

Assessing Functional Outcomes and Complications in Hemiarthroplasty for Elderly Patients with Femoral Neck Fractures: A Comparative Study

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ABSTRACT:

Introduction: Hemi replacement arthroplasty is a common surgical treatment for elderly patients with a fracture of the femoral neck. The choice of surgical approach—either the direct lateral or posterior approach—can significantly influence postoperative outcomes and complication rates. While both techniques are widely used, there is ongoing debate regarding their comparative efficacy in terms of functional recovery and safety. This randomized comparative study aims to Compare functional outcome and rate of complications in direct lateral and posterior approach in hemi replacement arthroplasty of fracture neck of femur in elderly patients.

Material & Method A Randomized observational comparative study conducted to evaluate the outcome between Direct Lateral and Posterior approaches for hemi replacement arthroplasty of fracture neck of femur in elderly patients at Department of orthopaedic, tertiary care hospital from February 2021 to June 2022. All the patients beyond age of 70 years attending outpatient department and casualty with intracapsular fracture neck of femur at our hospital and giving informed consent to participate in the study. Patients were divided into two groups: Group A (direct lateral) 55 patients and Group B (posterior approach) 55 patients. They were evaluated with pre-operative X-rays of hip and femur, detailed clinical history, their ability to walk independently or with walking aids before fall, their cognitive function and their Harris Hip Scores.

Result: In a study of 110 elderly patients with intracapsular femoral neck fractures, the mean age was 78.5 ± 5.1 years. Most participants had left-sided fractures (55.45%). Blood loss was significantly lower in the direct lateral approach (mean: 355.87 ± 41.48 ml) compared to the posterior approach (mean: 436.69 ± 43.7 ml), with corresponding average hemoglobin losses of 0.78 ± 0.55 g/dL and 1.52 ± 0.45 g/dL. At 6 weeks post-surgery, the majority of participants were classified as poor, but by 12 and 26 weeks, functional outcomes improved significantly, with 84.44% achieving satisfactory to excellent Harris Hip Scores. Post-operative complications were minimal, with 92.7% and 90.9% of participants in the direct lateral and posterior approaches, respectively, experiencing no complications.

Conclusion: This study highlights the favorable outcomes of the direct lateral approach for hemiarthroplasty in elderly patients with femoral neck fractures, demonstrating significantly lower blood loss and transfusion rates compared to the posterior approach. While previous studies suggested varying findings on blood loss and complications associated with surgical approaches, our results indicate no significant differences in Harris Hip Scores across both techniques at 6, 12, and 26 weeks post-surgery. Notably, there were no dislocations in either group, possibly due to meticulous surgical techniques and patient counseling. Overall, the direct lateral approach may offer better management of intraoperative blood loss while maintaining comparable functional outcomes.

Keywords: Hemiarthroplasty, Direct Lateral Approach, Posterior Approach, Harris Hip Score, Femoral Neck Fracture

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INTRODUCTION: The hip joint is crucial for supporting the body's weight and enabling movement. It involves the femur's head and the acetabulum. Although the femur is strong, its neck is vulnerable to fractures, especially in the elderly. In older adults, factors like osteoporosis, malnutrition, lack of physical activity, poor balance, and muscle atrophy increase the risk of hip fractures, making this population particularly susceptible.¹

Fractures in and around the hip joint are among the leading causes of physical limitations and disabilities in the elderly. These injuries significantly impact mobility and independence, making them a major concern in geriatric care. The average age of patients who suffer from these fractures is around 80 years, highlighting the vulnerability of this age group to such debilitating injuries.² Elderly osteoporotic women are especially vulnerable to femoral neck fractures, which remain a

significant challenge in orthopedic surgery. The best treatment approach is still debated. If not treated promptly, these fractures can lead to severe complications, including avascular necrosis of the femoral head and non-union, which may cause lifelong deformities and drastically reduce quality of life. Early diagnosis and proper management are essential to prevent these serious outcomes.³

Approximately 20% of cases in a trauma center typically involve hip fractures. This statistic underscores the prevalence of these injuries among trauma patients, particularly in older adults, and the significant burden they place on healthcare systems.⁴ Non-displaced femoral neck fractures are typically managed through osteosynthesis. However, the majority of femoral neck fractures—approximately 85%—are displaced, with 97% of these cases occurring in patients over the age of 60. This high incidence of displaced fractures in the elderly highlights the challenges in treatment and the need for specialized care in this population.⁵

One of the important issues while treating patients with hemiarthroplasty is the type of surgical approach. Direct lateral and posterior are the most preferred approaches in interventions to the hip during hemiarthroplasty. Each approach has advantages and different spectrum of complications.

