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Outcome of Bipolar Hemiarthroplasty in Neck of Femur Fractures

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ABSTRACT

Background and objectives: Femoral neck fractures are a major cause of morbidity, particularly in older adults. Bipolar hemiarthroplasty (BHA) is commonly used for their management due to its favorable outcomes in function and mobility. This study aimed to determine the distribution of functional outcomes after bipolar hemiarthroplasty in neck of femur fractures and assess their association with demographic and clinical variables. **Methodology:** It was a descriptive study, conducted at Department of Orthopedic Surgery, Allied Hospital, Faisalabad from: 27-Feb-25 to 27 May 2025. A total of 156 patients aged more than 65 years who underwent BHA for acute femoral neck fractures were enrolled through non-probability consecutive sampling. Patients with pre-existing hip disease (osteoarthritis/Rheumatoid arthritis), pathological fractures, non-ambulatory status prior and neuropathic or other causes of thigh or hip pain were excluded. Functional outcome was assessed at 3-month follow-up using the Harris Hip Score (HHS), categorized as excellent, good, fair, or poor. **Results:** Of the 156 patients, 47.4% achieved excellent outcomes and 31.4% had good functional outcomes. No statistically significant association was found between functional outcomes and age, gender, comorbidities, education level, socioeconomic status, implant type, or surgical approach ($p > 0.05$). Trends favored better outcomes in males, and cemented implant users. **Conclusion:** Bipolar hemiarthroplasty provides favorable short-term functional outcomes for femoral neck fractures. Although no significant predictors of outcome were identified, cemented fixation and posterior approach may offer modest functional advantages. Further studies with longer follow-up are recommended.

INTRODUCTION

Fracture of the neck of femur is among the most prevalent conditions affecting the hip joint, particularly in the elderly population. Over recent years, its incidence has markedly increased among geriatric individuals, where it represents a leading cause of morbidity and mortality.[1] Globally, hip fractures are recognized as a significant public health concern. The annual number of hip fractures is projected to reach approximately 2.6 million by 2025 and may rise to 4.5 million by 2050.[2] The treatment objectives for femoral neck fractures vary depending on patient age. In younger individuals, the primary goals include achieving early fracture union, preventing deformity, and restoring pre-injury functional capacity. In contrast, in older patients, treatment is directed toward early mobilization, functional restoration, and minimization of postoperative complications.[3] These aims are frequently accomplished through primary prosthetic interventions, most commonly in the form of bipolar hemiarthroplasty (BHA) or total hip replacement (THR).

Hemiarthroplasty remains a widely adopted surgical intervention for managing displaced femoral neck fractures in the elderly population.[4] Among the available prosthetic options, bipolar hemiarthroplasty (BHA) is often favored due to its relatively shorter operative duration, lower incidence of dislocation, and satisfactory postoperative functional outcomes. Comparative studies have demonstrated that total hip arthroplasty (THA), while associated with longer operative time and increased intraoperative blood loss compared to BHA, does not significantly affect perioperative mortality.[5] Notably, patients undergoing THA often benefit from superior early functional recovery, shorter hospital stays, and expedited mobilization.[6] However, in terms of long-term clinical outcomes, no substantial difference has been observed between THA and BHA, although THA carries a higher risk of postoperative dislocation.[5 6]

Sengodan et al[7] conducted a study to evaluate the clinical outcomes following hemiarthroplasty in patients with femoral neck fractures.[7] The majority of participants were within the 60–70-year age group, with a mean age of 65 years. Comorbid conditions were present in 53 patients, with type II diabetes mellitus being the most prevalent (52.3%). Functional outcomes were assessed using the

Harris Hip Score, which revealed that 51.9% of patients achieved excellent results, 29.8% had good outcomes, 9% had fair outcomes, and 9% were categorized as having poor outcomes.

Despite the widespread use of BHA, functional outcomes can vary based on several patient-related and surgical factors. Studies such as that by Sengodan et al. have reported varying degrees of postoperative recovery, with factors like age, comorbidities, and surgical technique influencing the results. However, there remains a lack of local data evaluating the association between these variables and functional outcomes in patients undergoing BHA. Therefore, this study is essential to evaluate the distribution of functional outcomes after bipolar hemiarthroplasty and to determine the influence of demographic and clinical factors on recovery. This will help guide clinical decision-making, improve patient selection, and enhance postoperative care strategies in the management of femoral neck fractures in the elderly.

