Cite this article as: Bhaskaran NS, Ibrahim MMK, Sunny N, Raj A. Comparison of functional outcomes of modular bipolar hemiarthroplasty done in direct lateral versus posterior approaches. Int J Res Orthop 2026;12:174-8.