Direct lateral approach which is also called as Hardinge Approach was originally described by Bauer and his colleagues and later was popularized by Kevin Hardinge⁶. It gives the excellent exposure to the hip joint. However, it involves the incision on the abductors of the hip; which later, if impaired healing occurs can lead to persistent limp in 4-29% of the patients^{7,8}. Complications such as hematoma and seroma formation, trochanteric bursitis (5%) infection, heterotrophic ossification also seen with this approach⁹. The posterior approach is probably the most commonly used approach for total hip replacement.^{10,11} It was first described by Langenbeck and modified by Kocher¹² in 1907. Moore's description in 1957¹³ is the most popular posterior approach. It is also known as "Southern" approach

The main causes of revision surgery following hip arthroplasty are dislocation of the prosthesis, infection, and periprosthetic fractures, which have significant rates of morbidity and mortality. Prosthetic dislocation is the most common reason for resurgery. Comparison of both of these approaches is well documented in the literature yet results are contrasting. Aim of this study is compare these two approaches for hemiarthroplasty of hip and choose suitable approach with least or no complications. It briefly involves the comparative study of the rates of dislocation and the amount of blood loss in both the approaches which will lead to best functional outcome.

MATERIAL & METHOD: A randomized observational comparative study was conducted to evaluate the outcomes of direct lateral versus posterior approaches for hemi-replacement arthroplasty in elderly patients with intracapsular fractures of the neck of the femur at the Department of Orthopaedics in a tertiary care hospital from February 2021 to June 2022. The study included patients over the age of 70 who attended

the outpatient department or casualty and provided informed consent to participate. Exclusion criteria included individuals with pathological fractures, cognitive impairments, those unfit for surgery, patients with pre-existing inflammatory joint diseases (such as rheumatoid arthritis), and those with polytrauma or other fractures apart from the neck of the femur.

Methodology: Patients were divided into two groups: Group A (direct lateral) with 55 patients and Group B (posterior approach) with 55 patients. Pre-operative evaluations included X-rays of the hip and femur, detailed clinical histories, assessments of walking ability (independently or with aids), cognitive function, and Harris Hip Scores. Upon admission, patients were allocated to groups using the slip-in-box method. Both groups underwent cemented hemi-replacement arthroplasty with the same implant. Intraoperative blood loss was measured by weighing wet swabs before and after use and monitoring the suction machine (Fig 1). Postoperative blood loss was assessed by measuring drainage amounts. A standard postoperative protocol was followed for both groups. Patients were critically evaluated postoperatively with hip and femur X-rays, assessments for neurological deficits, drain output, soakage, and infection. All patients were mobilized the day after surgery with a walker and were continuously observed until discharge on the fifth day, with suture removal performed in the outpatient department. Follow-up occurred at 6 weeks, 12 weeks, and 26 weeks post-surgery, during which their Harris Hip Scores and X-rays were evaluated. Patients who missed appointments were contacted by phone, and they were instructed to report any prosthesis dislocation during the study.

RESULTS: Age distribution of the study subjects (N=110) were in the range of 69 to 89 years of age. Mean age (in years) of study subjects participating in the study was 78.5 ± 5.1 . Most of the study subjects i.e. 38 (34.5%) participating in the study were in the age group of 81-85 years, followed by 36 (32.7%) & 27 (24.5%) were in the age groups of 71-75 years & 76-80 years respectively. (**Table 1**). According to the side of the fracture involved. Among 110 participants maximum i.e. 61 (55.45%) left sided fracture & 49 (44.54%) 21 patients suffered fracture on right side. (**Fig 2**). In the direct lateral approach group, the majority of participants (45.45%) had a blood loss between 351–400 ml, followed by 35.54% with a loss between 301–350 ml, and 9.09% with losses in both the 250–300 ml and 401–450 ml ranges. No patients experienced blood loss exceeding 500 ml, with the mean blood loss being 355.87 ± 41.48 ml. In the posterior approach group, most participants (40%) had blood loss between 451–500 ml, followed by 30.9% between 351–400 ml, and 25.45% between 401–450 ml. All participants had blood loss greater than 350 ml, with a mean of 436.69 ± 43.7 ml. (**Table 2**). In the direct lateral approach group, 80% of participants experienced a hemoglobin decrease of 0.1 to 0.9 g/dL, with an average loss of 0.78 ± 0.55 g/dL, and 7% required a blood transfusion. In contrast, the posterior approach group had an average hemoglobin

loss of 1.52 ± 0.45 g/dL, with 78% of participants experiencing a decrease of 1 to 1.9 g/dL, and 45.45% needing a blood transfusion. (Fig 3) (**Table 3**).