METHODOLOGY

This descriptive study was conducted in the Department of Orthopedic Surgery, Allied Hospital, Faisalabad and other teaching hospitals associated with Faisalabad Medical University form 27-Feb-25 to 27 May 2025. A total of 156 patients were included in the study using non-probability purposive sampling. The sample size was calculated using the WHO sample size calculator, with a 95% confidence interval, anticipated proportion of 9%, and margin of error of 4.5%.

Patients of both genders, aged more than 65 years, who underwent bipolar hemiarthroplasty due to fracture of the femoral neck, were included in the study. Exclusion criteria comprised the presence of osteoarthritis or rheumatoid arthritis in the affected hip, pathological fractures, a pre-injury status of non-ambulation and neuropathic or other causes of hip pain.

The study commenced after approval from the Institutional Ethical Review Committee and CPSP. Written informed consent was obtained from all participants after explaining the study objectives and ensuring confidentiality. Eligible patients were initially stabilized, and a single dose of intravenous ceftriaxone 2 g was administered 30 minutes before surgery after performing a test dose. All surgical procedures were performed by a consultant orthopedic surgeon with at least three years of post-fellowship experience. Bipolar hemiarthroplasty was carried out using either a posterior or lateral surgical approach, based on the surgeon's discretion.

Early postoperative mobilization and weight-bearing as tolerated were integral components of the care protocol. Patients were monitored over a three-month follow-up period. Functional outcomes were evaluated using the Harris Hip Score (HHS), categorized as poor (<70), fair (70–80), good (80–90), or excellent (90–100) based on standard guidelines.

All data were recorded in a structured proforma. Statistical analysis was performed using SPSS version 25. Mean and standard deviation were calculated for continuous variables such as age and duration of surgery, while frequencies and percentages were computed for categorical variables such as gender, education, socioeconomic status, comorbidities, surgical approach, and functional outcome. The association between functional outcome and categorical variables was evaluated using the chi-square test. To control for effect modifiers such as age, gender, education, socioeconomic status, comorbidities, duration of surgery, and surgical approach, data were stratified.

RESULTS

A total of 156 patients who underwent bipolar hemiarthroplasty, the majority of patients (53.8%) were aged 65-70 years, while 46.2% were between 70-80 years. Gender distribution was nearly equal, with females slightly outnumbering males (50.6% vs. 49.4%). Most participants were illiterate (33.3%), followed by primary (25.0%), secondary (21.2%), and graduate (20.5%) education levels. Regarding socioeconomic status, 37.2% belonged to the middle class, 34.6% to the lower, and 28.2% to the higher class. Diabetes and hypertension were each present in 41.0% of patients only 17.9% had other comorbidities. Surgically, the lateral approach was more commonly used (63.5%), and cemented implants were more frequently applied (66.0%) compared to uncemented ones (34.0%). (Table 1)

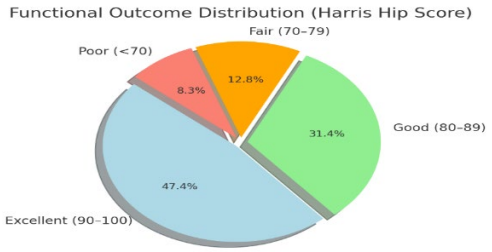
Table 1

Frequency Distribution of Categorical Variables (n = 156)

Variable	Sub-Groups	Frequency (n)	Percent (%)
Age Group	65-70 years	84	53.8
	70-80 years	72	46.2
Gender	Male	77	49.4
	Female	79	50.6
Education	Illiterate	39	33.3
	Primary	33	25.0
	Secondary	32	21.2
	Graduate	52	20.5
Socioeconomic Status	Lower	54	34.6
	Middle	58	37.2
	Higher	44	28.2
Diabetes	Yes	64	41.0
	No	92	59.0
Hypertension	Yes	64	41.0
	No	92	59.0
Other Comorbidities	Yes	28	17.9
	No	128	82.1
Approach Used	Lateral	99	63.5
	Posterior	57	36.5
Implant Type	Cemented	103	66.0
	Uncemented	53	34.0

Figure 1

Functional Outcome of Bipolar Hemiarthroplasty



The table 2 shows no statistically significant association between functional outcomes of bipolar hemiarthroplasty and any of the analyzed variables. Age, gender, education, socioeconomic status, diabetes, hypertension, and other comorbidities did not significantly influence outcomes ($p > 0.05$). Similarly, surgical approach and implant type also showed no significant effect. Although trends such as better outcomes in males, younger patients, and those receiving the posterior approach or cemented implants were observed, these differences were not statistically significant. (Table 2)