The Harris Hip Score (HHS) was assessed at 6, 12, and 26 weeks post-surgery, classified as excellent, good, fair, or poor. At 6 weeks, no patients in either approach were rated as 'good' or 'excellent'; 69% in the direct lateral approach and 70.9% in the posterior approach were classified as poor. By 12 weeks, none in the direct lateral group were poor, with 58.18% rated as good, 38.18% as fair, and 3.63% as excellent. In the posterior group, 56.36% were good, 34.5% fair, and 9% poor, with no excellent ratings. At 26 weeks, none in the direct lateral approach were poor; 43.63% were good, 38.18% excellent, and 18.18% fair. In the posterior approach, 5.45% were still poor, while 61.81% were good, 20% fair, and 12.72% excellent. (**Table 4**). The frequency of post-operative complications showed that in the direct lateral approach, the majority of participants, 51 (92.7%), did not experience any complications. Similarly, in the posterior approach, most participants, 50 (90.9%), had no post-operative complications. A significant difference ($P < 0.05$) was found when comparing the decrease in hemoglobin and blood loss between the two surgical approaches. The unpaired t-test was used for the statistical analysis. (**Table 5**) and No significant difference ($P > 0.05$) was observed when comparing the Harris Hip Scores (HHS) between the two surgical approaches at 6, 12, and 26 weeks of follow-up. The scores ranged from 94.6 to 35. Of the hemiarthroplasties, 22% achieved an HHS of 91-100 (excellent), 40% had scores of 81-90 (good), 22% had fair or satisfactory results, and only 15.55% fell into the poor category with scores below 70. Overall, 84.44% of the hips were classified as having satisfactory to excellent outcomes.

DISCUSSION: Our study involved 110 individuals with intracapsular fractures of the neck of the femur. Consistent with previous studies, such as those by Torbjørn B. Kristensen¹⁴ (mean age 83 years, 73% female) and Roland Biber¹⁵ (average age 80.4 years, with 342/487 females in one group and 150/217 in another), we found a significant female predominance in this injury. Our findings indicate a clear advantage for the direct lateral approach concerning blood loss and postoperative transfusions. In contrast, a study by Jose Ricardo Negreiros Vicente¹⁶ reported lower total estimated bleeding (1083.5 ml vs. 1682.3 ml; $p < 0.001$) and lower intraoperative bleeding (745.6 ml vs. 1282.8 ml; $p < 0.001$) for the posterior approach during total hip replacement, not hemi-replacement arthroplasty. Similarly, GS Keene¹⁷ found greater blood loss (251 ml vs. 197 ml; $p=0.002$) and longer operative times for anterolateral approaches in hemiarthroplasty, attributing this to increased muscle damage. Contrastingly, Chan and Hotchkinson¹⁸ claimed more blood loss with anterolateral approaches, while Swapnil Bhise et al¹⁹. found no statistically significant differences in blood loss or transfusion rates between the two approaches. In our study, 41.81% of the direct lateral approach participants achieved excellent functional outcomes,

while 49% of those in the posterior group had good functional outcomes.

The mean Harris Hip Scores at 12 weeks were 79.78 for the direct lateral and 78.71 for the posterior approach ($p=0.46$), and at 26 weeks, they were 86.27 and 85.76, respectively ($p=0.72$). No significant differences were observed in HHS across both approaches after 6, 12, and 26 weeks. Previous studies, like that of S Mukka²⁰, showed similar findings with HHS scores of 71 for direct lateral and 72 for posterior approaches, while Manish Patel²¹ reported HHS scores of 90.33 for direct lateral and 92.27 for posterior approaches at 6 months ($p=0.11$). In another series by Prasad Aparajit²², HHS at one year was comparable, with scores of 85.62 for the posterior and 83.40 for the lateral approach. Literature indicates that the posterior approach carries a higher risk of complications, particularly dislocations. Rogmark et al. found a clear increase in reoperation risk due to dislocation with the posterior approach, and Stian et al²³. noted an 8-fold increased risk for dislocations compared to lateral approaches. Dislocation rates for the posterior approach range from 5.1% to 16%, depending on posterior structure repair. Remarkably, our study reported no dislocations during the immediate postoperative period or the 26-month follow-up for either group. This may be attributed to meticulous reattachment of the short external rotators and capsule to the greater trochanter in the posterior approach, along with effective patient counseling regarding dislocation avoidance.

LIMITATIONS: The study has several limitations, including a small sample size, which may limit the generalizability of the findings. Conducting the research at a single tertiary care hospital could introduce selection bias. A follow-up duration of only 26 weeks may not adequately capture long-term outcomes. Additionally, the lack of strict randomization in group allocation could affect comparability. Reliance on subjective assessments, such as the Harris Hip Score, may introduce variability, and unaccounted confounding factors, like comorbidities and surgeon experience, could influence the results. These limitations should be considered when interpreting the finding

CONCLUSION: In conclusion, this comparative study of the direct lateral and posterior approaches for hemiarthroplasty in elderly patients with femoral neck fractures demonstrates that both surgical techniques yield comparable functional outcomes, as reflected in Harris Hip Scores, with no significant differences in postoperative complications. While the direct lateral approach showed lower blood loss and transfusion rates, the overall effectiveness of both methods supports their use in clinical practice. Continued follow-up is essential to further evaluate long-term outcomes and complications associated with each technique.

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Fig 1: INTRA OPERATIVE BLOOD LOSS ASSESSMENT



Table1: Distribution of study subjects according to Age (N=110)

Age in years	Frequency	Percentage (%)
65-70	3	2.7
71-75	36	32.7
76-80	27	24.5
81-85	38	34.5
86-90	6	5.4
Total	110	99.8

Fig 2: Distribution of study subjects according to the side of the fracture involved (N=110)

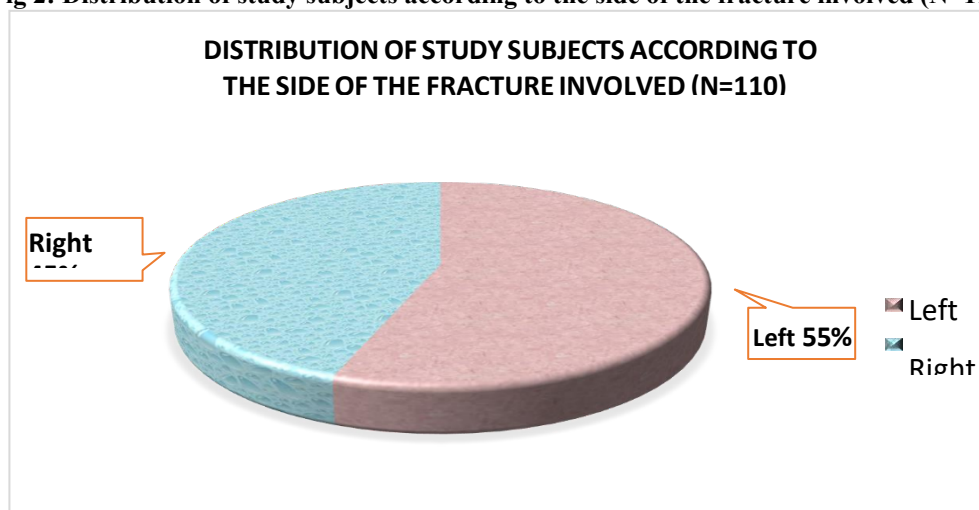
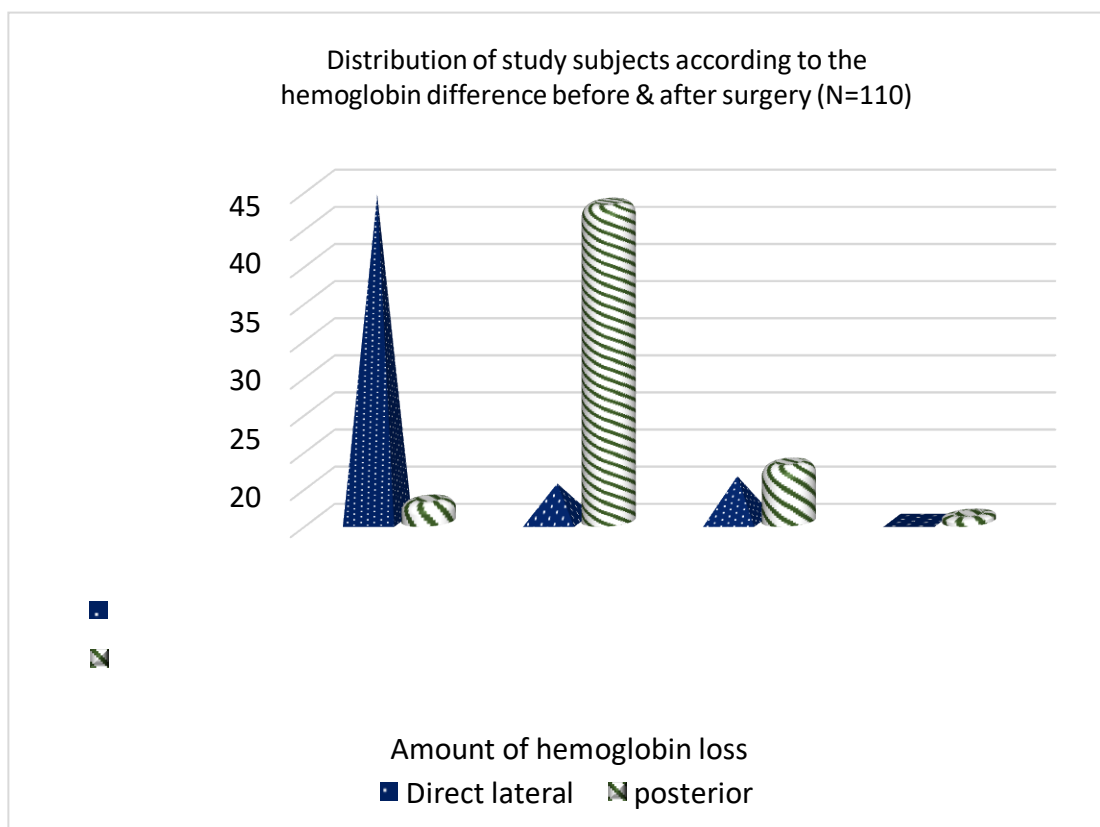