Table 2

Association Functional Outcome of Bipolar Hemiarthroplasty with Various Effect Modifiers

Variable	Group	Excellent n (%)	Good n (%)	Fair n (%)	Poor n (%)	Total (n)	P-value
Age Group	70-80yrs	37 (50.0%)	20 (40.8%)	8 (40.0%)	7 (53.8%)	72	0.656
	65-70 yrs	37 (50.0%)	29 (59.2%)	12 (60.0%)	6 (46.2%)	84	
Gender	Male	40 (54.1%)	23 (46.9%)	7 (35.0%)	7 (53.8%)	77	0.471
	Female	34 (45.9%)	26 (53.1%)	13 (65.0%)	6 (46.2%)	79	
Education	Primary	16 (21.6%)	11 (22.4%)	8 (40.0%)	4 (30.8%)	39	0.564
	Secondary	20 (27.0%)	10 (20.4%)	1 (5.0%)	2 (15.4%)	33	
	Graduate	14 (18.9%)	10 (20.4%)	4 (20.0%)	4 (30.8%)	32	
	Illiterate	24 (32.4%)	18 (36.7%)	7 (35.0%)	3 (23.1%)	52	
Socioeconomic Status	Lower	27 (36.5%)	19 (38.8%)	4 (20.0%)	4 (30.8%)	54	0.277
	Middle	32 (43.2%)	13 (26.5%)	9 (45.0%)	4 (30.8%)	58	
	Higher	15 (20.3%)	17 (34.7%)	7 (35.0%)	5 (38.5%)	44	
Diabetes	Yes	31 (41.9%)	21 (42.9%)	6 (30.0%)	6 (46.2%)	64	0.744
	No	43 (58.1%)	28 (57.1%)	14 (70.0%)	7 (53.8%)	92	
Hypertension	Yes	32 (43.2%)	18 (36.7%)	9 (45.0%)	5 (38.5%)	64	0.876
	No	42 (56.8%)	31 (63.3%)	11 (55.0%)	8 (61.5%)	92	
Other Comorbidities	Yes	10 (13.5%)	12 (24.5%)	4 (20.0%)	2 (15.4%)	28	0.470
	No	64 (86.5%)	37 (75.5%)	16 (80.0%)	11 (84.6%)	128	
Surgical Approach	Lateral	50 (67.6%)	31 (63.3%)	13 (65.0%)	5 (38.5%)	99	0.255
	Posterior	24 (32.4%)	18 (36.7%)	7 (35.0%)	8 (61.5%)	57	
Implant Type	Cemented	48 (64.9%)	33 (67.3%)	15 (75.0%)	7 (53.8%)	103	0.646
	Uncemented	26 (35.1%)	16 (32.7%)	5 (25.0%)	6 (46.2%)	53	

DISCUSSION

In our study, the majority of patients (53.8%) were in the 65–70-year age group, and a near-equal gender distribution was observed (49.4% males and 50.6% females). These findings differ from national demographic studies that report a male predominance in orthopedic trauma cases. For example, Khan et al. found that 72.9% of fracture patients over a 10-year period in a tertiary care hospital in Peshawar were male, and the most common site of fracture was the femur, comprising 38% of all fractures8. Our findings concurred with those of Ahmad et al., who identified a rising trend of neck of femur fractures in patients above 70 years of age and noted a shift toward total hip replacement (THR) in younger patients, with a reduction in the use of hemiarthroplasty in individuals aged 50–59 years9.

The etiology of fractures in our study population was not directly recorded, but regional evidence suggests that fall on floor after slipping and road traffic accidents (RTAs) are a predominant cause. Akhtar et al. reported that 12.3% of patients with femoral shaft fractures had an associated ipsilateral neck of femur fracture, most commonly due to RTAs, particularly in individuals aged 10–30 years10. Meanwhile, Lakho et al. reported a higher incidence of hip fractures in elderly females, where falls and slips were the primary cause, supporting the view that both age and gender influence the mechanism of injury11.

Bukhari et al. also confirmed a substantial national trend in Pakistan where cemented bipolar hemiarthroplasty was used in only 11.8% of cases, while uncemented stems were used in 72.8%, indicating a growing preference for uncemented fixation in local practice12.