Table 2– Distribution of study subjects according to the blood loss (N=110)

Amount of blood loss (ml)	Direct Lateral (ml)		Posterior (ml)	
	Frequency	%	Frequency	%
250-300	5	9.09	0	0
301-350	19	34.54	0	0
351-400	25	45.45	17	30.9
401-450	5	9.09	14	25.45
451-500	1	1.81	22	40
501-550	0	0	2	3.63
Total	55	99.98	55	99.98

Fig 3: Distribution of study subjects according to the hemoglobindifference before & after surgery



	0	0.1 – 0.9	1 – 1.9	2 – 2.9	> 3
Direct lateral	44	44	5	6	0
posterior	3	3	43	8	1

Table 3: Distribution of study subjects according to the number of blood transfusion given (N=110)

Number of blood transfusion given	Direct lateral		Posterior	
	Frequency	Percentage (%)	frequency	Percentage(%)
0	51	92.72	30	54.54
1	4	7.27	25	45.45
Total	55	99.99	55	99.99

Table 4: Distribution of study subjects according to the Harries Hip Score

Harris Hip Score after 6, 12 and 26 weeks of follow up						
	6 Weeks		12 Weeks		26 Weeks	
	Direct lateral	Posterior	Direct lateral	Posterior	Direct lateral	Posterior
Poor	69.09	70.9	0	9.09	0	5.45
Fair	30.9	29.09	38.18	34.54	18.18	20
Good	0	0	58.18	56.36	43.63	61.81
Excellent	0	0	3.63	0	38.18	12.72

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Total	99.99	99.99	99.99	99.99	99.99	99.98
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Table 5: Comparison of Hemoglobin Decrease and Blood Loss between Direct Lateral and Posterior Surgical Approaches (Unpaired t-test, P < 0.05)

Blood loss components	Surgical approach	N	Mean	SD	P value
Decrease in Haemoglobin	Direct lateral	55	0.78	0.55	<0.05
	Posterior	55	1.53	0.45	
Blood loss	Direct lateral	55	355.87	41.48	<0.05
	Posterior	55	436.69	43.70	