Regarding functional outcomes, our study demonstrated that nearly 79% of patients achieved excellent or good results based on the Harris Hip Score (HHS) at 3-month follow-up. This aligns with the findings of Chiroma et al., who evaluated hemiarthroplasty outcomes in elderly patients and reported an improvement in mean HHS from 16.92 preoperatively to 80.96 at 6 months. They found that 28% of patients had excellent and 48% had good outcomes13. Moaz et al. conducted a similar prospective study on 102 elderly patients undergoing cemented modular bipolar hemiarthroplasty and reported steady improvement in HHS to 88.76 by 6 months. Their low complication rate and absence of dislocation or erosion also support the safety and efficacy of cemented prostheses14. Our study similarly observed better trends with cemented implants, although the difference was not statistically significant.

In terms of surgical technique, Yoo et al. noted a significantly higher dislocation rate in THA compared to BHA, especially in patients who were independently ambulatory prior to injury. They found cemented BHA had lower dislocation risks and acceptable functional outcomes, supporting our use of cemented fixation in the majority of cases (66%)15.(delete lines) Chatterji et al. found similar trends in a comparative study, where the HHS in BHA patients improved from a mean of 59.95 at 1 month to 75.70 at 12 months, although still lagging behind THA16.

Importantly, our findings also emphasize that patient comorbidities such as diabetes and hypertension, although present in over 40% of our cohort, did not significantly influence outcomes. Senthilnathan et al. found that despite 73% of patients having comorbidities, satisfactory outcomes were achieved in nearly all, with a mean HHS of 84.2 at 6 months17. Socioeconomic and educational status did not significantly affect the outcome in our study. However, Lucas and Faizal, in a prospective evaluation of cemented bipolar prostheses, reported a 70% rate of good outcomes and highlighted the procedure's reliability across varying patient profiles18.

Together, these findings support BHA as a safe and effective surgical option for treating femoral neck fractures across a wide age spectrum. While factors such as age, gender, and implant type showed directional trends, statistical significance was not established, indicating that proper surgical technique and postoperative care likely play a more pivotal role in determining outcomes.

One of the key strengths of this study is its relatively large sample size of 156 patients, which enhances the reliability and generalizability of the findings within the regional context. The inclusion of patients aged more than 65 years allowed assessment of outcomes across older adult populations, providing a broader perspective on the utility of bipolar hemiarthroplasty. Moreover, all procedures were performed by orthopedic consultants with at least three years of post-fellowship experience, minimizing variability due to surgical expertise. The use of a standardized and validated outcome measure — the Harris Hip Score — ensures objective and comparable assessment of postoperative function. In addition, stratified analysis was carried out for key demographic and clinical variables, helping to explore possible associations with functional outcomes and highlighting important trends even when statistical significance was not achieved.

Despite its strengths, the study has several limitations. First, the follow-up duration was limited to three months, which may not fully capture the long-term functional outcomes, prosthesis-related complications, or late recovery patterns. Longer-term follow-up would provide more insight into implant durability and patient quality of life. Second, the use of non-probability consecutive sampling introduces a potential selection bias, which may limit external validity. Third, the study did not record specific etiological data such as mechanism of injury (e.g., fall vs. RTA), which could have provided valuable context for interpreting demographic trends. Additionally, radiological assessment of implant positioning, union status, or acetabular erosion was not included, restricting the scope of outcome evaluation to clinical parameters alone. Lastly, while comorbidities were recorded, their severity or control status was not quantified, which could influence recovery outcomes.

CONCLUSION

This study confirms that bipolar hemiarthroplasty results in favorable functional outcomes in patients with femoral neck fractures, regardless of age, gender, or comorbidity status. The findings align well with national and international literature. Further multicenter studies with longer follow-up durations and detailed etiological data are recommended to refine patient selection criteria and improve postoperative outcomes.

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REFERENCES

1. Saiyam S, Uikey K, Bhalavi M, Jamre1 Y. Prospective Study of the Functional Outcome of Bipolar Hemiarthroplasty versus total Hip replacement in Elderly Patients with Fracture of the Neck of Femur by using Harris Hip Score. Asian J Pharm Clin Res. 2023; 16(9):13-15. https://doi.org/10.22159/ajpcr.2023v16i9.49070
2. Ali S, Iqbal MF, Aziz S, Qureshi As, Ahmed D. Functional outcome of bipolar hemiarthroplasty. Pak J Med Health Sci.2021;15(1):43-45.
3. Peracha MA, Tago IA, Zaur ZA, Jatoi ZA, Maher IK, Khawaja K, et al. Outcomes of Bipolar Hemiarthroplasty versus Dynamic Hip Screw Fixation in Patients with Basicervical Femoral Neck Fractures: A Randomized Controlled Trial. Ann Rom Soc Cell Biol. 2022;26(01):748-53.
4. Ramasamy V, Nallan R. Functional Outcome of Bipolar Hemiarthroplasty for Proximal Femoral Neck Fractures in Elderly: A Prospective Study. J Orthop Joint Surg. 2022;4(1):22-5. 10.5005/jp-journals-10079-1053 https://doi.org/10.5005/jp-journals-10079-1053
5. Rahman M. Outcome of Hemi Arthroplasty Using Cemented Bipolar Prosthesis in Neglected Fracture Neck of Femur in Elderly: A Study of 1156 Cases. Saudi J Biomed Res. 2021;6(5):123-8. 10.36348/sjbr.2021.v06i05.007
6. Subith S, Charthal A, Dakhode S, Naik K. Functional assessment of bipolar hemiarthroplasty versus total hip replacement in trans cervical neck fracture of femur in elderly patients-a prospective observational study. Int J Res Orthop 2023; 9:513-8. https://doi.org/10.18203/issn.2455-4510.intjresorthop20231175
7. Sengodan VC, Vadivelu SK. Clinical Outcome after Hemiarthroplasty among Patients with Fracture Neck of Femur in South Indian Population. J Orthop Joint Surg. 2021;3(2):65-9. https://doi.org/10.5005/jp-journals-10079-1037
8. Khan MA, Nasim O, Hussain Z. A Demographic Study of Fractures in Patients Presenting to A Tertiary Care Hospital in Peshawar Pakistan. J Pak Orthop Assoc. 2019;31(3):98–103. https://www.jpoa.org.pk/index.php/upload/article/view/335
9. Ahmad T, Ashraf U, Irfan O, AbdulMuhammad Z. Trends in management of neck of femur fracture. J Pak Med Assoc. 2015;65(Suppl 3):S-163. http://ecommons.aku.edu/pakistan_fhs_mc_surg_surg/149
10. Akhtar S, Shah MA, Khan A, et al. Frequency of Ipsilateral Neck and Shaft of Femur Fracture at Tertiary Care Hospital. J Saidu Med Coll. 2024;14(3):139–43. https://jsmc.pk/index.php/jsmc/article/view/894
11. Lakho MT, Bughio SA, Khan AR, et al. The Incidence of Hip Fractures in the Study Population: A Retrospective Study. Int J Curr Res Rev. 2022;14(10):68–70. https://doi.org/10.31782/ijcrr.2022.141010
12. Bukhari SI, Ali N, Saleem Ullah, et al. Trends in managing femoral neck fractures with arthroplasty in the ≥50 years age group. Pak J Med Sci. 2024;40(6):1073–6. https://doi.org/10.12669/pjms.40.6.9135

13. Chiroma MM, Ibrahim MU, Salihu MN, et al. Early Functional Outcome of Hemiarthroplasty in the Elderly with Neck of Femur Fracture: A Single Centre's Experience. J West Afr Coll Surg. 2022;12(2):40–6. https://doi.org/10.4103/jwas.jwas_109_22
14. Moaz M, Afgan S, Ahmad I, et al. Cemented Modular Bipolar Hemiarthroplasty for Displaced Femoral Neck Fractures in the Elderly. Cureus. 2024;16(11):e74604. https://doi.org/10.7759/cureus.74604
15. Yoo JI, Cha YH, Kim JT, Park CH. Clinical Outcomes of Bipolar Hemiarthroplasty versus Total Hip Arthroplasty. Hip Pelvis. 2019;31(2):63–74. https://doi.org/10.5371/hp.2019.31.2.63
16. Chatterji G, Shukla S, Singhania S, et al. A Prospective Study Comparing the Functional Outcome of Bipolar Hemiarthroplasty Versus Total Hip Replacement. Cureus. 2022;14(9):e29529. https://doi.org/10.7759/cureus.29529
17. Senthilnathan A, Ramabadran P. Functional Outcome of Bipolar Hemiarthroplasty in Fracture Neck of Femur. Sch J App Med Sci. 2014;2(5D):1785–90. https://doi.org/10.36347/sjams.2014.v02i05.060
18. Lucas A, Faizal A. Evaluation of Clinical and Radiological Outcomes in the Management of Intracapsular Fracture Neck of Femur. Cureus. 2024;16(2):e55283. https://doi.org/10.7759/cureus.55283